Injury Free Coalition for Kids®

Forging New Frontiers:

ENGINEERING FOR EQUITY

The 29th Annual Conference of the Injury Free Coalition for Kids

December 6-8, 2024
Embassy Suites by Hilton
Ft. Lauderdale, Florida

COLUMBIA | MAILMAN SCHOOL OF PUBLIC HEALTH
CENTER FOR INJURY SCIENCE AND PREVENTION

UAB THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

This event is jointly provided by the University of Alabama Heersink School of Medicine and the Injury Free Coalition for Kids at the Columbia Center for Injury Science and Prevention (CCISP), Mailman School of Public Health, Columbia University. The University of Alabama School of Medicine is an equal opportunity/affirmative action institution.

Forging New Frontiers 2024
Engineering for Equity

The 29th Annual Injury Free Coalition for Kids® Conference
December 6-8, 2024, Embassy Suites Ft. Lauderdale

CONFERENCE OBJECTIVES

Forging New Frontiers, the annual conference of the Injury Free Coalition for Kids®, is the premier injury prevention meeting to foster collaborative research, develop best practices and address challenges in the field of pediatric injury prevention. The objectives of the December 2024 conference are to provide participants with an opportunity to:

- Expand knowledge in the field of Injury Prevention.
- Encourage and disseminate injury prevention research.
- Learn about designing, planning and building healthy communities.
- Share and explore challenges and successes in community-based injury prevention programming with a goal of helping trauma centers develop and improve injury prevention programs.
- Share information about innovative injury prevention best practices.
- Describe how trauma centers can develop and evaluate community-based injury prevention programs.
- Identify opportunities for multi-city projects and research as well as opportunities to learn more about translating research into practice in minority and resource-limited communities.
- Provide attendees with the opportunity to revitalize their creative energies in order to continue to innovate and sustain healthy communities.

ACCREDITATION

CME Credits: This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the University of Alabama Heersink School of Medicine and the Injury Free Coalition for Kids at the Columbia Center for Injury Science and Prevention (CCISP), Mailman School of Public Health, Columbia University. The University of Alabama Heersink School of Medicine is accredited by the ACCME to provide continuing medical education for physicians. The University of Alabama Heersink School of Medicine designates this activity for a maximum of 12.25 *AMA PRA Category 1 Credit(s)™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity. The University of Alabama School of Medicine is an equal opportunity/affirmative action institution.

CHES/MCHES Professional Development: Forging New Frontiers 2024 is sponsored by Injury Free Coalition for Kids, a designated provider of continuing education contact hours (CECH) in health education by the National Commission for Health Education Credentialing, Inc. This program is designated for Certified Health Education Specialists (CHES) and/or Master Certified Health Education Specialists (MCHES) to receive up to 15.75 total Category I contact education contact hours. Maximum advanced-level continuing education contact hours available are 15.75. No continuing competency CECH were approved. This event's NCHEC Provider Number is 1160428. This event's Program Number is 37760.

National Child Passenger Safety Certification Continuing Education: This program has been approved by National Child Passenger Safety Certification, a program of Safe Kids Worldwide, to offer CPS technical continuing education units. Individual sessions that qualify for CPS CEUs are indicated on the agenda. CPS technicians will self-claim up to 3 credits for the conference and will have to maintain documentation of attendance for each claimed session. (A certificate will be provided through the online Injury Free evaluations system that will satisfy this requirement.) This event's pre-approval number is 7981.

Welcome from Our Founder

Barbara Barlow, MD, FAAP, FACS

Professor of Surgery in Epidemiology
Associate Director, Center for Injury Science and Prevention
Executive Director, Injury Free Coalition for Kids
Mailman School of Public Health
Columbia University in the City of New York

Welcome to the 29th Annual Injury Free Coalition for Kids Conference. It is wonderful to see you again in Fort Lauderdale. Welcome to those of you who are here for the first time. Enjoy all the presentations which allow us to learn from each other. Please network and meet other Injury Prevention attendees who can help you develop your programs.

The Injury Free Coalition continues to grow each year from the 40 original sites. Our original PIs are now holding national leadership positions which will elevate injury prevention as a needed focus for research and program development. We applaud the hard work of the Program Coordinators and give special thanks for the hard work of Dilenny Roca Dominguez, Coordinator of Injury Free and the National Program Office, and Walter Rice who manages all our communications.

Many of you have worked hard to review abstracts, develop the Annual Meeting Program, choose papers for publication and head up our many committees. We consider all of you Injury Prevention stars. Special thanks to Dr. Monroe, Board President and Dr. Michael Levas, Program Committee Chair.

This year was the 5th year of National Injury Prevention Day. I hope you all will participate every November 18th to shine green lights and remind everyone to work for safe communities as well as participating in community events to promote safety. Injury Free has been joined by many organizations devoted to preventing injuries and make our country safe for everyone. The need for injury prevention is great and there is much work to do. It truly takes a village working together to keep everyone safe.

Share the excitement!

Tag **@InjuryFreeKids** and use **#BeInjuryFree** and **#InjuryFree2024** in your social media posts.

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Welcome from Our President

Kathy W. Monroe, MD, MSQI

Injury Free Coalition for Kids Board President
Forging New Frontiers: The Annual Conference of the Injury Free Coalition for Kids, Program Chair
PI, Injury Free Coalition for Kids of Alabama
Professor of Pediatrics, University of Alabama
Division Director, Children's of Alabama Emergency Department

It is a pleasure to welcome you to the 29th Injury Free Coalition for Kids Annual Conference, Forging New Frontiers: Engineering for Equity. The Injury Free family has continued to grow innovative strategies for injury prevention in our children's hospitals and communities. Through the publication of our annual meeting supplement in Injury Epidemiology, we continue to share our work with others.

This year our focus on "Engineering for Equity" features a keynote session with Erin Mannen, Director of the Boise Applied Biomechanics of Infants Laboratory in the Department of Mechanical and Biomedical Engineering. Her research focus is biomechanics, with particular interest in infant musculoskeletal development and safety of commercial baby products. In her lab, using electromyography sensors, motion capture technology and other testing devices developed by her team, Erin explores how babies move and use their muscles, and what that means for product development and safety. The U.S. Consumer Product Safety Commission hired her as an independent expert to conduct infant testing to evaluate the design of inclined sleep products. She and her team discovered that none of the inclined sleep products evaluated were safe for infant sleep. Her report contributed to millions of recalls for infant sleep products across the country. A new standard for infant sleep products took effect in 2022 thanks in part to her research. Kids in Danger, an organization that advocates for product safety for children, presented their Best Friend Award to Erin “for her groundbreaking infant sleep research that has led to policy changes and saved lives.”

On Saturday morning, our panel on “Get Off Your Grass: Let’s Work Together to Prevent Pediatric Lawnmower Injuries” will feature Ryan Manahl (Father of Tate and Founder of Tate’s Army Foundation); Charles Jennissen (Professor of Emergency Medicine at the University of Iowa Health Care Stead Family Children’s Hospital, David and Levi Zima (Engineers with RF Laboratories, Inc.) and John Brooks (owner/CEO Little Feet Safety Systems). This panel will discuss the dangers of lawnmower injuries and future engineering solutions.

We are excited to present this year's Pioneer Award to Dr. Karen Sheehan to honor her successful career dedicated to injury prevention. Dr. Sheehan is an MD, MPH, and a Professor of Pediatrics, Medical Education, and Preventive Medicine at Northwestern University’s Feinberg School of Medicine. She is a founding volunteer of the Chicago Youth Programs, a community-based organization that works to improve the health and life opportunities of at-risk youth. She is also Associate Chair of Advocacy for the Department of Pediatrics and Medical Director of Lurie Children’s Injury Prevention & Research Center and the Patrick M. Magoon Institute for Healthy Communities. The title of Dr. Sheehan’s keynote is “Looking Back/Forging Forward”. We are honored to hear her keynote presentation and to celebrate her lifetime commitment to injury prevention.

In addition to these exciting talks, we have added additional workshops this year. We also look forward to hearing all the amazing abstracts on work being done across the country to improve the lives of children.

Putting together an exciting conference like ours takes many dedicated colleagues. A special thanks to the members of the Program Committee for their work organizing the conference. I thank the

Scientific Publications Committee who have done an incredible job of reviewing abstracts. Thanks also go to the presenters, panelists, keynote speakers, and moderators for sharing their expertise with us. A special word of thanks to Walter Rice, DiLenny Roca-Dominguez, our co-program chair, Mike Levas and our Associate Director Dr. Danielle Laraque Arena for their hard work and dedication to Injury Free and their extensive knowledge, technical expertise, and experience in putting on this conference.

Many thanks to the National Injury Prevention Day Committee (DiLenny Roca-Dominguez, NPO and NIPD partners). Subcommittees (& chairs) of Injury Free that keep us connected all year long: the Social Media Subcommittee (Drs. Maneesha Agarwal (Atlanta, GA) and Kristyn Jeffries (Little Rock, AR), the Child Passenger Safety Committee (Adrienne Gallardo, Portland, OR), the Firearm Safety Committee (Drs. Kirsten Bechtel (New Haven, CT), Sandra McKay (Houston, TX), the Early Career Investigator Program (ECIP) (Dr. Ashley Blanchard, NYC), the Safe Sleep Subcommittee (Marybeth Vassey, Charleston, SC), the Awards Subcommittee (Dr. Steve Rogers (Hartford, CT), Lorrie Lynn (San Diego, CA) and DiLenny Roca-Dominquez (NPO). Introduced this year, the New PC Subcommittee supports new PCs professional growth and development (Founding Chair Mary Beth Vassy, Charleston, SC).

Thank you to the fabulous Garry Lapidus (Hartford, CT) for keeping our Drum Karaoke alive!

A special thanks to our fearless leader and founder, Dr. Barbara Barlow. Her dedication, wisdom, expertise, and inspiration help make this an exciting organization and conference every year. She continues to inspire, encourage, and challenge us to new heights of injury prevention.

This year, we mourned the passing of Lenita Johnson who served our organization above and beyond the call of duty for over 20 years. We will be honoring Lenita's memory by presenting the inaugural Lenita Johnson Award.

Many thanks for attending YOUR conference. Please take advantage of the many opportunities to network with both new attendees and known colleagues! When we come together and share injury prevention ideas, we are joining forces to make children safer.

Sincerely,

Keynote Speaker

Erin Mannen, PhD

Associate Professor, Mechanical & Biomedical Engineering
Director, Boise Applied Biomechanics of Infants (BABI) Lab
Boise State University
erinmannen@boisestate.edu

Dr. Erin Mannen is an Associate Professor in the Mechanical & Biomedical Engineering Department at Boise State, and Director of the new Boise Applied Biomechanics of Infants (BABI) Lab. She earned her B.S. and Ph.D. at the University of Kansas, worked as a Postdoctoral Fellow at the University of Denver, and began her faculty career at the University of Arkansas for Medical Sciences before moving to Boise in the Summer of 2020. Dr. Mannen's lab explores how babies move and use their muscles in common baby gear and orthopaedic devices, and what that movement means for safety and musculoskeletal development. Her favorite thing about the lab is the people – friendly, helpful, hard-working, and hilarious. In her free time, Erin enjoys all the outdoors adventures Idaho has to offer with her husband and two little kids.

2024 Pioneer Award

Karen Sheehan, MD, MPH

Professor of Pediatrics, Medical Education, and Preventive Medicine
Northwestern University's Feinberg School of Medicine
Medical Director, Patrick M. Magoon Institute for Healthy Communities
Associate Chair of Advocacy for the Department of Pediatrics
Medical Director of Lurie Children's Injury Prevention & Research Center

We are excited to present this year's Pioneer Award to Karen Sheehan, MD, MPH, Professor of Pediatrics, Medical Education, and Preventive Medicine at Northwestern University's Feinberg School of Medicine. She is a dedicated injury prevention researcher and a passionate advocate for children's health and well-being. Dr. Sheehan is a founding volunteer of the Chicago Youth Programs, a community-based organization that works to improve the health and life opportunities of at-risk youth.

The Chicago Youth Programs (CYP) strives to improve the health and life opportunities of vulnerable youth by providing programs that address the children's recreational, educational, and health care needs. Dr. Sheehan realized early in training that a "once-a-year well-child care visit" was not enough to improve a child's health. Getting children out of poverty has the greatest effect on their health and thus the CYP programming focuses on helping children graduate from college or trade school. For nearly 25 years, she has directed CYP's clinic, which is staffed by volunteer medical students.

Dr. Sheehan is also the Department of Pediatrics' Associate Chair of Advocacy and frequently partners with agencies such as the Chicago Park District, Chicago Department of Public Health, and Chicago Public Schools to improve child health. For example, using a multi-sector, collaborative approach, she has led city-wide injury prevention efforts in window fall prevention and playground safety. Her paper documenting neighborhood disparities in playground safety motivated the city of Chicago to commit to replacing 350 playgrounds over 5 years. She helped create the Strengthening Chicago's Youth (SCY), which is convened by Lurie Children's and connects over 3000 community partners to prevent violence by using a public health approach.

Dr. Sheehan directs the pediatric residency advocacy/population health track (called Health and Society) at the Feinberg School of Medicine. She serves as a coach for the Department of Pediatrics, Office of Faculty Development. She is the Medical Director of Lurie Children's Injury Prevention & Research Center and the Patrick M. Magoon Institute for Healthy Communities. She has published studies on safe sleep, firearm injury prevention, social determinants of health, violence injury prevention, opioid use and child maltreatment topics just to name a few.

Dr. Sheehan's research and practice have consistently focused on community engagement, ranging from using community-based participatory research to evaluate youth development programs to applying policy-system-environmental change strategies. Dr. Sheehan has held leadership positions in the Injury Free Coalition for Kids, Kids in Danger, and the American Academy of Pediatrics' former Section on Injury, Violence and Poison Prevention. Karen has been a member and leader in Injury Free Coalition for Kids since 1993. She has presented abstracts, moderated sessions, judged presentations, mentored many young injury prevention advocates and won the PI of the year award in 2022. Those who know and love her also know she is an avid swimmer and a lover of drum karaoke night!

We are so fortunate to have Dr. Karen Sheehan as an IFCK Pioneer and are looking forward to hearing her talk on "Looking Back, Forging Forward!"

2024 Principal Investigator of the Year

Marlene Melzer-Lange, MD

Professor of Pediatrics (Emergency Medicine)
Medical College of Wisconsin
Past President (2021-2023), Injury Free Coalition for Kids

Dr. Marlene Melzer-Lange has dedicated an extraordinary 45-year career to improving the health, safety, and well-being of Milwaukee's children, with a special focus on the city's most vulnerable youth. A Professor of Pediatrics at the Medical College of Wisconsin and a Pediatric Emergency Medicine specialist at Children's Hospital of Wisconsin, Dr. Melzer-Lange has been a pioneer in the field of violence prevention and adolescent health. She has served Milwaukee with a deep-rooted commitment, not only as a physician but also as a tireless advocate and a compassionate mentor to many, including her favorite mentee, Dr. Michael Levas.

In the early 1980s and 1990s, Dr. Melzer-Lange founded and directed the Teen Pregnancy Service of Milwaukee, a comprehensive program for pregnant adolescents and their children that provided crucial support and medical care for teenage mothers. Recognizing the complex needs of youth impacted by violence, she was also instrumental in the founding of Project Ujima in 1996 and served as its Medical Director from 2001 to 2020. This program, which she built in partnership with Children's Hospital, the Medical College of Wisconsin, local law enforcement, and community organizations, is the longest-standing hospital-based violence prevention initiative in the country and is widely regarded as a gold standard in violence prevention. Project Ujima serves over 300 youth and 500 adults each year, with documented improvements in quality of life, peer relations, and mental health for participating youth.

Dr. Melzer-Lange's impact on violence intervention extends nationally. Through her leadership, Project Ujima helped anchor the National Hospital Alliance for Violence Intervention, a network advancing policy and research in violence prevention. Locally, she has been equally dedicated, launching the Parklawn Peace Coalition to support violence prevention among young children and their families, as well as developing Project Staying Alive, an anti-violence curriculum for Milwaukee Public Schools. Additionally, she founded the Family Violence Program at Children's Hospital of Wisconsin, which offers essential training and education for healthcare providers on violence intervention.

Her advocacy extends to serving on various boards and councils dedicated to injury and violence prevention, including past service as President of the Injury Free Coalition for Kids and as a member of the Governor's Council on Domestic Violence Prevention. Her work has been recognized with numerous awards, including the Department of Justice's National Award for Professional Innovation in Victim Services, the American Academy of Pediatrics' Michael Shannon Humanitarian Award, the MCW President's Community Engagement Award, and the Wisconsin Medical Society Superhero of Medicine Award.

When not working, Dr. Melzer-Lange enjoys traveling with her husband, George, spending time with her grandchildren, and relaxing at her cabin in northern Wisconsin. Her life's work is a testament to her unwavering dedication to improving the lives of Milwaukee's youth, and her legacy will continue to inspire future generations of healthcare providers and community advocates.

2024 Program Coordinator of the Year

Pam Hoogerwerf, BA

Program Manager for Pediatric Injury Prevention and Community Outreach
University of Iowa Stead Family Children's Hospital

Pam Hoogerwerf is a remarkable individual whose contributions to pediatric injury prevention and safety have had a profound and lasting impact on her community, the hospital, and the state of Iowa. She has developed invaluable programs where she has educated thousands of children and families on various injury prevention topics: car passenger safety, bike safety, lawnmower injuries and many more. Pam's enthusiasm and commitment to childhood injury prevention is the reason SFCH is an Injury Free Coalition for Kids site.

One of Pam's very first endeavors was the implementation of the Safety Store which has served as a model for other institutions interested in launching their own safety store. She also serves on the Children's Hospital Association Safety Store Advisory Team where she shares her expertise and insights with other hospital programs. Pam established a safe sleep program that has expanded into the Statewide Safe Sleep Task force. She was instrumental in launching and leading several other injury prevention task forces including the All-Terrain Vehicle (ATV) Safety Task Force, the Firearm Safety Task Force, and the Lawnmower Safety Task Force, each focusing on educating the public and advocating for safety changes in their respective areas. Pam's leadership has been key to the success of these groups, each of which has made significant strides in raising awareness and reducing preventable injuries in Iowa.

Pam has also been instrumental in ensuring the sustainability of SFCH's injury prevention programs. She works tirelessly to secure grant funding for both existing programs and new initiatives, including substantial grants from organizations like Kohl's Cares for Kids, Children's Miracle Network, and Grinnell Mutual Insurance. Her ability to build lasting relationships with donors, foundations, and corporate partners has been critical in maintaining and expanding SFCH's injury prevention efforts.

In addition to her programmatic work, Pam has been an active pediatric injury prevention researcher. She has authored numerous peer-reviewed publications and contributed to studies focused on improving safety practices and reducing pediatric injuries. Pam regularly presents her findings at national, regional, and local conferences, sharing insights on the programs she has led and the research she's been involved with. Her research continues to influence policy and practice in the field of pediatric injury prevention.

Pam's legacy is defined by her ability to transform ideas into action, build effective programs from the ground up, and lead with a vision that serves both the immediate needs of her community and the long-term goals of injury prevention. She has educated thousands of children, forged invaluable partnerships, and advanced the work of injury prevention through tireless advocacy, all while serving as an exemplary leader, mentor, and friend.

In Memory of ESTELL LENITA JOHNSON

April 29, 1958 - April 12, 2024

Lenita joined the Injury Free NPO in 2000 when the program expanded to 40 sites. She had experience in radio and TV and 5 Emmys for her documentaries and was passionate about making a difference. She became Director of Marketing and Communication and worked tirelessly to create safe communities and prevent injuries. Lenita then started National Injury Prevention Day. She received a Lifetime Achievement Award in 2023 at our annual meeting. We will never forget her as we carry on.

-Dr. Barbara Barlow, Founder of Injury Free

Lenita was a one in a million person. She could manage 1000 things at once and bring together everyone on the same page! She was a personal mentor to me when I first joined IFCK and remained a great friend and mentor through the years. She made a difference for kids and for those of us who work to keep children safe.

-Dr. Kathy Monroe, President of Injury Free

Through thick and thin, Lenita was always striving with determination and joy to ride out the many storms IFCK faced. She made us all look good.

-Dr. Michael Hirsh, Injury Free Worcester

Lenita was a phenomenal supporter of Injury Free and an amazing human being! Just another reminder of how precious life is. She will be missed.

-Dr. Wendy Pomerantz, Injury Free Cincinnati

Lenita was the first person I met at my first meeting at Injury Free. She made me feel included and put me to work. I will always think of her as my first PC mentor and a dear friend.

-Lorrie Lynn, Injury Free San Diego

Lenita truly embodied the spirit and intent of Injury Free. Through her deeds and words, she showed us all how to live a life of intention, meaning, love, and generosity of spirit. The Injury Free community would not be what it is today without her. And we can all contribute to continuing her legacy.

-Dr. Lois Lee, Injury Free Boston

Schedule at a Glance

Thursday, December 5

4:00-7:00pm	Registration	Grand Salon E/F

Friday, December 6

7:00 am	Registration	Grand Salon E/F
8:00 am	Welcome & Logistics	Grand Salon A/B/C/D
8:15 am	**Keynote: Erin Mannen**	**Grand Salon A/B/C/D**
9:15 am	Platform Presentations: Drowning Prevention	Grand Salon A/B/C/D
10:30 am	Coffee Break	Grand Salon E/F
10:40 am	Platform Presentations: Firearm Injury Prevention	Grand Salon A/B/C/D
11:55 am	Lunch / Topic Tables	(will be announced)
1:00 pm	Friday Lightning Round Presentations	Grand Salon A/B/C/D
1:40 pm	Friday Poster Session	Grand Salon E/F
2:00 pm	Workshop Sessions 1A, 1B, 1C, 1D	(see agenda)
3:00 pm	Workshop Sessions 2A, 2B, 2C, 2D	(see agenda)
4:00-5:00 pm	PI Meeting PC Meeting	Grand Salon C Grand Salon A/B
6:00-7:00 pm	Reception	Terra/Aqua
7:00 pm	Board of Directors Meeting	Gulfstream

Saturday, December 7

7:00 am	Registration	Grand Salon E/F
8:00 am	**Keynote Panel Discussion: "Get Off Your Grass!"**	**Grand Salon A/B/C/D**
9:00 am	Platform Presentations: Safe Sleep	Grand Salon A/B/C/D
10:15 am	Coffee Break	Grand Salon E/F
10:25 am	Saturday Lightning Round Presentations	Grand Salon A/B/C/D
11:00 am	Poster Session	Grand Salon E/F
11:30 am	**Pioneer Award Presentation and Keynote: Karen Sheehan**	**Grand Salon A/B/C/D**
12:30 pm	Lunch	Atrium
1:30 pm	Platform Presentations: Injury Prevention Programs	Grand Salon A/B/C/D
2:45 pm	Break	
3:00 pm	Workshop Sessions 3A, 3B, 3C, 3D	(see agenda)
4:00 pm	Group Meetings: Safe Sleep, Firearm, IAMSBIRT, NIPD	(see agenda)
5:00 pm	Group Meetings: CPS, ECIP	(see agenda)
6:30 pm	Reception/Cocktail Hour	
7:30 pm	Banquet Dinner and Awards Presentation Drum Karaoke featuring the *Lapido Sound Machine!*	Causeway

Sunday, December 8

8:15 am	Group Meeting: Social Media	
8:30 am	Business Meeting	Grand Salon A/B/C/D
9:00 am	Platform Presentations: Other Injury Prevention Topics	Grand Salon A/B/C/D
10:15 am	Break	
10:30 am	Sunday Lightning Round Presentations	Grand Salon A/B/C/D
11:15 am	Poster Session	Grand Salon E/F
12:00 pm	Adjournment	

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Conference Agenda

Thursday, December 5, 2024

4:00 pm

SALONS E/F
Registration

Friday, December 6, 2024

7:00 am

SALONS E/F
Registration

8:00 am

SALONS A/B/C/D
Welcome & Logistics

8:15 am

KEYNOTE — SALONS A/B/C/D
The Biomechanics of Infant Product Safety
0.75 CME/1.0 CHES CREDIT HOURS

Erin Mannen, PhD
Associate Professor, Mechanical & Biomedical Engineering
Director, Boise Applied Biomechanics of Infants (BABI) Lab
Boise State University
erinmannen@boisestate.edu

9:15 am

PLATFORM PRESENTATIONS — SALONS A/B/C/D
Drowning Prevention
1.0 CME/1.25 CHES CREDIT HOURS

Moderators:
Kristyn Jeffries, MD, MPH
Brent M. Troy, MD, MPH, FAAP

A retrospective study of drowning victims presenting to a pediatric emergency department
Jamie Holland, MD

Child Drowning Data Collection Tool
Jaya Bhalla, BS
Phyllis Agran, MD, MPH

Economic Burden of Pediatric Drowning in Texas
Rohit P. Shenoi, MD

Making Waves: Understanding Previous Local Drowning Data to Inform Future Prevention
Victoria Thompson, DO
Micaela Parson, MS4

Studying the epidemiology of drowning from media reports using artificial intelligence
Aedan Villegas, BS
Rohit P. Shenoi, MD

Parental Perspectives on Water Safety Challenges for Children with Autism
Barbara D. Cosart, MLIS, MPH, CHES
Molly B. Johnson, M.AmSAT, PhD

10:30 am

SALONS E/F

Coffee Break

10:40 am

PLATFORM PRESENTATIONS — SALONS A/B/C/D

Firearm Injury Prevention

1.0 CME/1.25 CHES CREDIT HOURS

Moderators:
Narmeen Khan, MD
Jonathan Green, MD, MSCI

National Trends and Disparities for Firearm and Motor Vehicle Crash Deaths from U.S. Youth 2011-2021: the Intersection of Age, Sex, Race, and Ethnicity
Lois K. Lee, MD, MPH, FACEP, FAAP

Extreme Risk Protection Orders for Firearm-Related Harm Prevention in Pediatrics: Results from a Survey of New York State Pediatricians?
Nina Agrawal, MD
Pallavi Arora, MPH, MA

Gun Violence Exposures Impact on Urban Youth School Performance
Kiesha Fraser Doh, MD

We Ask Everyone? Utilization of Universal Screening for Firearm Injury Risk Among Pediatric Trauma Patients
Emma Cornell, MPH

Creation of a Multidisciplinary Team to Combat Firearm Injuries
Jennifer E. McCain, MD

Improving Awareness and Utilization of Safety Net Resources After Extremity Firearm Injury
Colleen M. Moreland, DO

11:55 am

Lunch / Topic Tables

We will be hosting Table Topics this year in which you may choose a table where you will enjoy your lunch and have a lively discussion with leaders in the field. Please bring your questions and work experiences to share with the group in these informal interactive sessions. This time is meant to be useful for networking and sharing between sites on topics of injury prevention activities.

Child Passenger Safety
Adrienne R. Gallardo, BSW, MAOM, CPST-I
Victoria Pennington, LMSW, CCLS, CPST
Dex Tuttle, M.Ed., CPST-I

Hospital Support for Injury Prevention
Maneesha Agarwal, MD, FAAP
Salvador Vargas, CPST-I

Suicide Prevention
Steven C. Rogers, MD, MS-CTR

Funding
Karen Sheehan, MD, MPH
Kathy W. Monroe, MD, MSQI

Firearm Safety
Lindsay D. Clukies, MD, FAAP
Amanda Batlle, MSN, RN, CPNP-PC, NPD-BC

Safe Sleep
Lois K. Lee, MD, MPH, FACEP, FAAP
Gina S. Lowell, MD, MPH

Violence Prevention Programs
Michael Levas, MD, MS

Drowning Prevention
Rohit P. Shenoi, MD
Lorrie Lynn, MA, CPSTI

Legislative Advocacy
Charles W. Pruitt, MD
Sofia Chaudhary, MD, FAAP

1:00 pm

LIGHTNING ROUND PRESENTATIONS — SALONS A/B/C/D

Friday Lightning Round

0.5 CME/1.0 CHES CREDIT HOURS

Moderators:
Jamie Holland, MD
Sofia Chaudhary, MD, FAAP

Suicide and COVID-19: Analyzing Suicidal Behaviors in Youth after COVID-19 Related Deaths in the Community
Karolina Kalata, BS

Equitable Concussion Monitoring: Exploring a Generalizable Model in New York State High Schools
Sarah Frances, BS

Clinical Factors to Predict Methamphetamine Ingestion
Lauren Brewer, MD

Development of an Evidence-based Safer Prescribing Toolkit for Clinical Care
Taylor Hautala, MPH

Utilizing Child Abuse Death Review (CADR) Data to Implement Statewide Prevention Initiatives
Brenna Radigan
Symone Ferguson
DeShanta Richardson

Transition from Safety Center Based Education to Bedside Trauma Rounding for Injury Prevention Education
Amber Kroeker, MPH, CPST
Emily Dicksa, MaT, BSPH, CPST

Vehicle architecture and child restraint design influence the position of children treated with hip spica casts
Kristy Brinker Brouwer, MS, CPST

1:40 pm

POSTER SESSION — SALONS E/F

Friday Poster Session

2:00 pm

WORKSHOP SESSION 1A — GULFSTREAM

Climate Change: What's the Injury Risk?

1.0 CME/CHES CREDIT HOURS

Judy Schaechter, MD, MBA
Monica Cardenas, MD
Cheryl Holder, MD
Lois K. Lee, MD, MPH, FACEP, FAAP

WORKSHOP SESSION 1B — SALONS A/B

Using Quality Improvement Methods to Enhance an Injury Prevention Program

1.0 CME/CHES CREDIT HOURS

Narmeen Khan, MD
Brooke Cheaton, MBA
Pnina Goldfarb, PhD
Michael Levas, MD, MS
Rada Drca, MA, LPC
Savannah Olsen, MSW, APSW

WORKSHOP SESSION 1C — SALON C

★CPS

Car Seat Product Development: Why Can't You Just Do [This]?

INELIGIBLE FOR CME CREDIT — 1 CPS CEU

Sarah Haverstick, CPST-I

WORKSHOP SESSION 1D — SALON D

A Workshop in Addressing Adolescent Relationship Abuse

1.0 CME/CHES CREDIT HOURS

Katelin Blackburn, MD, MPH
Felicia Scott-Wellington, MD

3:00 pm

WORKSHOP SESSION 2A — SALON C ★CPS

Safer Car Seats: The Impact of 3 New Regulations

1.0 CME/CHES CREDIT HOURS — 1 CPS CEU

Joseph M. Colella, CPST-I

WORKSHOP SESSION 2B — SALONS A/B

Love and happiness: Building and sustaining a career at a pediatric academic medical center

1.0 CME/CHES CREDIT HOURS

Garry Lapidus, PA-C, MPH

WORKSHOP SESSION 2C — GULFSTREAM

What TiKtok Taught Me About Safe Sleep: Rethinking Sudden Unexpected Infant Death Messaging to Adolescent Parents and Caregivers

1.0 CME/CHES CREDIT HOURS

Felicia Scott-Wellington, MD
Gina S. Lowell, MD, MPH
Eliot England, MPH

WORKSHOP SESSION 2D — SALON D

Injury Prevention Considerations for Youth Resettling in the United States

1.0 CME/CHES CREDIT HOURS

Sofia Chaudhary, MD, FAAP
David Greenky, MD
Amy Zeidan, MD
Brittany Lee Murray, MD, MPhil
Esther Kim, MD
Lin Snowe, CPST-I

4:00 pm

SALON C

PI Meeting

SALONS A/B

PC Meeting

6:00 pm

TERRA/AQUA

Reception

7:00 pm

GULFSTREAM

Board of Directors Meeting

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Saturday, December 7, 2024

8:00 am

PANEL DISCUSSION — SALONS A/B/C/D

Get Off Your Grass: Let's Work Together to Prevent Pediatric Lawnmower Injuries

1.0 CME/CHES CREDIT HOURS

Panelists:

Pam Hoogerwerf, BA
Program Manager for Pediatric Injury Prevention and Community Outreach
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pamela-hoogerwerf@uiowa.edu

Ryan Manahl
Father of Tate
Founder of Tate's Army Foundation
rmanahl@gmail.com

Charles Jennissen, MD
Professor of Emergency Medicine and Pediatrics
Department of Emergency Medicine
University of Iowa Healthcare
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David Zima
Engineer
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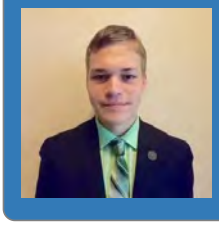

Levi Zima
Engineer
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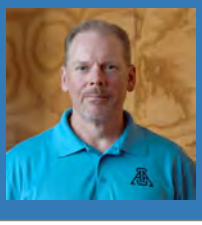

John Brooks
Owner/CEO
Little Feet Safety Systems
john@littlefeetsafetysystems.com

9:00 am

PLATFORM PRESENTATIONS — SALONS A/B/C/D

Safe Sleep

1.0 CME/1.25 CHES CREDIT HOURS

Moderators:
Lorrie Lynn, MA, CPSTI
Marisol Nieves, LCSW, CPST

A Quality Improvement (QI) Initiative: An Emergency Department (ED) Based Safe Sleep Screening to Improve Access to Safe Sleep Resources and Education
Elizabeth Hendrickson, MD

Reducing sudden unexpected infant deaths using innovative approaches
Joanna O'Donnell, BA, GC-C

Building a Birth Hospital Learning Community to Prevent Sudden Unexpected Infant Death
Christie Lawrence, DNP, RNC-NIC, APN/CNS

Sleeping Safely: A Program to Promote Safe Sleep Practices and Empower Families.
L'Mara Thomas, BA

Supporting Safe Sleep in Emergency Shelter Settings for Migrants in Chicago
Gina S. Lowell, MD, MPH

An Equity Advisory Committee to Support the Work of a Community Facing Injury Prevention Organization
Joseph L. Wright, MD, MPH
Sadiqa A. I. Kendi, MD, MPH, CPST

10:15 am

SALONS E/F

Coffee Break

10:25 am

LIGHTNING ROUND PRESENTATIONS — SALONS A/B/C/D

Saturday Lightning Round

0.5 CME/1.0 CHES CREDIT HOURS

Moderators:
Caitlin Farrell, MD
Pam Hoogerwerf, BA

From birth to death: the intersection of social vulnerability and pediatric injury fatalities
Sofia Chaudhary, MD, FAAP

Evaluating Safety Baby Showers as an Approach to Improve Parental and Pediatric Resident Practice of Infant Injury Prevention
Shannon Coleman, MD

Pediatric Helmet Use and Fit on an Urban Bikepath - The Impact of Educational Intervention on Helmet Fit
Jordan Couceyro, MD

Safe System Approach to Preventing Cyclist Fatalities: Safety by Design for Urban and Rural Environments
Tanya Charyk Stewart, MSc

Bike Helmet Usage in the Most Disadvantaged Neighborhoods: A Focused Area for Trauma Prevention
Owen S. Henry, MD

Rural Adolescent Attitudes and Use of Bicycle Helmets in Iowa
Shannon Landers, MS

Pediatric Hospital Admissions for Unintentional Drowning in Bathtubs in Central Texas
Molly B. Johnson, M.AmSAT, PhD

11:00 am

POSTER SESSION — SALONS E/F

Saturday Poster Session

11:30 am

KEYNOTE — SALONS A/B/C/D

Pioneer Award Keynote: Looking Back/Forging Forward

0.75 CME/1.0 CHES CREDIT HOURS

Karen Sheehan, MD, MPH
Professor of Pediatrics, Medical Education, and Preventive Medicine
Northwestern University's Feinberg School of Medicine
Medical Director of the Patrick M. Magoon Institute for Healthy Communities
Associate Chair of Advocacy for the Department of Pediatrics
Medical Director of Lurie Children's Injury Prevention & Research Center
ksheehan@luriechildrens.org

12:30 pm

ATRIUM

Lunch

Share the science!

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1:30 pm

PLATFORM PRESENTATIONS — SALONS A/B/C/D

Injury Prevention Programs

1.0 CME/1.25 CHES CREDIT HOURS

Moderators:
Elizabeth Hendrickson, MD
Adrienne R. Gallardo, BSW, MAOM, CPST-I

Pop-Up Safety Town: Pediatric Injury Prevention Education Reimagined
Jamie Holland, MD

Back to School Programming in a Large Metropolitan Area
Melissa H. Kwan, MD, FAAP

Empowering Tomorrow's Child Advocates through the Trainees for Child Injury Prevention (T4CIP) Program
Kristyn Jeffries, MD, MPH

Injury Prevention for Children and Teens: A free, innovative, choose-your-topic approach to delivering an online pediatric injury prevention course to a global audience
Jill Solomon, MPH, CHES

Strengthening the Safety Net: Piloting a Hospital-Based Violence Intervention Program within a Level 1 Pediatric Trauma Center
Olivia Frank, MPH

Florida's Poison Control Centers Treat, Educate & Prevent
Wendy Blair Stephan, PhD, MPH

2:45 pm

Break

3:00 pm

WORKSHOP SESSION 3A — GULFSTREAM

The Struggle is Real: Starting and Maintaining a Firearm Safe Storage Program at Your Institution

1.0 CME/CHES CREDIT HOURS

Kirsten Bechtel, MD
Lindsay D. Clukies, MD, FAAP
Sandy McKay, MD, FAAP
Isabell Sakamoto, MS, CHES
Sofia Chaudhary, MD, FAAP

WORKSHOP SESSION 3B — SALONS A/B

To the Core...Standards and Indicators for Injury and Violence Prevention Programs

1.0 CME/CHES CREDIT HOURS

Sarah Beth Abbott, BS, EMT-LP
Christa Thelen, MA, CHES

WORKSHOP SESSION 3C — SALON C

Using the Injury Equity Matrix to Surface SUID Prevention Recommendations

1.0 CME/CHES CREDIT HOURS

Gina S. Lowell, MD, MPH
Kyran P. Quinlan, MD, MPH
Felicia Clark, D-ABMDI
Christie Lawrence, DNP, RNC-NIC, APN/CNS

WORKSHOP SESSION 3D — SALON D

Empowering Safety: Inclusive Practices for People with Disabilities

1.0 CME/CHES CREDIT HOURS

Adrienne P. Robertiello, BS, ACDS

4:00 pm

SALONS A/B
Safe Sleep Group Meeting

GULFSTREAM
Firearm Group Meeting

SALON C
IAMSBIRT Group Meeting

SALON D
NIPD Group Meeting

5:00 pm

CHILD PASSENGER SAFETY GROUP MEETING — GULFSTREAM ★CPS
The future is upon us: Automated driving keeps families safer
1 CPS CEU (NO CME/CHES CREDIT HOURS)
Kristy Brinker Brouwer, MS, CPST
Joseph M. Colella, CPST-I

ROOM 209
Early Career Physicians Group Meeting

6:30 pm

Reception/Cocktail Hour

7:30 pm

Banquet Dinner and Awards Presentation
Drum Karaoke featuring the Lapido Sound Machine!

Sunday, December 8, 2024

8:15 am

Social Media Group Meeting

8:30 am

SALONS A/B/C/D
Business Meeting

9:00 am

PLATFORM PRESENTATIONS — SALONS A/B/C/D
Other Injury Prevention Topics
1.0 CME/1.25 CHES CREDIT HOURS

Moderators:
Holly R. Hanson, MD, MS
Alicia Webb, MD

Rural Iowa Adolescents' Use, Knowledge and Attitudes Regarding ATVs on Public Roads
Cole Wymore, BS

Drowning Among 1–4-Year-Old Children in California, 2017-2021
Phyllis Agran, MD, MPH
Jaya Bhalla, BS

A Window of Opportunity: Understanding Pediatric Falls Using Area Deprivation Index
Romeo C. Ignacio, MD, MS, MPath, FACS, FAAP

Mapping the Association Between Pediatric Injuries During Activities Where Helmet Use is Recommended and the Child Opportunity Index
Brent M. Troy, MD, MPH, FAAP

Child Passenger Safety Program for Autistic Youth with Unsafe Car Behavior: A Program Description
Shea Buckley, MEd, BCBA, CPST

Utility Task Vehicle Crashes and Injuries in Iowa
Parker Sternhagen

10:15 am

Break

10:30 am

LIGHTNING ROUND PRESENTATIONS — SALONS A/B/C/D

Sunday Lightning Round

0.75 CME/1.5 CHES CREDIT HOURS

Moderators:
Marlene Melzer-Lange, MD
Charles Jennissen, MD

Contributing factors for pediatric bystander lawn mower-related injuries: A qualitative study
Mikayla Gibson, BS

Adolescent Driving Intentions and Licensure by Neighborhood Opportunity
Maura Powell, MPH, MBA

Preventing firearm injuries in children: a nationwide survey of safe storage device distribution
Kelsey Schoenmeyer, BS

Understanding Sudden Unexpected Infant Death during Temporary Living Situations
Eliot England, MPH

Referral pattern for Pediatric Trauma Patients at a Level 1 Trauma Center
Rachel Eisenhauer, BS

Using the Safe System Framework to Examine Pediatric Mortality on U.S. Roadways Pre-Covid-19 and in Covid-19 Era
Joyce C. Pressley, PhD, MPH

Safety Quest- A Mobile Classroom Experience
Dominick Dunbar, BS, CPST
Asia Simpson, BS, CPSTI

Opioid Overdose Prevention and Harm Reduction Program
Isabell Sakamoto, MS, CHES

Statewide Child Restraint Distribution
Michael Chappell, CPST-I

11:15 am

POSTER SESSION — SALONS E/F

Poster Session

12:00 pm

SALONS E/F

Boxed Lunch

Adjournment

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Thank you **Social Media Committee** for your great content and dedication to increase the visibility of Injury Free and injury prevention to professionals and parents across the country. Interested in supporting this important work through social media or in another way? Scan the QR code to sign up! **#BeInjuryFree**

Session and Presentation Abstracts

KEYNOTE

The Biomechanics of Infant Product Safety

Friday, December 6, 2024, 8:15 AM to 9:15 AM

Erin Mannen, PhD
Associate Professor, Mechanical & Biomedical Engineering
Director, Boise Applied Biomechanics of Infants (BABI) Lab
Boise State University
erinmannen@boisestate.edu

Infants in the US spend an average of six hours a day in various infant products, and tragically, dozens of infants lose their lives in these products each year. Infants are particularly vulnerable to the mechanical environments in which they are placed. Products like swings, bouncers, and rockers position babies in ways that affect breathing through body posture and how their faces interact with soft materials. Design factors can pose serious risks to normal respiration. We will explore three key biomechanics studies that reveal how design features in infant products impact body position and movement, elucidating biomechanics-related hazards. The ultimate goal of this research is to identify suffocation and asphyxiation risks, paving the way for safer baby products.

Objectives:
1. Recognize the unique biomechanical vulnerabilities of infants and their implications for injury.
2. Identify the biomechanical hazards associated with inclined products and their impact on posture, movement, and injury risk.
3. Examine product design features that pose suffocation hazards and learn how to identify and mitigate these risks.
4. Explore messaging strategies for promoting the safer use of infant seated products.
5. Analyze age-related biomechanical risk factors for positional asphyxiation and the implications for infant product use.

PLATFORM PRESENTATIONS

Drowning Prevention

Friday, December 6, 2024, 9:15 AM to 10:30 AM

Session Description: Drowning is a leading cause of unintentional severe injury and death in the United States. Throughout this session, we aim to further examine pediatric drowning encounters in pediatric emergency departments while also incorporating artificial intelligence to better understand this population. We will learn about parental perspectives on patients with autism in relation to their risk of drowning while also evaluating the economic burden of pediatric drownings. Additionally, we will look at methods to improve pediatric drowning data collection during hospital visits to help guide prevention strategies.

Learning Objectives:
1. Identify risk factors for pediatric drownings using data sources in local communities.
2. Understand how child drowning surveillance can help improve state data collection of drowning events.
3. Describe the significant economic burden of fatal and non-fatal pediatric drownings.
4. Explore the benefits and limitations of using artificial intelligence for drowning surveillance.
5. Examine the challenges and opportunities for drowning prevention for children with autism.

Moderators:

Kristyn Jeffries, MD, MPH
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Brent M. Troy, MD, MPH, FAAP
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A retrospective study of drowning victims presenting to a pediatric emergency department

Jamie Holland, MD
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Authors: *Jamie Holland, MD; Wendi Wendt, MD*

Background: Drowning is the leading cause of death in children ages 1 to 4 and is the second leading cause of unintentional injury related death in adolescents ages 5 to 14 in the United States. Prior works have reported that rates of drowning death vary with age, sex, and race. In addition, age has been found to be an important determinant of drowning location, with infants being more likely to drown in bathtubs and buckets, preschool-aged children being more likely to drown in swimming pools, and older children and adolescents being more likely to drown in natural bodies of water.

This study aims to describe encounters for patients presenting to a single emergency department after a drowning event to identify possible risk factors for these events to help target future interventions.

Methods: We performed a retrospective chart review for a single tertiary-care, academic emergency department from November 2012 to June 2023, including patients age 0-17 presenting after a drowning event. Data collected included both patient specific information, as well as details of the drowning or submersion event. Summary statistics were used for descriptors, whereas Chi-Square, Wilcoxon, and Kruskal-Wallis tests were used for comparisons.

Results: We identified 161 children presenting for care after a drowning event. The median age for patients was 4.0 years, with a greater proportion being male (53.4%). When a location was listed, drownings most often occurred around the home (16.1%), at a natural body of water (16.1%), or at a hotel pool/spa (14.9%). Saturday was the most common day for drowning events to occur (28.0%). When separated by age, patients 0-4 years were more likely to drown around the home compared to older children. Patients >4 years were more likely to drown at private pools and hotel pools/spas compared to younger children. Public pools and natural bodies of water posed a drowning risk for children of all ages.

For the majority of patients (59.0%), a parent or family member was identified as being the supervisor at the time of the drowning event. The rescuer was most often a parent or family member (49.1%), followed by a bystander (15.5%).

Conclusions: Similar to prior studies, our results found that young children, as well as males are at highest risk for drowning events. With regards to event details, we identified natural bodies of water, specifically Lake Michigan, as a common location for drowning events. In addition, our findings highlighted the dangers of hotel pools/spas that do not have lifeguards on duty and are frequently locations for parties and gatherings where supervisors may easily become distracted. Parents and family members were often both the supervisor and the rescuer at the time of these drowning events. Results from this project may be used to shape future drowning prevention efforts and lead to improved water safety in our community.

Objectives:
1. Recognize the frequency of drowning related deaths in children and the impact it has on our communities
2. Discuss possible risk factors for pediatric drowning events
3. Emphasize the need for further drowning prevention efforts to promote water safety for children

Child Drowning Data Collection Tool

Jaya Bhalla, BS
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Departments of Pediatrics and Emergency Medicine
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Authors: *Phyllis Agran, MD, MPH; Van Greco; Diane Winn; Jaya Bhalla, BS; Nakia Best; Romeo Ignacio; Chaksu Soni; Soheil Saadat; Shahram Lotfipour*

Background: Drowning is the leading cause of unintentional injury death among U.S. and California 1-4-year-old children. The California EpiCenter Injury database provides information on rates of childhood drowning over time by victim demographics and location. However, addressing limitations to adequately inform prevention requires improved documentation of key variables for specific ICD-10 CM coding. Our goal is to improve data documented in medical records by creating a data collection tool that can be used in the hospital setting. Specific objectives were to 1) determine key elements for hospital-based record documentation and create a data collection tool; 2) review a sample of cases to indicate documentation gaps; and 3) create a simple guide for data collection and local surveillance.

Methods: We reviewed child drowning surveillance and data collection tools used at the national, state, and local levels, and produced a reference table and a “Flowchart: Outcomes and Sources of Data for Drowning Incidents” indicating portals for hospital record data entry. A team of healthcare experts participated in the development of the data collection tool. We then conducted a retrospective review using a convenience sample of 12 hospital records to identify data element gaps. We then developed the “Child Drowning Surveillance Guide.”

Results: Portals of data entry for drowning cases were identified. The retrospective chart review of participant facilities revealed the following. General demographic information was well documented except for gaps in race

(67%) and ethnicity (42%). Incident narratives included the location of the pool (documented in 92% of cases), child location prior to the event (83%), pool access (75%), and supervisor location (100%). Shortcomings included safety device (25%) and pool fence (33%) descriptions. All cases had a Social Worker consult.

Conclusions: Gaps identified in the state database resulting in "unspecified" and "unknown" codes that provide no further context to the drowning incident, such as location, can be addressed by improved hospital discharge data ICD-10 CM coding. However, ICD-10 code limitations call for more comprehensive surveillance systems. Our surveillance guide can be used for hospital documentation/surveillance, physician, nurse, and social worker training; child death team case review; and, social worker and home visitation professionals charged with assisting with a family safety plan to prevent drowning incident recurrence. The California Legislature found a solution to the statewide drowning data collection gap through the implementation of SB 855 (Newman, Ch. 817, Stat. 2022: Childhood Drowning Data Collection Pilot Program). This bill requires the State Department of Public Health to establish and administer the Childhood Drowning Data Collection Pilot Program for fatal and nonfatal incidents. Our Child Drowning Surveillance Guide can contribute to the establishment of electronic tools used for the state data collection system that will further inform prevention. Child Drowning Surveillance (UCI Institutional Review Board #1940, #1953)

Objectives:
1. Statewide Vital Statistics and Hospital Discharge Data are limited in contextual information regarding child drowning incidents.
2. ICD-10 CM coding gaps hamper hospital-based surveillance of child drowning incidents.
3. Enhanced medical record documentation of variables addresses these coding gaps.

Economic Burden of Pediatric Drowning in Texas

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Attending Physician, Emergency Center
Texas Children's Hospital
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Authors: *Rohit P. Shenoi, MD; Linh Nguyen, PhD.*

Background: Drowning is the leading cause of unintentional injury death in US children aged 1-4 years. Texas led the US in fatal pediatric drownings between 2018-2021. We assessed the economic burden of unintentional fatal and non-fatal pediatric drowning in Texas.

Methods: This was a cross-sectional study involving children aged 0-17 years treated for unintentional drowning in Texas hospitals during 2016-2022. We obtained inpatient (IP) and outpatient (OP) data from the Texas Health Care Information Collection. We selected fatal and non-fatal unintentional drowning (including water-transport related) encounters and excluded undetermined intent drowning, subsequent and sequela encounters. Data included demographics, diagnoses, procedure codes, body of water, length of stay, discharge status, and facility charges. The economic burden comprised direct medical costs (DMC) and indirect costs (IC) associated with drowning IP and OP treatment. DMC includes facility and professional costs. Facility costs (accommodation, ancillary services, outpatient charges, ambulance fees) were estimated by multiplying the facility charges by mean year-specific, county-specific cost-to-charge ratio. Professional costs were the product of facility costs and professional fee ratio for drowning. DMC was converted to 2022 US$ using the Consumer Price Index for All Urban Consumers Medical Care Services. To estimate IC, we measured the caregiver productivity loss based on time needed to care for a hospitalized patient or to visit the emergency department (ED). Workdays lost (#inpatient days or 1 day for ED visit) were multiplied by the average daily compensation for full-time employees and the average wage multiplier incurred by the employer due to worker absence to compute economic loss of productivity. We performed descriptive analysis and utilized non-parametric tests to estimate the economic burden and cost variations among groups.

Results: There were 1,339 pediatric hospitalizations in Texas during 2016-2022. Most drownings occurred in swimming pools (41%); Fatal drownings occurred in 15% of hospitalizations. Most hospitalizations occurred in children aged 1-4-years (64%). Males, non-Hispanic White children, and commercially-insured constituted the majority (63%,39% and 52%, respectively) of drowning patients.

DMC IP costs averaged $62,398 with no significant differences in mean costs by sex, race/ethnicity, or insurance. Fatal drownings incurred significantly higher mean IP costs ($99,248) than non-fatal drowning ($55,852)($p<0.001$). Watercraft-related drownings ($121,393) and bathtub drownings ($107,070)($p<0.001$) had the highest mean IP costs. Mean DMC OP costs were $2,593 and varied by race/ethnicity, insurance, and body of water ($p<0.001$). Watercraft-related drownings incurred the highest mean OP costs ($3,324). The mean productivity loss was 6.2 days. IC averaged $3,299 and varied by age, race/ethnicity, insurance, discharge status, and water body ($p<0.05$). Non-fatal drownings had higher mean IC ($3,356) than fatal drownings ($2,974). Watercraft-related drownings had the highest mean IC ($8,707), followed by bathtub drownings ($4,982)($p<0.001$).

Conclusions: Pediatric drowning is a significant economic burden in Texas. Costs varied by age, discharge status, and body of water. Fatal IP and watercraft-related drownings incurred the highest direct and indirect costs.

Objectives:
1. Compute direct and indirect costs from drowning injuries
2. Discuss the economic burden of pediatric drowning in Texas.
3. Recognize groups that incur the highest drowning-related costs

Making Waves: Understanding Previous Local Drowning Data to Inform Future Prevention

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Authors: *Victoria Thompson, DO; Micaela Parson, MS4; Brit Anderson, MD; Kerry Caperell, MD, MBA, MSC*

Background: Drowning is a leading cause of injury-related death in the pediatric population. The circumstances surrounding drownings are varied, impacting primary prevention. The purpose of this study was to evaluate pediatric drownings seen in a pediatric emergency department (ED) and drowning-related deaths in the metro area surrounding a pediatric trauma center, to determine annual injury rates and describe injury characteristics.

Methods: Retrospective chart review was completed for patients <18 years old who lived in the metro area of this land-locked state and were seen at a pediatric ED with a chief complaint, or ICD-10 code, related to drowning from 1/2016-1/2022. Coroner's data with the same inclusion criteria completed the dataset, and duplicates were excluded. We extracted demographic information, relevant past medical history, disposition, location of residence, and water source. Injury rates were calculated using census data. Descriptive statistics, chi-square, and mapping software were used for analysis. Injury rates are expressed as injuries per 100,000 children per year.

Results: 219 patient encounters met inclusion criteria. The mean age was 4.2 years (SD 3.7), 55.7% male, 69.4% white, 20.1% Black, 6.9% Hispanic ethnicity. The majority (61.2%) occurred in the summer and nearly half on the weekend (43.8%). 14.2% of patients had a diagnosed neurologic/neurodevelopmental condition, while only 1.4% and 0.5% had a documented psychiatric and cardiac history, respectively. Pools were the most common site (71.2%), followed by bathtubs (20.6%) and open water (5.9%). Evaluation of disposition showed that 54.7% went home from the ED, 25.1% were admitted to the medical-surgical floor, 12.3% were admitted to the pediatric intensive care unit (PICU), and 6.9% died. Of the children that died or were admitted to the PICU, 26.2% had a previous neurologic/ neurodevelopmental diagnosis. The overall injury rate for the included region ranged from 9.6-15.5 during the study period. 2022 had the highest injury rate at 15.5.

Conclusions: Drownings in our metro area are more common in pools, during the summer, and disproportionally on weekends. A considerable number of children had a previous neurologic/neurodevelopmental diagnosis. Along with mapping, this critical information will be used to target finite resources for local primary injury prevention. This methodology could be employed to inform injury prevention in other locations.

Objectives:
1. Describe how local data sources can be used to describe injury epidemiology.
2. Examine characteristics associated with pediatric drowning and consider targeted injury prevention strategies.
3. Evaluate geographic distribution of pediatric drownings to target injury prevention.

Studying the epidemiology of drowning from media reports using artificial intelligence

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Authors: *Aedan Villegas, BS; Shaila Zaman, PhD; Rohit P. Shenoi, MD*

Background: Media reports are a source of information on fatal drowning. The narratives provide information about demographics and contextual information of victims. We sought to describe the epidemiology of fatal drowning in the metropolitan Houston region using artificial intelligence to analyze media report narratives.

Methods: This was a cross-sectional study of victims of unintentional drownings of all ages who drowned in the 8-county metropolitan Houston region from 2016-2022. We queried the search platform – NexisUni using keywords "drown" and "submersion" to access online media archives of fatal drownings from the following formats: print; blog, video, and audio records. Temporal data, demographic information (age, sex, ethnicity, race), risk and protective factors were obtained from the narratives. We developed an automated method to extract the information using the natural language processing (NLP) capabilities of OpenAI's GPT-3.5 model. The OpenAI API significantly enhances the efficiency and accuracy of extracting structured information from unstructured text by implementing advanced NLP techniques, facilitating efficient handling of large datasets with precision that surpasses manual methods. Using OpenAI API, we focused on extracting key factors such as swimming ability, supervision status, alcohol use, and life vest use from narrative descriptions of drowning circumstances. Our approach involved prompt

engineering that guided the model to output structured responses in a dictionary format, ensuring consistency in the extracted data. The method was implemented in Python, where we utilized the OpenAI API to process each narrative in our dataset. The responses were then parsed and organized into a structured format suitable for further analysis. We used descriptive statistics for reporting results.

Results: There were 133 media reports of drowning between 2016-2022 in metropolitan Houston. We analyzed 110 cases of drowning after excluding non-fatal (n=16), homicides (n=4) and those external to the Houston region (n=3). The mean age of drowning victims was 25.5 years (Std. Dev. ±23). There were 49 (44.5%) children; males constituted 81% of reports. The majority of drownings occurred in natural water (73%). The rest occurred in confined water (swimming pools, bathtubs)(26%) and unknown (1%) Life jackets were used by 33% of drowning victims; their use was unknown in 67% of cases. Fourteen percent of drowning victims knew how to swim, whereas 19% did not know how to swim. Swimming ability was unknown in 67% of cases. A majority of drowning victims did not consume alcohol (65%). Only 1% consumed alcohol and its use was unknown in 34%. Among children, 65% were supervised, 10% were unsupervised. Supervision was unknown in 25%.

Conclusions: Media reports are an alternate source of data on fatal drowning. Artificial intelligence is a novel method to extract drowning information from media report narratives for epidemiological purposes. However, the utility of media reports in drowning surveillance and prevention is limited, given biases in reporting and sub-optimal reporting of information on protective and risk factors. Engagement with media outlets to include drowning prevention information during reporting is encouraged.

Objectives:
1. Explain how artificial intelligence can be used in injury surveillance. 2. Discuss the epidemiology of drowning obtained from media reports. 3. Recognize the limitations of media reports in describing the epidemiology of drowning

Parental Perspectives on Water Safety Challenges for Children with Autism

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Background: Among children with autism, drowning is the leading cause of death through age 14. Autistic children are more likely to drown than neurotypical children. Attributes, such as wandering, sensory issues, impulsivity, and a limited sense of danger, could increase risk. In addition, autistic children often have trouble participating in structured group activities, such as swimming lessons. The purpose of this study is to better understand water safety experiences of parents of children with autism.

Methods: Parents of children with autism were asked to complete a brief online survey and to participate in a focus group about their water safety experiences. Six focus groups consisting of 2-6 participants, and one individual interview were held. Focus groups and interviews were recorded and transcribed by the study team. The codebook, created using both deductive and inductive approaches, was revised throughout the study period to aid in thematic analysis of the participants' contributions.

Results: Twenty-one parents participated in a focus group or interview (95% female, 5% male, average age 44 years). Participants were parents of 1-3 children with autism (n=25, 72% male, 20% female, 8% Trans/non-binary, average age 11 years). Parents reported that 43% of the children had completed multiple years of swim lessons; 33% had completed multiple sessions; 14% had attempted, but not completed more than one session; and 10% had never attempted swim lessons. Several major themes were identified that were near-universal among participants. Parents viewed the experience and training of swim instructors teaching autistic children as being of paramount importance. They highlighted characteristics such as impulsivity, elopement, poor sense of danger, and sensory and communication challenges that affect risk of drowning and participation in learn-to-swim programs. Parents pointed out barriers in accessing adaptive swim lessons due to scarcity of experienced instructors and high cost of these lessons, and that they have often received inadequate information about water safety in the context of autism. Parents indicated that autistic children have uniquely different characteristics and needs presenting complexities in scheduling and adjusting activities around therapy. Parents contributed valuable insight into what would make a learn-to-swim program successful for their autistic children. This includes instructors who have a deep understanding of autism, tailored instruction according to their child's unique sensory, behavioral, and motivational needs, and a sensory-friendly environment with few distractions.

Conclusions: Water safety needs to be elevated in importance for families of autistic children. Information on drowning risk and prevention should be proactively provided. Barriers to adaptive swim lessons such as cost, scheduling, and availability need to be addressed. More training opportunities need to be provided to swim instructors to improve teaching children with complex needs, such as those with autism.

Objectives:
1. Identify several individual characteristics that are prevalent among autistic children that contribute to a higher risk of drowning.
2. Identify several prevalent challenges to water safety faced by families of autistic children.
3. Identify barriers and facilitators to successful learn-to-swim instruction for children with autism.

PLATFORM PRESENTATIONS

Firearm Injury Prevention

Friday, December 6, 2024, 10:40 AM to 11:55 AM

Session Description: Firearm injuries surpassed motor vehicle collisions as the leading cause of death in youth aged 0-19 years of age. Firearm Injury Prevention is crucial in keeping children safe. In this session, we will explore trends/disparities of firearm related deaths in pediatric patients. Additionally, we will review the utilization of Extreme Risk Protection Orders amongst pediatricians. We will then discuss how gun violence exposures impact urban children's school performance. Next, we will learn about the implementation of a universal Firearm Injury and Mortality Screening in Trauma Patients. We will switch gears and learn about the creation of a multidisciplinary team to approach firearm injuries. Lastly, we will delve into utilization of resources after extremity firearm related injuries. These specific study discussions will be set in the context of the importance and success of child firearm injury prevention efforts.

Learning Objectives:

1. Compare trends of firearm and motor vehicle collision mortality and describe differences of intentional firearm fatality rates by age, gender, race, and ethnicity.
2. Enhance awareness of Extreme Risk Protection Orders (ERPO) for firearm-related prevention, while understanding barriers and facilitators to ERPOs for pediatricians.
3. Recognize the impact of gun violence exposure on our Urban Youth's Education, specifically as it relates to honor roll achievement, repeating a grade and failing a class
4. Identify opportunities and barriers in the implementation of a universal screening for firearm injuries amongst pediatric trauma patients.
5. Discover how a multidisciplinary team can address firearm injury prevention among community pediatricians.
6. Understand the long-term sequelae of pediatric firearm extremity injuries, while exploring resources available to pediatric patients.

Moderators:

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National Trends and Disparities for Firearm and Motor Vehicle Crash Deaths from U.S. Youth 2011-2021: the Intersection of Age, Sex, Race, and Ethnicity

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Background: Injuries from firearms and motor vehicle crashes are the leading causes of death among U.S. children and youth 0-19 years old. Examining the intersections of age group, sex, race, and ethnicity is essential to focus prevention efforts. The objectives of this study were to examine firearm and motor vehicle crash fatality rates by population subgroups and analyze changes over time.

Methods: We conducted a cross-sectional study of firearm and motor vehicle crash deaths among US children and youth 0-19 years old using data from the Centers for Disease Control and Prevention Web-based Injury Statistics Query and Reporting System (WISQARS) database. We reported firearm and motor vehicle collision (MVC) fatality rates by year and over time. To examine changes over time we performed JoinPoint regression analyses reporting average percent change (APC) per year for fatality rates by age, sex, race, and ethnicity.

Results: From 2011-2021 there were 35,684 firearm and 40,735 MVC fatalities among US youth 0-19 years old. For firearms there were 21,332 (59.8%) homicides, 12,113 (33.9%) suicides, and 1,359 (3.8%) unintentional shootings. For all firearm deaths, an overall increase occurred 2014-2021 (APC 8.7%). For firearm homicides no statistically significant increase occurred until 2018-2021 (APC 19.2%). In contrast, firearm suicide had an APC of 5.6% over the entire study period. When considering age group, sex, race and ethnicity, for firearm homicides among youth 15-19 years old the APCs were similar for non-Hispanic Black (21.8%) and Hispanic (22.2%) males from 2018-2021 though with different peak rates (104.22/100,000 and 17.80/100,000, respectively). Non-Hispanic Black females 15-19 years old demonstrated a dramatic APC increase of 40.7% from 2019-2021 (peak rate 14.07/100,000). For firearm suicide in youth 10-19 years old by sex, non-Hispanic Black females had the greatest APC increase of 22.0% from 2016-2021; however, the highest rate occurred among American Indian/Alaska Native males 15-19

years old (18.12/100,000). For MVCs overall no statistical changes occurred overtime. MVC fatalities increased at the highest rate for non-Hispanic Black males 15-19 years (APC 22.9% 2019-2021) with the highest rates in 2021 among non-Hispanic American Indian/Alaska Native males 15-19 years (38.16/100,000) and females (29.31/100,000).

Conclusions: US youth 0-19 years old experienced important disparities in firearm and MVC fatality rates and increases over time when considering the intersectionality by age group, sex, race, and ethnicity. A multi-pronged strategy focused on individual, community and policy level approaches for specific high risk groups for each injury mechanism are necessary to address these leading causes of death in US youth.

Objectives:
1. Compare trends in firearm and motor vehicle collision deaths over time.
2. Describe differences in fatality rates from firearms by intent when considering the intersections of age group, sex, race, and ethnicity.
3. Discuss changes in motor vehicle collision fatality rates by age group, sex, race, and ethnicity.

Extreme Risk Protection Orders for Firearm-Related Harm Prevention in Pediatrics: Results from a Survey of New York State Pediatricians?

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Background: Firearm-related harm towards self and others is a significant adolescent health problem. Extreme risk protection orders (ERPOs), also known as "Red Flag Laws", offer an evidence-informed prevention approach. Through a non-criminalizing process, ERPOs remove legal access to firearms from individuals at risk of causing harm. Despite passage of ERPO laws in numerous states and expansion to authorize clinicians to independently file for such orders in some states, including New York, ERPOs remain underutilized. While federal funds are available to promote uptake, there has been a lack of attention to youth-serving clinicians. This study aimed to assess New York State (NYS) pediatricians' familiarity with and willingness to use ERPOs, understand barriers and facilitators to ERPO use, and offer strategies to improve uptake in pediatric settings.

Methods: An anonymous online survey was distributed to New York State American Academy of Pediatrics members from October to December 2023. The survey included 24 items covering awareness, attitudes, and barriers/facilitators to utilizing ERPOs, as well as participant demographics. Responses were descriptively analyzed, with thematic analysis used to characterize open-response data.

Results: Of the 180 participants included in the analysis, most were pediatricians (97%, n=175), were practicing primary care (69%, n=119) for >20 years (56%, n=100) in urban areas (60%, n=107). Slightly more reported encountering, a few times a year, patients "in contact" with a person at risk of harm (e.g. parents, 61%) compared to patients at risk of harming themselves or others (54%). Less than half (42%, n=77) were familiar with ERPOs; while 63% (n=113) reported being likely to file an ERPO, none had ever done so. Most common barriers were lack of knowledge about the ERPO filing process (82%, n=148) and filing criteria (68%, n=123), followed by conducting risk assessments (53%, n=95). Additional barriers described in open-response data included perceived inapplicability to their practice (e.g. neonatology), gun rights infringement, belief in centering mental health support, and retaliation risk from patients/families. Commonly identified facilitators were access to ERPO training (72%, n=130), legal consultation (67%, n=120), filing coordinators (64%, n=115), patient supports (52%, n=94), clinician anonymity (51%, n=103), and liability protections (50%, n=90).

Conclusions: This study is the first to characterize pediatricians' views regarding use of ERPOs for firearm-related harm prevention in pediatrics. Our findings highlight policy-practice gaps, including lack of knowledge about filing procedures and conducting risk assessments. Our study underscores the importance of allocation of ERPO resources for clinician and patient supports (e.g. education, filing coordinators, crisis response teams, legal protections), particularly within pediatric settings that demand greater sensitivity and caution.

Objectives:
1. Enhance awareness of ERPOs as a tool for firearm injury prevention by clinicians.
2. Understand barriers and facilitators to clinician initiated ERPOs and identify factors specific to pediatricians.
3. Bring attention to unique considerations for ERPO implementation in the pediatric population.

Gun Violence Exposures Impact on Urban Youth School Performance

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Background: Exposure to firearms has been shown to negatively impact youth's mental and behavioral health. This study's primary objective is to analyze the intersection of gun violence exposure (GVE) and school achievement (SA). The secondary objective is to investigate a difference in school achievement based on location of GVE in the community (at home, school, or both).

Methods: We utilized the Future of Families and Wellbeing Study (FFCWS), a longitudinal birth cohort study surveying urban youth and guardians specifically at age 15 utilizing surveys of parents and teens. SA was measured by 4 metrics: parent report of attending summer school and repeating a grade; and student report of honor roll and failing a grade. GVE data was obtained from the Gun Violence Archive (GVA), a national database that collects information on firearm injury and mortality data based on geographic locations. GVA data was cross referenced with survey data from FFCWS. GVE was categorized by presence of exposure within 1600 meters of home, school, or both. Two sample t-test and chi-squared tests adapted to complex survey samples were used for p-value calculations. P< 0.05 indicated statistical significance.

Results: Our sample comprised of 2563 students. Students who attended summer school had more cumulative total GVE (5.72 vs. 3.66, p< 0.05) and school GVE (2.57 vs. 1.54, p< 0.05) than those who didn't. Those who repeated a grade had twice as much GVE in both locations compared to those who did not repeat a grade (total 7.89 vs. 3.76, p< 0.05; home 4.09 vs. 2.18, p< 0.05; school 3.80 vs. 1.57, p< 0.05). Similarly, students who failed a class had more GVE in both locations compared to those who did not (total 4.99 vs. 3.45, p< 0.05; home 2.85 vs. 1.97, p< 0.05; school 2.13 vs. 1.48, p< 0.05). Those not on honor roll had more home GVE (2.77 vs. 1.87, p< 0.05) and total GVE (4.66 vs. 3.45, p< 0.05) than those on honor roll. Additionally, those on honor roll had a statistically significant higher proportion of no GVE (51% vs. 49%), less home (38% vs. 62%) and less combined home/school GVE (47% vs. 53%).

Conclusions: Our research reveals that an increase in cumulative exposure to gun violence is associated with attending summer school, repeating a grade, not achieving honor roll, or failing a class. This demonstrates that cumulative GVE can impact school achievement. The level of achievement in high school may carry significant ramifications that extend into one's future career trajectory. Since academic accomplishments attained during this formative period could shape an individual's career opportunities in the years to come, further research is crucial to comprehend the full impact of GVE on youth wellbeing

Objectives:
1. Attendees will recognize the impact that gun violence exposure has on summer school attendance.
2. Understand that measures of school achievement such as honor roll or not failing a class are associated with lower rates of gun violence exposure.
3. Explain the impact of the number of gun violence exposure on honor roll achievement, repeating a grade, failing a class and attending summer school.

We Ask Everyone? Utilization of Universal Screening for Firearm Injury Risk Among Pediatric Trauma Patients

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Background: As the leading cause of death for children and adolescents, firearm injury requires healthcare-led solutions to meaningfully address and reduce the epidemic of gun violence in the US. We implemented a universal Firearm Injury and Mortality Prevention (FIMP) screening program in three emergency departments (EDs) to identify and subsequently provide resources to patients who may be at risk for firearm injury based on violence risk or access to a firearm within or outside the home. Anecdotal reports from ED staff indicated high risk trauma patients including those with firearm-related injuries were not being screened in the ED. We retrospectively reviewed all pediatric patients with a trauma-related discharge diagnoses to determine the frequency of FIMP screening among this subpopulation.

Methods: Beginning in July 2021, universal screening for firearm injury risk for patients ?12 years was implemented across three health system hospitals including our pediatric level one trauma center. This screening includes a question about firearm access within or outside of the home, and the 4-question SaFETy score, a validated tool shown to predict future firearm violence risk. Data for all pediatric patients were extracted from the electronic medical record (EMR) and REDCap. Following data extraction, chief complaint and primary diagnosis were reviewed and coded as "trauma," or "medical, according to ICD-10 CM diagnoses; patients coded as "trauma" were included. Standard descriptive statistical analyses were performed using SPSS (Statistical Package for Social Sciences).

Results: From implementation in July 2021 through March 31, 2024, 42,492 patients ages 12-17 were seen in the pediatric ED, including 7,144 trauma patients (16.8% of total patients). Among trauma patients, 18.4% (n=1,311) received FIMP screening in the ED among which 4.3% (n=57) screened positive for either access to a firearm or risk for future firearm violence. Youth aged 15 and 14 accounted for the greatest percentage of trauma patients screened (20.7% and 17.5% respectively), and males accounted for 65.7% (n=861) of these patients. White and African American/Black children accounted for the largest percentage of trauma patients receiving the screening (30.6% and 27.6% respectively). There were 309 patients with a violent injury listed as their primary diagnosis following discharge (stab wound, gunshot wound, assault, child abuse, and self-injury), 30.1% of whom (n=93) received FIMP screening.

Conclusions: The majority of high-risk trauma patients including those with violent mechanisms of injury are not receiving FIMP screening while in the ED. Factors that may be associated with reduced screening include severity of injury and patient acuity for trauma patients, many of whom enter the ED as a trauma activation and may go directly to the OR from the trauma bay, thus preventing a comprehensive evaluation. Future steps should evaluate the feasibility of delivery of FIMP Screening and intervention in the inpatient setting for patients with severe traumatic injuries who require hospitalization and complex care.

Objectives:
1. Attendees will be able to describe trends observed in the implementation of firearm injury and mortality prevention screenings.
2. Attendees will be able to identify opportunities to integrate firearm injury and mortality prevention screening among trauma patients.
3. Attendees will be able to potential barriers and facilitators to firearm injury and mortality prevention screening among high risk populations.

Creation of a Multidisciplinary Team to Combat Firearm Injuries

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Background: Firearm-related injuries have become the leading cause of death in children. Over the last five years at our children's hospital, annual ED visits for children with firearm-related injuries increased by 141% (41 in 2018 to 99 in 2023). Recognizing this alarming trend, a firearm injury prevention team began meeting in August 2023 to find ways to address this multifaceted problem.

Methods: With support from hospital administration, a multidisciplinary team was developed by Emergency Department (ED) leaders with funding from the hospital foundation and corporate communications. Teams included representatives from the Emergency Department, Integrative Care, Government Relations, Communications, and Mental Health. Physicians were also present from Rehabilitation Medicine, ED, Hospital Medicine, and Critical Care. Many were already addressing firearm injury prevention individually.

The goal of the team, which meets bimonthly, is to slow the rising trend at our hospital of firearm-related injuries. The initial action was to improve awareness of hospital staff of the significant increase in firearm-related injuries. The next goal was to encourage community pediatricians to engage in discussions during patient encounters regarding securing all firearms. A needs assessment tool was administered to hospital-affiliated general pediatricians to gauge the culture of firearm discussions during visits, measure interest in further education, and provide firearm locks to patients.

Results: Data demonstrating the rise of firearm injuries over the last 20 years was shared with hospital administration and campus leaders. Three podcasts offered multiple communications and discussions. A state House Representative met with the team to discuss upcoming legislation. Team members working with pediatric residents in Health Equity Scholars shared BeSMART educational materials and resources at community meetings. Team members participated in our local chapter's National Injury Prevention Day along with other community events.

The team developed a pathway to screen all ED and surgical ward patients for the presence of unsecured firearms within the patient's home. The care team provides cable gun lock(s) and educational materials to families with unsecured firearms. A hospital violence intervention program is being developed by the team which is also providing wraparound services for patients in anticipation of hospital discharge.

Of the 78 community physicians contacted for the needs assessment, 60 (78%) responded. Regarding whether firearms discussions occur, 33/51 (64.9%) reported they discussed firearms only with certain at risk populations or not at all. Most of the physicians (80%) were interested in further education about having these discussions. Based on this needs assessment, the team is partnering with four practices to offer guidance regarding secure firearm education and gun locks for their patients' families.

Conclusions: The creation of a firearm injury prevention team allowed disparate groups to work together instead of in silos. Bringing stakeholders together was a logistic challenge. Once the team convened, though, efforts were coordinated and combined. We believe this team has made significant progress toward combatting this serious concern.

Objectives:
1. Firearm injuries are increasing significantly in the last 5 years.
2. Community pediatricians are interested in learning how to provide firearm injury prevention in their clinics.
3. Multidisciplinary teams can make much more progress than individuals working on their own to address injury prevention.

Improving Awareness and Utilization of Safety Net Resources After Extremity Firearm Injury

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Background: Firearm-related injuries have surpassed motor vehicle collisions as the leading cause of death among children and adolescents. Children who survive firearm injuries are at increased risk of developing post-traumatic stress disorder, substance abuse, incarceration, and subsequent violent injuries. While there is no universally-accepted standard of aftercare for treating firearm injuries, best practices in caring for pediatric trauma victims involve multidisciplinary care coordination during and after initial hospital care. The orthopaedic surgery department sought to improve access to follow-on services by creating a defined list of and initiating referral to safety net resources at the time of initial orthopaedic consultation. As there was no prior utilization of a standard set of safety net resource referrals, the baseline was 0%. We set our target for standardized resource initiation to improve to 50% by June 2024.

Methods: The orthopaedic fellow queried other level 1 pediatric trauma centers to determine how similar institutions address post-violence aftercare for firearm-injured patients. After identifying best practices put in place by two sister institutions, the orthopaedic fellow collaborated with stakeholders in several departments including: the trauma committee, the department of pediatrics, the center for childhood safety and injury prevention, social work, the council on violence prevention, hospital security and local leaders of anti-violence initiatives. We then collated a list of safety net resources presently available at our institution and within the greater metropolitan area. Utilizing quality improvement methodology, a fishbone diagram was created to determine root causes and potential roadblocks to implementing actionable items intended to guide clinicians in addressing post-violence care needs. The fellow then developed and implemented countermeasures utilizing a driver diagram to define actionable interventions. The checklist interventions included consideration for baseline blood lead level, social work consultation, free physical gun lock, and a handout on gun safety, among others.

Results: The checklist initiative was officially implemented February 2024. PDSA cycles and monthly run charts were processed to demonstrate resource initiation. In February the department was consulted on 7 patients with isolated extremity firearm injury, on 1 patient in March, and on 4 patients in April. The patients ranged in age from 31 months to 17 years, and 75% were male. Since undertaking this QI endeavor, 100% of the 12 firearm-injured patients have received at least 1 referral for follow-on care services, including 100% receiving social work consultation and consideration for baseline blood lead level screening. Interestingly, this initiative identified 2 patients with high baseline lead levels, 1 patient who survived a second firearm-related injury, and 3 patients who sustained an extremity firearm injury while handling a firearm under direct adult supervision.

Conclusions: Streamlining orders and consultation requests has the potential to minimize variability in healthcare delivery and improve access to safety net resources by ensuring all orthopaedic-related firearm victims have the same workup and consultation requests beginning at initial presentation. This initiative may mitigate post-trauma sequelae for pediatric victims of firearm violence.

Objectives:
1. Long-term sequelae of pediatric firearm injury.
2. How to leverage existing resources within an institution.
3. Elevated baseline lead level in trauma victims may be a proxy for social determinants of health.

LIGHTNING ROUND PRESENTATIONS

Friday Lightning Round

Friday, December 6, 2024, 1:00 PM to 1:40 PM

Session Description:
In this session attendees will learn about a variety of pediatric injury prevention topics and programs. Presentations will offer an opportunity for exploration of innovative partnerships and programming that could be applied in other settings and communities. Topic to be covered include suicidal behaviors during the COVID-19 pandemic, concussion monitoring programs, methamphetamine ingestions, the opioid epidemic, the role of Child Abuse Death Review in injury prevention, bedside injury prevention education, and proper vehicle restraint for children treated with a hip spica cast.

Learning Objectives:
1. Examine how social disruption from the COVID-19 pandemic may have exacerbated mental health outcomes among youth.
2. Analyze the current concussion monitoring programs in place in the United States and acknowledge the barriers to implementing similar models.
3. Recognize vital sign abnormalities and clinical exam findings that may suggest methamphetamine ingestion in patients ages 0-5 years.
4. Understand the key components of the Safer Prescribing Toolkit and its role in addressing the ongoing challenges and complexities of the opioid epidemic in the United States.
5. Demonstrate how data-informed prevention initiatives can address primary factors contributing to preventable child death and identify available and/or needed data sources.
6. Discover how to tailor injury prevention education from a resource intensive Safety Center setting to a bedside setting.
7. Understand how vehicle type, child restraint design, rear- or forward-facing direction, and spica cast type influence the safe restraint of a child.

Moderators:

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Suicide and COVID-19: Analyzing Suicidal Behaviors in Youth after COVID-19 Related Deaths in the Community

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Background: Suicide among Wisconsinites increased 40% from 2000 to 2017, where teens and young adults were more likely to have thoughts of suicide than any other age group. The stress related to the COVID-19 pandemic may have exacerbated these poor mental health outcomes among youth. This study examines the association between neighborhood-level COVID-19 mortality and suicidal behavior among youth living in those zip codes. We hypothesize that, because of the social disruption and neighborhood-level stressors of the COVID-19 pandemic, zip codes in Milwaukee County that experienced disproportionately high rates of COVID-19 deaths will also demonstrate higher rates of suicidal behaviors among youth and young adults ages 11 to 24.

Methods: This study utilized suicide and COVID-19 death data from the Milwaukee County Medical Examiner's Office. Suicidal behavior data (attempts, self-harm, ideation) were collected from local hospital emergency departments. Mental health data focused on individuals ages 11-24. All data was filtered for residents of Milwaukee County and looked at the time between March 1, 2020, and March 31, 2022. Data was de-identified and filtered to eliminate repeat visits. Zip codes were categorized by socioeconomic status using criteria from Health Compass Milwaukee. Statistical analysis, including bivariate linear regression and multivariate analysis of variance (ANOVA), examined the association between rates of suicidal behaviors and COVID mortality by zip code, controlling for SES and median age.

Results: There were 1695 COVID-19 related deaths and 836 individuals with suicidal behaviors. The regression analysis revealed a statistically significant relationship between COVID-19 death rates within zip codes and suicide rates among youth ($p=0.037$) in Milwaukee County. This association suggests that zip code areas with higher COVID-19 mortality experienced increased suicide behavior rates among youth. The multivariate ANOVA test showed median age as a significant factor ($p=0.0424$).

Conclusions: Findings indicate a significant relationship between COVID-19 death rates and suicidal behaviors at the zip code level in Milwaukee County. This study highlights the

pandemic's profound impact on youth mental health and offers a framework for regional analysis to better identify areas where youth face the greatest challenges and improve targeted injury prevention strategies.

Objectives:
1. Analyze data on suicidal behavior among youth ages 11-24.
2. Compare suicide related outcomes to COVID-19 related outcomes by zip code and understand the association.
3. Examine how social disruption from the COVID-19 pandemic may have exacerbated mental health outcomes among youth.

Equitable Concussion Monitoring: Exploring a Generalizable Model in New York State High Schools

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Background: Concussion remains a serious public health problem in the United States, particularly in adolescents participating in contact sports. Except in limited circumstances, there are no requirements for systematically reporting sport-related concussion (SRC) in high schools reflected by limited infrastructure and support for reporting. Given these limitations, major gaps exist in understanding adolescent SRC epidemiology. Regional and even nationwide monitoring programs are of increasing interest, however the financial and practical implications of such programs are not well understood.

Methods: Local, regional, and state-wide high school SRC monitoring programs and nationwide research were identified to determine cost and other practical aspects, and potential barriers to implementation. Resources included 1) State Education department websites, 2) Compiled lists of state-level laws and implemented programs as available through the Centers for Disease Control and Prevention as well as the Brain Injury Association of New York State, and 3) other programs brought to our attention through professional networks. Costs were determined through 1) the above resources, 2) projections of athlete volume drawn from The National Federation of State High School Associations (NFHS), and 3) publicly available program- and state-level fiscal end-of-year documents detailing program expenses. Cost estimates included physicians, data managers, systems fees, and educational resources with varying athletic trainer support across models, ranging from none (presumed already in place) to new/dedicated lines. Means for fiscal support and flow of funds for support were also explored. We then created models for state- and athlete-level costs of implementing a program in New York State with 356,803 high school athletes.

Results: Publicly available data were reviewed and semi-structured interviews were conducted with program coordinators at regional (a rural New York high school district), state (Hawaii Concussion Awareness Management Program (HCAMP) and North Texas Concussion Registry (ConTex) programs) and national (High School Reporting Information Online (RIO)) levels. Overall, there was variability in available infrastructure which ranged from a volunteer-based local enterprise to a state-funded mandatory program. Some programs were supported by state law enhanced by traffic violation surcharges, while others were supported through philanthropic or volunteer efforts. State-level cost estimates ranged from $7.9M to $33.1M, with per-athlete costs of $22.24 (ConTex) to $92.78 (Hawaii). Logistical challenges, including medical personnel and data infrastructure, appeared manageable at scale in each model.

Conclusions: High school SRC monitoring programs are generally financially feasible and often cheaper than routine costs associated with sports participation, such as uniforms and standard equipment. These models provide guidance for possible implementation of state- and federal-programs. Large, inclusive programs are necessary to identify critically understudied aspects of SRC including health disparities as relates to SRC detection, reporting, and recovery in diverse populations.

Objectives:
1. Attendees will be able to recognize the current public health burden of sport-related concussions and their unclear epidemiology within American high schools, with a focus on New York State.
2. Attendees will be able to analyze the current concussion monitoring programs in place in the United States and acknowledge the barriers to implementing similar models.
3. Attendees will be able to draw conclusions from the findings to a wider model for national and global concussion monitoring interventions to address potential unmet health disparities.

Clinical Factors to Predict Methamphetamine Ingestion

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Background: Our hospital is seeing a number of pediatric patients test positive for methamphetamine on screening urine drug screen (SUDS). Child services become involved when child exposure to methamphetamine is suspected due to its illicit, dangerous nature. SUDS is an immunoassay prone to false positive results from poor antibody specificity. Comprehensive urine drug screen (CUDS) utilizes gas chromatography mass spectrometry and is more reliable but takes weeks to result. Our goal is to identify clinical correlates to risk stratify true ingestion while awaiting CUDS confirmation. Methamphetamine is metabolized into amphetamine and inactive compounds excreted into urine. True methamphetamine positive tests should be amphetamine

positive as well. Presenting symptoms consistent with a sympathomimetic toxidrome may increase clinical suspicion for ingestion. Certain lab abnormalities are suspected in methamphetamine ingestions such as elevated creatine kinase (CK), hyperlactatemia, hyperglycemia, and hypokalemia.

Methods: This 5 year (2018-2023) retrospective cohort study compares clinical factors of pediatric patients who tested methamphetamine positive on urine drug test at a tertiary medical center. Inclusion criteria required methamphetamine positive SUDS and those without CUDS collection were excluded. Primary outcomes included amphetamine co-positivity, vital sign abnormalities, and hypokalemia. Secondary outcomes included CK elevation, hyperlactatemia, hyperglycemia, and clinical suspicion for ingestion. Age was divided into two groups, 0-5 years (age category 1) and 6-18 years (age category 2). Clinical values compared via logistic regression and utilized corrected Chi square test and T-test of means with Satterthwaite adjustment.

Results: 205 patients tested methamphetamine positive on SUDS. Only 52 subsequently had a CUDS obtained. 54% were male and 46% were female. 63% were in age category 1 and 37% in age category 2. 40% were less than 24-months-old. 23% tested in 2023, which was the year with the most cases. 62% of methamphetamine positive SUDS were confirmed with a positive methamphetamine CUDS and 60% were positive for both methamphetamine and amphetamine. This makes 97% of methamphetamine positive CUDS also amphetamine positive. 81% methamphetamine positive CUDS did have amphetamine positive on initial SUDS (Chi-square=25.7, P< 0.005). Age category 1 found to have statistically significant tachycardia when methamphetamine ingestion confirmed with mean heart rate 166 versus 133 when negative (T=-3.3, P=0.003). Age category 2 had clinically significant tachycardia with mean heart rate 104 when methamphetamine positive versus 84 when negative (T=-1.8, P=0.105). 58% age category 1 presented with fussiness, aggression, and agitation. Hypokalemia, CK elevation, hyperlactatemia, and hyperglycemia not statistically significant.

Conclusions: Tachycardia, a marker of sympathomimetic toxicity, was associated with methamphetamine resulting as true positive in ages 0-5 years. A positive amphetamine result on SUDS was also associated with methamphetamine resulting as a true positive, as suspected as amphetamine is a metabolite of methamphetamine. Clinical suspicion for methamphetamine ingestion should increase in patients ages 0-5 years presenting with unexplained fussiness, aggression, and agitation.

Objectives:
1. The presence of aggression, agitation, and fussiness is strongly correlated with methamphetamine ingestion and should increase clinical suspicion.
2. Methamphetamine ingestion correlates with tachycardia.
3. True methamphetamine ingestions should also test positive for its metabolite, amphetamine, on urine drug screen.

Development of an Evidence-based Safer Prescribing Toolkit for Clinical Care

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Background: Despite a reduction nationwide in new opioid prescriptions since 2012, opioid overprescribing, as well as opioid misuse and overdose, remain significant U.S. public health issues. This issue extends to pediatric populations, with approximately 4 million pediatric opioid prescriptions in 2019, 45.6% of which were considered high-risk.This underscores the importance of safe prescribing practices, particularly in settings where youth frequently receive care, such as pediatric clinics and dental offices. It is well-documented that overprescribing of opioids has markedly contributed to the opioid epidemic; more recently, overdose deaths increasingly involve stimulants and benzodiazepines, signaling the need to address polysubstance use as part of our response to the opioid epidemic. In 2019, there was a deficit in just-in-time educational resources/tools; in response, the “Safer Prescribing Toolkit” was created to offer comprehensive, evidence-based guidelines and practical tools for healthcare providers and their patients pertaining to opioids, and more recently, stimulants and benzodiazepines.

Methods: In 2018-2019, a needs assessment of Michigan primary care providers was conducted, identifying knowledge/skills gaps. Based on the results, a comprehensive review of publicly available opioid prescribing resources and a systematic literature review to identify up-to-date recommendations were conducted in key areas. Provider and patient-focused educational content and resources were curated from existing sources or newly developed. Resources were reviewed by expert researchers/clinicians for accuracy and by practicing clinicians for usability and relevance. Training series covering topics related to safe prescribing were organized to complement the online toolkit. These efforts were funded by the Michigan Department of Health and Human Services. Periodic updates with new topics, including new sections on benzodiazepines and stimulants, have expanded the toolkit’s content.

Results: Toolkit resources are categorized across three commonly prescribed substance types: opioids, stimulants, and benzodiazepines. Several sub-categories exist within each section, including but not limited to: background resources (i.e., managing acute/chronic pain, managing anxiety/insomnia, reducing stigma), just-in-time tools (clinical decision flowcharts, screening and assessment tools), tapering/deprescribing, opioid use disorders (screening, referral, naloxone, medication for opioid use disorder), and prescribing laws (PDMPs, legal resources). In addition, there are resources and tailored information on/for special issues and populations, including adolescents, teachers and coaches, LGBTQ+, pregnant women, older adults, and more. Since its

2019 launch and subsequent updates, the toolkit pages have had over 228,000 views, suggesting high engagement with the content.

Conclusions: Development/dissemination of a just-in-time online toolkit to guide safe prescribing of these controlled substances, evidence-based pain and anxiety management, and substance use disorder treatment/linkage to care has potential for broad public health and clinical impact in addressing the opioid overdose epidemic. Future work on this toolkit includes responding to feedback from physicians to make the toolkit easier to navigate.

Objectives:
1. Understand the ongoing challenges and complexities of the opioid epidemic in the United States, including polysubstance use, and the increasing involvement of stimulants and benzodiazepines in opioid-related deaths.
2. Recognize the importance of evidence-based tools and training in promoting safer prescribing practices for all patients from childhood to older adulthood.
3. Understand the key components of the Safer Prescribing Toolkit, including its development process, target audience, and primary objectives.

Utilizing Child Abuse Death Review (CADR) Data to Implement Statewide Prevention Initiatives

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Background: The Florida CADR System is charged with conducting case reviews on all incidents of child deaths investigated by the Florida Department of Children and Families with the purpose of achieving a greater understanding of the factors contributing to preventable child death and to address these factors through the development of effective prevention efforts. The CADR System utilized data to inform the development of prevention initiatives to specifically address the primary factors contributing to the leading causes of preventable child death as demonstrated through the CADR case review process including, sleep-related infant death, drowning, and inflicted trauma.

Methods: Through the CADR case review process, an examination of at least 688 child death incidents occurring in 2019-2021, demonstrated sleep-related infant death and drowning as the two leading causes of preventable child death of cases examined by the Florida CADR System. Data analysis of surrounding circumstances of sleep-related infant death and drowning highlight contributing factors which is utilized to inform the development of effective prevention efforts.

Results: CADR data demonstrates the majority of sleep-related infant deaths in Florida are among infants 1-4 months of age, most frequently occurring in an unsafe sleep environment such as an adult bed, and the infant is most often found on their stomach when discovered unresponsive. Additionally, CADR data demonstrates that the majority of child drowning deaths occur in children 1-4 years of age and occur during non-swim time activities or when the child was not expected to be in or near the water. These critical factors along with other data derived from the CADR system were used in the design, development, and implementation of two data-informed prevention initiatives: Sleep Baby Safely and Keep Kids Safe From Drowning. Further examination of CADR data indicates geographical areas of the state with higher-than-state-average occurrence of sleep-related infant death and child drowning, allowing the CADR system to focus efforts in critical areas of the state to make the greatest initial impact, with an overarching goal of implementing the developed prevention efforts statewide.

Conclusions: In 2019, the CADR System implemented Sleep Baby Safely in Duval County, Florida as a pilot project. The examination of needed resources, support, and demonstrated outcomes of this pilot project promoted the expansion of Sleep Baby Safely to include eight additional counites in the state with higher-than-state-average incidents of sleep-related infant death. In 2022, the Florida legislature approved funds to support the expansion of this project as well as the Keep Kids Safe From Drowning prevention effort by allocating $2.8 million to these efforts. Both prevention initiatives have been implemented through the coordinated efforts of Local CADR Committee members and stakeholders, with continued examination of data collected through the CADR case review process for further evaluation of efficacy and to further support prevention initiative efforts.

Objectives:
1. Attendees of this presentation will outline methods utilized in the development of data-informed prevention initiatives, Sleep Baby Safely and Keep Kids Safe From Drowning.
2. Attendees will be able to demonstrate how data-informed prevention initiatives can address primary factors contributing to preventable child death and identify available and/or needed data sources.
3. This presentation will encourage attendees to examine existing data-informed prevention initiatives and evaluate gaps which may be addressed through further prevention initiative development.

Transition from Safety Center Based Education to Bedside Trauma Rounding for Injury Prevention Education

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Background: Injury is the leading cause of death for children. Children who experience one traumatic injury are at increased risk to experience another. Education and environmental modification is a critical component to injury prevention interventions. Historically, our hospital used our Safety Center as a site for injury prevention education at time of hospital admission for trauma. However, our Safety Center was located a five + minute walk from the Children's Hospital and had very limited hours. The Safety Center housed one injury prevention health educator limiting availability to our trauma patients if the health educator was already engaged with another family. This new program sought to ease barriers to education post traumatic injury.

Methods: Our team worked to transition tailored injury prevention education from a Safety Center setting to a bedside setting. Injury Prevention Health Educators screen daily in the hospital Electronic Health Records (EHR) for any patient admitted with an unintentional injury including submersion injuries and ingestion injuries (poisonings, magnets). Once patients are identified, age-based injury prevention packets were assembled and delivered to family's bedside. Safety product relevant to the injury is also offered to family. For example, if a child is admitted with a bicycle injury we offer a new helmet. A window fall injury may be offered window stops or guards. Presence of firearms in the home may result in distribution of gun locks. Education and product may extend beyond the child admitted if there are other children in the home.

Results: We lack historical data for the number of trauma patients that came to the Safety Center for education. Anecdotally, we estimate that number to be around 4 families per month. Bedside trauma rounding was piloted in late 2018. Trauma Rounding numbers were: 2018: 22 Trauma Rounds 2019: 99 Trauma Rounds 2020: 131 Trauma Rounds 2021: 242 Trauma Rounds 2022: 439 Trauma Rounds 2023: 334 Trauma Rounds

Conclusions: Removing barriers to education in the form of bringing education to bedside resulted in significant increase in injury prevention education.

Objectives: 1. How to identify and remove access to resources for patients. 2. How to craft a sensitive harm reduction intervention at bedside. 3. How to transition from a resource intensive program (safety center) to a less resource intensive yet more beneficial program.

Vehicle architecture and child restraint design influence the position of children treated with hip spica casts

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Background: Hip spica casts are commonly used for children aged 6 months to 5 years as an effective treatment for femur fractures and developmental hip dysplasia. While the spica cast is advantageous due to its non-invasive and conservative methodology, it can render transportation difficult. Past crash testing studies have shown that the child restraint shape and cast design significantly influence the positioning of the restrained child. One major drawback of these investigations was that all testing was performed on the same, simulated vehicle seat, as required by FMVSS 213. It was unknown how children fitted with hip spica seats would be positioned in actual vehicles. This was due to the design of 213 vehicle seat which allows unrestricted access from all directions. In contrast, access to seating positions in actual vehicles are constrained by adjacent features such as doors, nearby seats, and rear glass in the case of typical cars and pickup trucks. The current study was designed to investigate if children treated with a hip spica cast can be properly restrained in different child restraints in a range of typical vehicles.

Methods: Common vehicles representing a range of interior architectures were studied: 2-row truck, minivan, SUV, and compact car. Two crash test dummies (1 and 3 year-old) were used as child surrogates. Two child restraints (Merritt Wallenberg, Diono Radian R100) were investigated for the rear-facing and forward-facing configurations. An additional restraint (Ride Safer vest with or without the BubbleBum booster) was also studied for the forward facing 3 year-old. Casts typically utilized to treat bilateral hip dysplasia and femur fractures were applied to the dummies during which the positioning of the dummies body and lower extremities were maintained with a hip spica casting table. A third "walking" hip spica femur fracture cast was also created. A test matrix was created that attempted to properly restrain the two children in the different vehicles, in the different child restraints, while fit with each of the 3 hip spica casts.

Results: The forward-facing 3 year-old was safely restrained in nearly all test configurations. All hip dysplasia casts were safely restrained while 67% of femur fracture and walking casts were safely restrained. In contrast, the rear-facing 1 year-old was only safely restrained in the hip dysplasia cast, femur fracture cast, and walking cast at a frequency of 87.5%, 12.5%, and 37.5%, respectively. The minivan was associated with greatest number safely restrained configurations.

Conclusions: The current study documents that certain combinations of vehicle, child restraint design, rear- or forward-facing direction, and spica cast type influence the safe restraint of a child. Of note, the hip dysplasia cast can be restrained safely in nearly all cases, regardless of the variation in independent test parameters. In contrast, the cast typically used to femur fracture cannot be safely restrained in all cases, with forward-facing yielding more success than rear-facing.

Objectives: 1. There are differences between the hip dysplasia and femur fracture spica casts. 2. Common reasons for improper restraint include head-neck-spine misalignment and reduced pulmonary function. 3. The minivan was associated with greatest number safely restrained configurations.

Friday Workshop Sessions

WORKSHOP SESSION 1A

Climate Change: What's the Injury Risk?

Friday, December 6, 2024, 2:00 PM to 3:00 PM

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Description: For many, climate change conjures up images of polar bears adrift, Amazon deforestation and bleached coral reefs. Increasingly, the human health impacts of climate change are demonstrated and directly and powerfully felt, not only in lands far off, but here at home. 2023 was the hottest year ever on record, contributing to premature birth and excess deaths. The once paradise of Maui experienced the deadliest fire in a century. Smoke from Canadian fires crossed borders to pollute states across the US. Precipitation changes are causing both draughts and deluge, with storms such as Hurricane Harvey pouring down 61 inches of rain, the highest of any single storm in recorded history.

This workshop is designed to engage injury prevention experts in the development of a framework to understand climate change as a cause and contributor to injury. Dialogue will include consideration of classic extreme weather injuries (CO, power lines, burns, puncture wounds and lacerations) as well as conditions on the increase (heat stress) or not usually considered injury (birth outcomes, asthma, brain effects). The workshop will explore the disproportionate impact of climate change on children, how climate change exacerbates health inequities and how health inequities impede the ability to adapt to climate change.

Importantly, tools and action steps for providers and families served will be discussed, empowering participants to address climate change at the personal, practice and/or policy level. Throughout the workshop, participants will be invited to share their experiences and to contribute to the shaping of an injury prevention approach to climate change. Interested attendees may elect to join in the drafting of a manuscript on climate change and child injury prevention.

Objectives:
1. Understand the current injury impacts of climate change, as well as the predicted trends affecting children.
2. Describe the climate change inequities (exposure, physiology, adaptation) which disproportionately effect children, adolescents, pregnant persons, people of color and those living with poverty.
3. Applying the Haddon Matrix, consider prevention, adaptation and mitigation means of injury reduction.
4. Commit to 1-2 action steps at the personal, practice or policy level to address climate change and child injury.

WORKSHOP SESSION 1B

Using Quality Improvement Methods to Enhance an Injury Prevention Program

Friday, December 6, 2024, 2:00 PM to 3:00 PM

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Description: Beginning in December 2021, our tertiary care pediatric hospital in an urban, socioeconomically diverse city with high rates of firearm injuries implemented a study to improve the effectiveness of our hospital-based violence intervention program (HVIP) services. Despite the proven effectiveness of HVIPs in reducing injury recidivism, significant gaps were identified in the delivery of trauma-informed services to eligible families presenting to our emergency department (ED).

To address these gaps, our team conducted a comprehensive root cause analysis. This involved stakeholder interviews and surveys with nurses, providers, and Ujima staff (crime victim advocates - CVAs), as well as shadowing CVAs during patient interactions to better understand the challenges and needs.

Key interventions included: 1. Streamlining Referral Databases: Integration of various program referral databases to ensure they meet inclusion and exclusion criteria more efficiently. 2. Space for CVAs: Establishment of an ED touchdown space to increase the visibility and accessibility of Ujima staff. 3. EMR-Based Modifications: Creation of an automatic page-out system in the EMR, modeled after child life consults, with triggers for providers and more visible alerts for RNs (e.g., moving best practice advisories from triage to primary RNs). 4. Data Analysis: Collaboration with data analysts to create p-charts and c-charts for tracking referral rates over time. 5. Staff Education: Enhancing staff knowledge about Ujima through just-in-time resident training, RN newsletters, and the creation of an Ujima informational video accessible to patients post-ED discharge.

These interventions have been evaluated through multiple plan-do-study-act cycles, resulting in a significant increase in our HVIP referral rate from 54.3% to 95.4%.

This workshop will provide an overview of our HVIP improvement strategies and lead participants through the process of developing and evaluating interventions to enhance their own injury prevention programs. Participants will be divided into groups, each led by one of the presenters, to practice using root cause analysis to identify gaps and develop interventions for their program. Groups will reconvene to discuss their findings and share potential strategies for improving care delivery in their own settings.

Objectives:
1. Understand the components and significance of hospital-based violence intervention programs (HVIPs).
2. Learn how to conduct a root cause analysis to identify gaps in care delivery.
3. Gain insights into leveraging the electronic medical records to enhance program referrals and service delivery.
4. Reflect on how improved referral processes can enhance equity and access to trauma-informed care for all patients.

WORKSHOP SESSION 1C

Car Seat Product Development: Why Can't You Just Do [This]?

Friday, December 6, 2024, 2:00 PM to 3:00 PM

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Description: Have you ever wondered what it takes to design and develop a new car seat? This presentation will provide background on the three phases of product development while answering the question: "Why can't you just do [insert idea for a car seat]?" Design considerations and the computer aided design process will be discussed. The presentation will also cover the manufacturing process and assembly line features. Participants will leave with a better understanding of the scope of the car seat development and manufacturing process. Additionally, we will discuss Evenflo's medical waiver program and discuss the potential for adaptations to assist with individual car seat needs.

Objectives:
1. Review the three phases of product development.
2. Name at least three design considerations utilized when researching product ideas.
3. Discuss the computer aided design process.
4. Review the manufacturing process and assembly line features.
5. Discuss opportunities for the use of the Evenflo Medical Waiver program.

WORKSHOP SESSION 1D

A Workshop in Addressing Adolescent Relationship Abuse

Friday, December 6, 2024, 2:00 PM to 3:00 PM

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Felicia Scott-Wellington, MD
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Interim Division Chief, Adolescent Medicine
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Description: Participants will leave this workshop with enhanced tools and strategies for effectively supporting adolescents who are or may be experiencing adolescent relationship abuse, otherwise known as teen dating violence.

Adolescent relationship abuse is a critical issue affecting far too many young individuals. Each year, more than 1 in 3 adolescents experience physical, sexual, or emotional abuse in their dating relationships. These experiences significantly increase their risk of developing harmful internalizing and externalizing symptoms. Youth with intersectional identities—including those identifying as LGBQ, those who are gender diverse, and those from minority racial and ethnic backgrounds—face even higher rates of physical and sexual dating violence.

Scope of the Problem: - Detailed exploration of the prevalence and impact of adolescent relationship abuse. - Examination of the physical injuries and emotional harms experienced by both those who experience and those who commit the violent acts.

Clinical Insights: - Using an emergency room clinical encounter as a case study, we will discuss the critical role every clinical staff member can play in supporting adolescents facing relationship violence. - We will introduce the CUES framework (Confidentiality, Universal Education and Empowerment,

Support), an evidence-based tool designed to empower healthcare providers to support adolescents who may be experiencing relationship abuse, regardless of if they choose to disclose this or not during our encounter.

Practical Application: - We will train participants to use the CUES framework as a means of empowering adolescents to continue to build healthy relationships, as well as in supporting adolescents in safely navigating unhealthy or ending abusive relationships, as the time immediately following a break-up is the most dangerous time from a physical injury and mortality standpoint.

Community Partnerships: - We will highlight US-based organizations that clinicians can collaborate with to implement transformative programs in their communities with a goal of equipping youth with skills for building healthy relationships, recognizing signs of unhealthy relationships, and accessing professional support safely.

By the end of the workshop, participants will be equipped to make a meaningful impact in the lives of adolescents by promoting healthy relationships and providing crucial support to those experiencing relationship abuse.

Objectives:
1. Define what constitutes physical, sexual and emotional adolescent relationship abuse.
2. Describe the epidemiology of adolescent relationship abuse.
3. Identify groups that are at elevated risk of experiencing adolescent relationship abuse.
4. Describe the harmful physical and psychological sequelae of adolescent relationship abuse.
5. Demonstrate ability to implement the CUES (confidentiality, universal education and empowerment, support) framework in clinical settings to provide youth with resources to recognize, prevent, and address dating violence.

WORKSHOP SESSION 2A

Safer Car Seats: The Impact of 3 New Regulations

Friday, December 6, 2024, 3:00 PM to 4:00 PM

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Description: Motor vehicle crashes remain a leading cause of injury, hospitalization and death of children in the United States, and correct restraint of all vehicle occupants is the best proven intervention. Car seats are continually improving due to both voluntary improvements from manufacturers and new regulatory requirements, with the objective of enhancing the protection offered by the safety devices and the convenience of using them correctly.

This presentation will highlight three new child restraint regulations and the product changes we are likely to see as a result. This interactive session will familiarize advocates with the new requirements, the reasoning behind some of the specific improvements, and additional regulatory activities we anticipate this year.

References:
FMVSS 213a Final Rule, published June 30, 2022
FMVSS 213 Final Rule, published December 5, 2023
FMVSS 213b Final Rule, published December 5, 2023
Unified Agenda of Regulatory and Deregulatory Actions (https://www.reginfo.gov/public/do/eAgendaMain)

Objectives:
1. Have functional awareness of three new car seat regulations
2. Understand why highlighted regulatory decisions are appropriate
3. Be prepared for likely changes to current and future products advocates will encounter

WORKSHOP SESSION 2B

Love and happiness: Building and sustaining a career at a pediatric academic medical center

Friday, December 6, 2024, 3:00 PM to 4:00 PM

Garry Lapidus, PA-C, MPH
Co-Director, Office of Advanced Practice Providers, Connecticut Children's
Associate Professor, Pediatrics & Public Health, UCONN School
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Description: I will share my approach to professional and personal success that led to a career focused on injury and violence prevention and a proud IFCK member since 2001. The presentation will describe how I, 1) created a learning agenda and development plan that was flexible and specific to my individual professional interests and needs in injury prevention that included enhancing research skills, clinical knowledge, and building a professional network; 2) Sought mentors who were my teachers, sponsors, advisors, agents, role models, coaches, and confidant's, 3) Engaged in scholarship via research activities, reviewing journal articles, developing curriculum, and teaching, 4) Provided service and leadership to professional societies and organizations locally and nationally (including IFCK), and, 5) Invested in personal wellness through relationships, athletics, recreation, and music.

This approach and personal story may benefit others seeking personal and career satisfaction and success.

Objectives:
1. Describe the approach, strategies, and activities to build professional relationships with leaders and colleagues.
2. Describe opportunities and challenges related to research, education and training, community outreach, advocacy and policy activities.
3. Understand the clinical practice and professional growth challenges and opportunities for injury prevention researchers and practitioners working in academic medical centers.

WORKSHOP SESSION 2C

What TiKtok Taught Me About Safe Sleep: Rethinking Sudden Unexpected Infant Death Messaging to Adolescent Parents and Caregivers

Friday, December 6, 2024, 3:00 PM to 4:00 PM

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Director, Adolescent Medicine Fellowship
Co-Director, Department of Pediatrics DEI Taskforce
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Description: The transition through adolescence can be a challenging journey for most teens. Becoming a parent during adolescence is an additional transition. After the birth of a new baby, an adolescent shifts from being parented to becoming a parent who can plan appropriately, assert one's voice, and assess risk for their own child. This adaptation, however, is often met with substantial obstacles and challenges. Many parenting youth have experienced numerous negative health care encounters that contribute to disengagement and mistrust of the health care system, encouraging them to seek information from sources outside of healthcare providers.

A qualitative study of new mothers found that images of sleeping infants and infant sleep environments, as found in photographs, television, and social media platforms, were one of the most consistent influences on their decisions about how infants slept at home. Adolescents are particularly vulnerable to these images, especially when posted by peers who are strong influencers during this stage of brain development. Adolescents may rely on their parents or other family members for their infants' care and find themselves waffling between accepting "Grandma knows best" , peer influences, and their own instincts. Those providing safe sleep counseling may inadvertently direct their guidance towards an adolescent's parent, leaving adolescents excluded from effective safe sleep messaging, adolescent appropriate conversations, and situationally specific solutions.

This workshop will review adolescent brain development and the importance of appropriate adolescent discussions when reviewing safe sleep recommendations. We will review quotes from teen parents regarding barriers to safe sleep, highlighting the importance of engaging teens in discussions and solutions regarding infant safe sleep. Lastly, we will discuss the importance of recognizing cultural influences on safe sleep practices and historical challenges teen parents face when trying to reorganize these deeply embedded familial structures. To engage adolescents and young adults in health care, practitioners are encouraged to consider their own biases when serving this population. Together we must work towards fostering a positive, nonjudgmental approach, thereby providing supportive environments for our young parents to thrive.

Objectives:
1. Review data on SUID in infants with adolescent parents in temporary housing situations
2. Review adolescent brain development and its importance in adolescent specific messaging to parenting youth
3. Highlight challenges adolescent and young adult parents face when following safe sleep recommendations
4. Provide strategies to aid in discussions about safe sleep practices in parenting youth

WORKSHOP SESSION 2D

Injury Prevention Considerations for Youth Resettling in the United States

Friday, December 6, 2024, 3:00 PM to 4:00 PM

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Description: Unintentional injuries are a leading cause of morbidity and mortality for children and teens in the United States. The risk of injury is even higher for youth that have resettled in the United States as these youth face unique structural vulnerabilities and may experience pre-migration, migration, and post-migration trauma. Prior research has found a 20% higher rate of unintentional injuries among refugees compared with non-refugees. Further, most injury prevention resources do not account for cultural and linguistic difference or preferences, which may lead to increased injuries among this population. There are a variety of reasons why families resettle in the United States whether it be a natural disaster, famine, war, or seeking asylum and as the number of displaced populations continues to rise, pediatric clinicians and injury prevention experts will continue to treat increasing numbers of immigrant families. In caring for resettled children, it is important that we explore cultural and linguistic preferences when developing injury prevention strategies, as traditional methods of injury prevention may be inaccessible or not as effective.

This interactive, case-based workshop will include speakers that have worked directly with pediatric immigrant populations and have content expertise in injury prevention strategies. These experts will share their recommendations for engaging in trauma-informed and culturally appropriate injury prevention education for families and their communities. In this session, attendees will learn about 1) the different types of pathways or statuses (e.g. asylum seekers, refugees, undocumented immigrants) and how this impacts access to medical care 2) some of the most common and unique injury risks for immigrant youth populations (e.g. pedestrian, carbon monoxide, transportation, burns, falls, occupational injury/child labor) 3) best practices for tailored injury prevention strategies that incorporate trauma informed practices and avoid re-traumatization (accounting for pre-migration, migration and/or post-migration trauma that can lead to anxiety, depression, or post-traumatic stress disorder) and 4) strategies for fostering community engaged partnerships to develop and provide population-based, culturally informed injury prevention anticipatory guidance and interventions. It is critical that we engage newly resettled families by partnering with pre-existing resettlement, post-resettlement agencies, and community-based injury prevention organizations. This early engagement can help build trusting partnerships and allow existing injury prevention organizations to serve as a resource while families navigate a high-risk period for injury.

Objectives:
1. Define pediatric communities at high risk for injuries that have settled in the United States including asylum seeker, refugee, undocumented.
2. Identify increased injury risks that these resettlement pediatric populations may have compared to local pediatric populations.
3. Explore the role of medical evaluation in healthcare setting with trauma informed approaches for this population.
4. Provide recommendations for conducting injury prevention education, initiatives, and research while being mindful of cultural values and linguistic needs.
5. Understand how to collaborate with existing agencies and community organizations as a platform for providing injury prevention education.

PANEL DISCUSSION

Get Off Your Grass: Let's Work Together to Prevent Pediatric Lawnmower Injuries

Saturday, December 7, 2024, 8:00 AM to 9:00 AM

Panelists:

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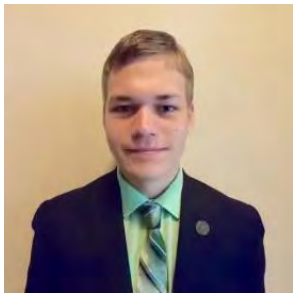

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Description:
Join us for a thought-provoking discussion aimed at enhancing child safety and preventing lawnmower-related injuries through engineering, community involvement, and proactive education. This session will address alarming statistics and factors that increase the risks of these injuries while delving into how engineering innovations such as improved safety features and the development of aftermarket products can significantly decrease the risk. Lastly, we will explore the powerful role that families of injured children can play in advocating for safety measures.

Objectives:
1. State at least three factors that put children at increased risk for lawnmower-related injuries.
2. Discuss how engineering changes in lawnmowers or aftermarket products could significantly decrease the risk of pediatric bystander injuries.
3. Understand how serious injuries to children may motivate families to help protect other children from similar harm, and how these families can become important partners in delivering injury messages.

PLATFORM PRESENTATIONS

Safe Sleep

Saturday, December 7, 2024, 9:00 AM to 10:15 AM

Session Description:
In this session, attendees will explore how systematic Safe Sleep screening can increase the number of families given access to education and a cribette for home use. They will also examine how collaborations and surveys with health departments, community alliances, and direct interactions with families can inform state and local prevention efforts. The session will highlight how sharing hospital-specific SUID data can raise awareness among hospital representatives, leading to policy changes and improved family education. Additionally, training hospital professionals and outreach nurses will be shown to increase education and resources for low-income families. Finally, the session will address how to meet the unique needs of families living in emergency shelters through collaboration with key organizations, shelter staff, and on-site education for families.

Learning Objectives:
1. Understand the importance of a formalized screening process to decrease preventable sleep-related deaths.
2. Learn about three examples of low-cost projects that effectively improve infant health and safety in local communities.
3. Recognize how sharing hospital-specific SUID data can inform and influence quality improvement initiatives related to safe sleep in birth hospitals.
4. Appreciate the benefits of targeted outreach and training for professionals who provide care to infants and their families.
5. Explore how developing safe sleep guidance tailored to the unique needs of shelter settings can effectively engage shelter staff and emergency response stakeholders.

Moderators:

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A Quality Improvement (QI) Initiative: An Emergency Department (ED) Based Safe Sleep Screening to Improve Access to Safe Sleep Resources and Education

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Authors: *Elizabeth Hendrickson, MD; Michelle Pintea, MD, MPH; Lindsay Clukies, MD*

Background: In the United States, approximately 3,400 children die annually from unsafe sleep environments. These deaths include sudden unexpected infant deaths (SUID), suffocation, and strangulation. Numerous national educational campaigns have decreased the national SUID death rate. However, Missouri continues to experience high rates of preventable sleep-related deaths, with 103 in 2022 alone. Data reviewed from our institution showed providers rarely documented conversations about safe sleep. Our QI initiative sought to improve safe sleep screening at our level 1 pediatric trauma center and provide appropriate resources and education to families.

Methods: Our QI initiative took place at a single-center level 1 pediatric trauma center with approximately 50,000 ED visits per year. A safe sleep screening initiative was implemented with the SMART aim to increase the rate of safe sleep screening of all children under 12 months of age by providers by 75% from July 5, 2023 to March 1, 2024. We created a “Best Practice Advisory” (BPA) that flagged in the charts of all patients under 12 months of age and asked providers to answer a predeveloped, three-question screening set via an Epic “dot phrase.” At time of discharge, all patients under 12 months of age were provided with the American Academy of Pediatrics safe sleep guidelines, regardless of screening answers. If unsafe sleep practices were identified, providers were prompted to place a Social Work (SW) consult for necessary education or resources, including portable cribs at no cost. Our outcome measure was the total number of consults placed/cribettes given out.

Results: In the 12 months prior to our initiative, 7,998 infants were seen in the ED. Of those, only 15 received SW consults for unsafe sleep practices and were provided cribettes. Following the implementation of our initiative, from July 2023 to March 2024, 5,808 infants were seen. Forty-eight were screened as practicing unsafe sleep and provided education and a cribette for home, a 340% increase in only nine months. This outcome was significant enough to justify continued implementation of this screening measure. Limitations found by analysis of

process and balancing measures included increased patient volumes, the subtle location of the BPA in the chart, and noncompliance. These barriers were overcome by moving the BPA to a more visible location, sending reminders, and posting signage at provider workspaces reminding them of the initiative.

Conclusions: Injuries or deaths from unsafe sleep practices are preventable. Our initiative demonstrated that implementation of formalized screening in the ED setting leads to increased identification of infants at risk. While barriers to screening exist, it does increase rates of safe sleep counseling and improves access to resources to facilitate safe sleep practices.

Objectives:
1. Attendees will learn that there continues to be a high rate of preventable, sleep-rated death in Missouri and other individual states despite decreases in overall national SUID rates.
2. Attendees will learn the importance of documentation around safe sleep.
3. Attendees will learn the importance of a formalized screening processes aimed at decreasing preventable sleep-related deaths.

Reducing sudden unexpected infant deaths using innovative approaches

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Authors: *Joanna O'Donnell, BA, GC-C*

Background: Prematurity is the leading cause of sudden unexpected infant death (SUID) in the U.S.; however, sleep-related deaths are in the top three. Safe sleep messaging has been ongoing since the mid 1990's, yet sleep-related infant deaths continue to occur.

Methods: Our organization implemented three projects designed to capture and elevate the family voice around infant safe sleep practices, increase understanding of family needs and adjust prevention efforts.

1. Sleep Baby Safe Project - 10 local health departments were invited to participate in this project. Participants attended local community events, conversed with families about their current and/or planned infant sleep habits, visually demonstrated what a safe sleep environment looks like and utilized this project to enhance their current prevention efforts. This project made it possible for health department staff to provide education around safe sleep and converse directly with families. Families also were asked to complete a survey as a method to capture first-hand information.

2. Reducing SUID Using a Collaborative Approach – The Alliance partnered with the Child Abuse and Neglect Prevention Board to survey public health departments, Women, Infants and Children (WIC) clinics and hospitals, in order to understand how infant safe sleep and abusive head trauma (AHT) information was being shared with families. In 2023-24, the survey was piloted to agencies in Milwaukee County, Wisconsin's most populous county. The survey results revealed inconsistencies about how the agencies interpreted information delivery methods. This survey highlighted the need to offer more training to agencies about infant safe sleep and AHT that should include how to have trusting, nonjudgmental conversations to raise awareness and share information.

3. Reducing Sleep-Related Infant Mortality Impacting African American Communities in Southeast Wisconsin. African American families in Wisconsin experience SUID at a rate nearly four times greater than other families. This project focused on including family voices from impacted communities to help address the issue and to learn what barriers exist for families. The survey was offered to African American caregivers between the ages of 18-30 who were pregnant or caring for an infant under 1 year of age. Families who choose not to follow safe sleep recommendations often include one or more social determinants of health, like unstable or crowded housing, transportation and lack of support; the Alliance's goal was to learn from families what community and professional support would look like to help address these issues.

Results: Survey results informed state and local prevention efforts for SUID and injury in infant sleep environments.

Conclusions: Taking part in these projects improved collaboration and engagement between local health departments and the community. More than 500 families received education and information on the utilization of the AAP guidelines for infant safe sleep and shared their thoughts first-hand.

Objectives:
1. Learn how SUID impacts communities.
2. Understand how direct conversations with families can help reduce SUIDs.
3. Hear three examples of low cost projects designed to influence the health and safety of infants in local communities.

Building a Birth Hospital Learning Community to Prevent Sudden Unexpected Infant Death

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Background: Sudden Unexpected Infant Death (SUID) claims ~ 3,400 infants each year in the United States. In Cook County, IL, a SUID occurs nearly every week and are concentrated in areas that experience increased socio-economic hardship. Birth hospitals rarely hear about the SUID which occur among infants they discharge, contributing to low awareness of the frequency and distribution of SUID in their communities. In 2019, Cook County joined the Center for Disease Control and Prevention's national SUID surveillance system and through these efforts SUID data by hospital of birth were obtained. In 2023, the Illinois Perinatal Quality Collaborative (ILPQC) named Equity and Safe Sleep for Infants (ESSI) as the statewide QI project for 2024. We describe our process for sharing hospital-specific SUID data and cases with Cook County, IL birth hospitals coinciding with the launch of ESSI.

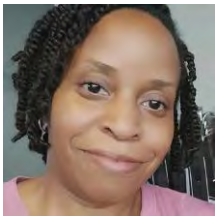
Methods: We identified our Birth Hospital Outreach Coordinator, who leads our hospital's Safe Sleep Task Force, to drive the outreach approach. Stakeholders were identified at each hospital, and two meetings were scheduled. The first meeting was used to establish relationships, review SUID and the Cook County SUID Case Registry and Prevention (SUID-CR) data, provide hospital-specific SUID rate and ranking among other institutions, and discuss each hospital's current safe sleep education, modeling, policies and practices. The second meeting reviewed the SUID-CR data process and shared hospital-specific SUID cases, including narratives with doll scene reenactment photos. Stakeholder reflections and opportunities for growth were noted. Follow-up meetings were provided for those stakeholders who desired case-level presentations for staff review. The opportunity for building a learning community was explored. This effort was funded by the Michigan Public Health Institute.

Results: Meetings as described above were completed with 9 hospitals. During this time, 4 other Cook County birth hospitals contacted us for their data and meetings with these hospitals were also completed. Hospital leadership were receptive to and visibly moved by their data, resulting in an openness to sharing their current safe sleep practices and policies. Three hospitals requested presentations to their perinatal and postpartum staff, and these were completed. Common reflections included the importance of raising and sustaining SUID awareness and considerations regarding improved approaches to supporting safe sleep in their perinatal and postpartum settings. The majority of hospitals discussed how ESSI has prioritized improving safe sleep modeling and education, and felt case-sharing influenced how safe sleep education could be optimized to be more conversationally oriented and inclusive.

Conclusions: Providing birth hospitals the details of SUID among their newborn discharges may stimulate a re-examination of how SUID prevention is handled prior to discharge including staff education, safe sleep modeling and crib/bassinet availability for families who need them. Sharing hospital-specific data with birth hospitals as they embarked on ESSI synergistically promoted SUID prevention goals. Reviewing individual SUID cases puts humanity into the statistics allowing hospital personnel to reflect on how they role model and conduct conversations for families they serve.

Objectives:
1. Birth hospitals rarely hear of SUID that occur among the infants they discharged.
2. Sharing hospital-specific SUID data can inform and influence birth hospital safe sleep QI initiatives.
3. Raising awareness through sharing hospital-specific SUID data is a useful approach to improving accurate risk perception of SUID.

Sleeping Safely: A Program to Promote Safe Sleep Practices and Empower Families.



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Background: Infant sleep related deaths are preventable if safe sleep education is provided to caregivers and the resource to obtain a safe sleep environment is made available. This program aims to reduce sleep-related infant deaths in high priority areas or areas that have high rates of sleep related infant deaths, through virtual and in person Safe Sleep trainings for community professionals and caregivers. The Program Manager is responsible for collecting data on local infant sleep related deaths which is used to make data driven decisions in the community. The program also provides Model Behavior Safe Sleep trainings for the six (6) local birthing hospitals by our 2 Safe Sleep Model Behavior Registered Nurses. Outreach to OBGYN offices, Pediatric offices, and childcare centers allows the program to share safe sleep educational resources at a professional level that can be shared with their clients. Through the program eligible families can apply for a Pack' N Play to ensure their infant has a safe sleep environment.

Methods: Our Safe Sleep program which started in 2019 offers a 2-hour Safe Sleep training class for Professionals once a month or more as requested and Facilitated by the Program Manager. The curriculum is evidence based and modeled from the 19 Safe Sleep recommendation from the American Academy of Pediatrics. The program is made sustainable

through funding from non-profit organizations that assists in purchasing monthly; 100 Pack N Plays, 100 fitted sheets, 100 sleep sacs (wearable blankets) and educational materials that are provided to families in need of a safe sleep environment. To be eligible the family must have an infant up to 12 months of age or pregnant (35 weeks gestation to birth) and household income is below the poverty line for Broward County. Funding also allows the program to acquire 2 Safe Sleep Model Behavior Nurses to provide education to local hospitals and provide outreach to OBGYN offices and Pediatric offices in Broward County.

Results: In the fiscal year 2023 the program provided 783 Pack'n Plays, safe sleep education and resources to Broward families. The funding also allowed The Safe Sleep program to reach its yearly goal of providing Model Behavior Safe Sleep education to100 hospital staff members at the six (6) birthing hospitals in the County. The Safe Sleep train the trainer program has been successful in training 281 Community Professionals including case managers, care coordinators, nurses, child investigators and counselors.

Conclusions: Infant sleep related deaths are preventable. By bringing the community together using education, available resources and normalizing safe sleep practices we can ensure that every infant has a safe sleep environment.

Objectives:
1. Understand how the Safe Sleep Program operates in a high priority area.
2. The benefits of targeted outreach and training to professionals who provide care for infants and their families.
3. Recognize the importance of assisting families in acquiring a safe sleep environment for their infant and to practice safe sleep AAP recommendations.

Supporting Safe Sleep in Emergency Shelter Settings for Migrants in Chicago

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Authors: *Gina Lowell, MD, MPH; Monica Mitchell, MPH, LCPC, CCTP; Jessica Wilkerson; Jose Perez; Jennifer Vidis, JD; Hope Vaughn, LSW; Wayne Detmer, MD; Kyran Quinlan, MD, MPH*

Background: Sudden Unexpected Infant Death (SUID), the leading cause of death for ages 1-12 months, mostly occurs in infants <6-months-old. Bedsharing and soft bedding increase SUID risk. Since August 2022, ~40,000 migrants from Latin America have arrived in Chicago with a surge arriving in the summer through winter months of 2023. The City of Chicago's emergency shelter system response includes 18 family-serving shelters. Sleep environments in these shelters contain multiple infant sleep hazards for this vulnerable population, placing infants at substantial risk for SUID.

Methods: The Chicago Department of Public Health (CDPH) launched monthly "Prenatal and Newborn Care for New Arrivals" collaborative calls, convening the Emergency Operations Center (EOC) of the Department of Family and Support Services (DFSS), the Illinois Department of Public Health (IDPH), healthcare systems providing prenatal/newborn care to new arrivals (Cook County Health and Hospital Systems (CCHHS), Lawndale Christian Health Center (LCHC)), the Chicago Homelessness and Health Response Group for Equity (CHHRGE), and the Cook County SUID Case Registry and Prevention, to exchange data and coordinate efforts supporting health and housing needs of newly arrived pregnant/postpartum families. SUID risk emerged as a key focus, prompting our development of "Guidance for Safe Sleep in Shelter Settings," a document detailing SUID definitions, safe sleep guidance, a safe sleep checklist, recommended infant sleep products, and a recalled infant sleep product list developed in partnership with an advocacy group, Kids in Danger (KID). Using this guidance, we provided safe sleep education for shelter staff throughout the system and with monthly census data provided by DFSS, conducted "safe sleep rounds" at shelters with infants <6-months-old to promote safe infant sleep environments.

Results: From December 2023-May 2024, 12 of 18 emergency shelters housed 84-88 infants <6-months-old at any given time. Safe sleep rounds (10) were well-received at the 7 shelters that housed >90% of these young infants. Visiting families (30) in the rooms where they slept allowed for observation of their infant's sleep environment and enabled rich conversations about preventing suffocation. Shelter spaces included congregate rooms with cot-sleeping and individual rooms with bed/bunk sleeping. Space for portable bassinets/cribs varied. Bedsharing and soft bedding use was prevalent. Safe sleep conversations were held in Spanish or with translation support. Parents were receptive, appreciative, and shared usual infant sleep practices from their home countries. Cribs (16) and sleep sacks (30) were provided in real time. The EOC also established a process by which shelters could order bassinets and these were observed at 13 bedsides.

Conclusions: SUID prevention for vulnerable populations is possible even in highly dynamic and constrained environments. The density of Chicago's immigrant emergency housing resulted in high risk infant sleep environments, but also enabled "Safe Sleep Rounds." Convening multiple stakeholders with public health, maternal-infant health, emergency operations, social care, housing and healthcare expertise who are involved on-the-ground and at systems levels is necessary for an effective intervention.

Objectives:
1. Infants in congregate shelter settings face multiple sleep environment hazards.
2. Relationships and partnership with local and system-level stakeholders enables effective injury prevention approaches.
3. Developing safe sleep guidance specific to the unique needs of shelter settings effectively engages shelter staff and emergency response stakeholders.

An Equity Advisory Committee to Support the Work of a Community Facing Injury Prevention Organization

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Background: Since the murder of George Floyd, there has been unprecedented recognition by many disciplines on the importance of identifying and addressing the structural causes of inequities, including racism, classism, and other forms of bigotry. The injury prevention community is no exception; injury inequities and outcome disparities persist and in some cases are widening. The CDC Vital Signs described a 28% increase in drowning deaths for children between 1 and 4, and Black people between 2019 and 2021. American Indian/Alaska Native people continue to have the highest drowning rates. In addition, Black and American Indian/Alaska Native children have the highest rates of traffic fatalities, both as pedestrians and as occupants. The leadership of Safe Kids Worldwide recognized the need for an equity science-based approach to programs, policies, and research to address these inequities. This led to the formation of the Safe Kids Worldwide Equity Advisory Committee (EAC).

Methods: The EAC was chaired by a physician scientist with expertise in injury prevention and equity science. The chair along with Safe Kids Worldwide leadership identified subject matter experts in water safety, child passenger safety, safe sleep, child fatality review, and emergency preparedness to be involved in the committee. Further, Safe Kids Worldwide governance was directly aligned with the EAC.

Results: The EAC includes 10 members, including the chair, 6 academically-oriented, subject matter expert pediatricians, a Safe Kids Worldwide board member (also a subject matter expert pediatric subspecialist), and 2 Safe Kids Worldwide staff members. Each member agreed to a 3 year term. The EAC meets monthly for one hour and is also represented on the agenda of all Safe Kids Worldwide Board meetings. The committee discusses various research ideas, and provides input on programming and advocacy. The group has presented on approaches to centering equity in injury outcomes at various scholarly meetings, including the Pediatric Academic Societies, the Society for the Advancement of Violence & Injury Research, Lifesavers, and Safe States. The EAC has successfully supported Safe Kids Worldwide in implementing an equity science-based approach. This is in line with comprehensive work being done by other pediatric focused organizations such as the American Academy of Pediatrics, which has seated equity science experts to support the incorporation of race-conscious approaches to the development of clinical practice guidelines.

Conclusions: It is feasible and mutually beneficial for a scholarly-based, academic committee to support the work of a community facing injury prevention organization in prioritizing an equity focus.

Objectives:
1. To understand how an academic committee with expertise in injury and equity science can support the work of community facing organizations.
2. To understand the breadth and depth of work that can be accomplished by an injury prevention organization with the support of an academic focused committee.
3. The field of injury prevention can benefit from partnerships across community facing organizations and equity science pediatrician experts.

LIGHTNING ROUND PRESENTATIONS

Saturday Lightning Round

Saturday, December 7, 2024, 10:25 AM to 11:00 AM

Session Description:
This session will cover important topics in injury prevention including social vulnerability and its relationship to fatal pediatric injury, bicycle safety, helmet use, infant drowning, and the novel role of Safety Baby Showers.

Learning Objectives:
1. Evaluate the incidence of the 5 most common causes of pediatric injury death in Georgia and their differences by social vulnerability index
2. Understand a potential framework to establish a safety baby shower program
3. Understand how a simple intervention can improve caregiver understanding of appropriate helmet fit
4. Explore the epidemiology and risk factors associated with urban and rural fatal cyclist motor vehicle collisions and engineering countermeasures to mitigate crash risk
5. Discover how the Area Deprivation Index can be utilized to design and implement targeted injury prevention programs.
6. Identify at least three rural adolescent demographic groups who ascribe lower importance to helmet use.
7. Overview common drowning scenarios for pediatric bathtub drowning incidents.

Moderators:

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From birth to death: the intersection of social vulnerability and pediatric injury fatalities

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Background: Unintentional injuries are the leading cause of childhood death in the United States. Children living in neighborhoods with lower social vulnerability indices (SVI), originally used to evaluate communities at higher risk of complications following natural disasters, have greater overall injury risk. However, the overlap in injury-related mortality risk by SVI looking at multiple mechanisms has been less explored. Our objective is to evaluate the association of SVI with the incidence of the five most common causes of injury-related death among children and young adults (0-24y) in the state of Georgia.

Methods: We conducted a cross-sectional study utilizing Georgia Department of Vital Records death certificates from 2011-2021. We evaluated the association between incident deaths from drownings, firearms, motor vehicle collisions (MVCs), poisonings, and sleep-related death (SUID) with census-level SVI defined by the CDC (a composite SVI divided into quartiles). We evaluated incident deaths for each cause stratified by the four subcategories comprising the SVI (socioeconomic, household composition/disability, minority, housing type/transportation). To determine factors associated with incident injury-related causes of death, we modeled outcomes using negative binomial regression controlling for the cause of death and SVI.

Results: 10,643 deaths were included: 531 from drownings, 3,798 from firearms, 3,414 from MVCs, 1,163 from poisonings, and 1,737 from SUID. Most of the deaths were in males (7,845, 74%). Lower socioeconomic SVI and greater minority SVI had the strongest correlation with incident deaths overall. Firearm deaths were most disparate between the lowest and highest overall SVI quartiles (2.1 deaths per 100,000 in the wealthiest SVI vs. 5.8 deaths per 100,000 in the poorest SVI). Conversely, the incidence of deaths from poisonings was highest in the wealthiest SVI in all subcategories (socioeconomic, household composition/disability, minority, housing type/transportation).

Incident deaths from drownings varied the least by SVI (0.42 deaths per 100,000 in the wealthiest SVI vs. 0.64 deaths per 100,000 in the poorest SVI).

Conclusions: More socially vulnerable children had a higher incidence of injury-related deaths for all causes except for poisonings. Disparities in incident deaths were greatest in those affected by firearm injury, indicating a pressing need to address this cause of death in socially vulnerable populations. Determining which SVIs were associated with each injury-related mechanism can inform targeted interventions to prevent these untimely deaths.

Objectives: 1. Evaluate the incidence of the 5 most common causes of pediatric injury death in Georgia.
2. Compare the incidence of pediatric injuries throughout SVI quartiles.

Evaluating Safety Baby Showers as an Approach to Improve Parental and Pediatric Resident Practice of Infant Injury Prevention

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Background: Unintentional injuries are the leading cause of death for people ages 1-44 and the fifth leading cause of death for infants. Injury prevention counseling has been shown to reduce unintentional injuries. Safety Baby Showers (SBS) are educational events that aim to improve expectant parent knowledge of infant safety. Pediatric resident physicians are resources for families, but don't always discuss injury prevention during patient encounters. In one study, less than half of pediatric residents mentioned injury prevention in well-child visits and only one minute was devoted to these topics if discussed. As a follow-up to previously presented work, we will discuss the evaluation of our SBS program aimed at improving pediatric resident and expectant parent infant safety knowledge and comfort.

Methods: We conducted SBS events in partnership with Centering Pregnancy, a group prenatal care model for low-income expectant mothers. Participants rotated through six safety stations covering infant-specific injury prevention topics. Participants received educational materials and an incentive gift bag with approximately $75 worth of safety items. Raffles were held for larger items such as car seats. Participants completed pre- and post-SBS surveys to assess effectiveness in improving parent knowledge and confidence. Follow-up surveys were sent out to participants 3-9 months after SBS attendance to determine long-term impact. We assessed baseline pediatric resident knowledge and comfort with infant injury prevention topics via survey in fall 2023. Residents who attended SBS events completed an additional survey to assess attitudes regarding SBS clinical impact.

Results: We've hosted three SBS events with 76 participants; 40% identifying as first-time parents. Participants had significant improvement in knowledge of infant safe sleep positions, with 47% identifying the back as the safest position for sleep in pre-survey and 76% in post-survey. Participants had significant improvement in knowledge of car seat transitioning time, from 31% correct in pre-survey to 54% in post-survey. Participant confidence increased in multiple areas, including child passenger safety and choking management.

Approximately 55% of pediatric residents completed a baseline survey. Over half reported never previously receiving infant safety training. The most frequently reported safety topics residents discussed in patient encounters were safe sleep (93%), formula mixing (75%), and car seats (87%). Most residents reported discussing car seats with families, it was one of the most uncomfortable topics to review. Additionally, 75% of residents who volunteered at a SBS felt it was a very good/excellent educational activity, and two-thirds would use what they learned from the showers in clinical practice.

Conclusions: Infant safety can be overwhelming for parents and residents. Safety baby showers may be an effective way to improve pediatric resident knowledge and comfort in infant injury prevention counseling, and to share safety information with parents. We plan to continue our SBS program utilizing this feedback to improve their efficacy.

Objectives:
1. Potential framework to establish a safety baby shower program.
2. Areas expectant parents need improvement in infant safety.
3. Areas pediatric residents need improvement in infant safety.

Pediatric Helmet Use and Fit on an Urban Bikepath - The Impact of Educational Intervention on Helmet Fit

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Background: Pediatric traumatic brain injuries from activities where helmet use is recommended (AWHUR) can be mitigated by use of appropriately fitting helmets. However the rate of appropriate helmet use during AWHUR on dedicated pedestrian/bicycle paths may vary, and the efficacy of brief education regarding helmet fit is unknown. Our objectives were to evaluate helmet use of children participating in AWHUR on a dedicated bike/pedestrian path and to evaluate the effect of a brief educational intervention on helmet fit.

Methods: In this study's observational arm, we observed children participating in AWHUR and recorded sex, race, estimated age group, type of AWHUR, and helmet use. In the

interventional arm, guardian/child pairs were asked to complete a pre/post assessment. Participants completed a survey on demographics and helmet use. Educators assessed helmet fit after the caregiver put their child's helmet on or supervised their child's own helmet placement. Helmet fit was assessed based on chin strap and side strap placement, helmet brim height, and helmet movement greater than 1 inch in any direction. Helmet standards were also assessed for age, certification, and AWHUR suitability. Any single incorrect element resulted in a fail. Then, an educator demonstrated proper helmet fit. After loosening straps and removing the helmet, guardians fit it on their child a second time; this post-education assessment was recorded, with additional feedback if needed. The pre- and post-test values were compared using McNemar's test and are reported with p-values.

Results: Of the 287 children (61.3% male, 78% White) in the observational arm, most were engaged in bicycling (39.0%) or riding in a bike seat or caravan (40.4%). Overall helmet use was 72.8% with rates varying by activity. In the interventional arm, even though 80.8% of 78 guardian/child dyads endorsed helmet ownership, only 24.4% demonstrated appropriate helmet fit pre-intervention; this fell to 15.4% when accounting for helmet standards. Post-intervention, helmet fit improved to 89.7% (p< 0.001). The most common areas of poor fit pre-intervention included helmet brim (51.3%) and chin strap placement (29.5%); post-intervention this improved to 93.6% and 94.9% respectively (p< 0.001).

Conclusions: Even though pediatric helmet use during AWHUR on a dedicated pedestrian/bicycle path was high, appropriate helmet use and fit was suboptimal . A brief educational intervention significantly improved helmet fit immediately after education. Further study on whether improvements in helmet fit are retained over time is warranted.

Objectives:
1. Describe how helmet use in the pediatric is suboptimal, both in usage rates and helmet fit.
2. Understand how a simple intervention can improve caregiver understanding of appropriate helmet fit.
3. Discuss how helmet use rates vary across activity children engage in.

Safe System Approach to Preventing Cyclist Fatalities: Safety by Design for Urban and Rural Environments

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Background: Cyclists are a particularly vulnerable road user group, with the number of preventable deaths increasing by 37% over the past decade. The objective of this study was to review the epidemiology of cyclist fatalities to identify risk factors to target via a safe system approach.

Methods: Fatal cyclist motor vehicle collision (CMVC) and injury data were collected from the Office of the Chief Coroner (2013-19), with selected crash investigations and expert review by a multidisciplinary team of engineers, coroners, physicians, geographers and epidemiologist. Descriptive analyses were undertaken. Urban and rural CMVC were compared with Pearson chi square and Mann-Whitney U tests.

Results: There were 83 unintentional cyclist fatalities (81% male), 5(6%) children, 11(13%) youth, 57(69%) adults and 10(12%) seniors, with median (IQR) age=48.0 (27.0-48.0) and ISS=75 (45-75). Head was the most severely injured body region (median MAIS=5), except in children [median MAIS thorax=4.5 (3.75-5)]. Nearly 2/3 of cyclists were not wearing a helmet and 24% were impaired at the time of the crash. Expert review found 60% of child cyclists were runover, all <6 years, and this was the only age group to be struck by a car or pickup truck. Distraction from cell phone (n=1;1%) or headphones (n=7;8%) may have contributed to CMVC. There were 49 (59%) cyclists killed in an urban environment. Comparing urban with rural CMVC, all child cyclist deaths were in the urban group, which also had a significantly (p<0.001) higher proportion of collisions involving an intersection (57%; 6%), very low speed (?15kmh) collisions (33%; 0%), bike lane (29%; 0% with 8/14, 57%, struck by a heavy truck), cyclists stopped/slowed (33%; 3%), crossing the street (31%; 0%), involving heavy vehicles (31%; 6%; p=0.006), resulting in more runovers (49%; 9%). Rural collisions were associated with significantly (p<0.001) more high speeds (>50 kph) (94%; 49%), darkness/nighttime (44%; 10%), cyclist going ahead (97%; 65%), riding on roadway with traffic (65%; 18%). No rural CMVC had cycling infrastructure, bike lane/path or sidewalk, available (0% vs 33%; 0% vs 84%; p<0.001).

Conclusions: Riding a pedal cycle in traffic puts cyclists at risk for severe injury and death, in both urban and rural environments. A safe system approach recognizes that people are vulnerable and make mistakes. Incorporating engineering countermeasures into the design of roadways to separate cyclists from vehicles, lighting in rural areas, and traffic calming measures to reduce speeds. Vehicle safety features include guard rails, mirrors and cameras on heavy vehicles, higher rated vehicle headlight performance, and advanced driver assistance technologies to detect cyclist or automated emergency braking can play important roles in the prevention of CMVC. Policy and legislative action can also improve the safety of the transportation system. To be equitable, these countermeasure must be implemented in all areas of a region to protect all road users.

Objectives:
1. The epidemiology and risk factors associated with urban and rural fatal cyclist motor vehicle collisions.
2. Principles of a safe system approach to road safety for cyclists.
3. Engineering countermeasures including road and vehicle design, to help mitigate crash risk.

Bike Helmet Usage in the Most Disadvantaged Neighborhoods: A Focused Area for Trauma Prevention

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Background: There is a paucity of data to describe how neighborhood socioeconomic disadvantage (NSD) correlates with childhood injuries and outcomes. This study assesses the relationship of NSD to bicycle safety and trauma outcomes among pediatric bicycle versus automobile injuries.

Methods: Between 2008 and 2018, patients < 18 y old with bicycle versus automobile injuries from a Level I pediatric trauma center were evaluated. Area Deprivation Index (ADI) was used to measure NSD. Patient demographics, injury, clinical data characteristics, and bike safety were analyzed. Traffic scene data from the Statewide Integrated Traffic Records System were matched to clinical records. Multivariate logistic regression was used to assess demographic characteristics related to helmet usage.

Results: Among 321 patients, 84% were male with a median age of 12 y [interquartile range 9-13], and 44% were of Hispanic ethnicity. Hispanic ethnicity was greater in the most disadvantaged ADI groups (P < 0.001). Mortality occurred in two patients, and most (96%) were discharged home. Of Statewide Integrated Traffic Records System matched traffic records, 81% were at locations without a bike lane. No differences were found in GCS, intensive care unit admission, or length of stay by ADI. Hispanic ethnicity and the highest deprivation group were independently associated with lower odds of wearing a helmet (AOR 0.35, 95% confidence interval 0.1-0.9, P = 0.03; AOR 0.33 95% confidence interval 0.17-0.62; P = 0.001), while patient age and sex were unrelated to helmet usage. Outcomes for bike versus auto trauma remains similar across ADI groups. However, bike helmet usage is significantly lower among Hispanic children and those from neighborhoods with greater socioeconomic disadvantage.

Conclusions: Outcomes for bike versus auto trauma remain similar across ADI groups. However, bike helmet usage is significantly lower among Hispanic children and those from neighborhoods with greater socioeconomic disadvantage.

Objectives:
1. Learn the definition of Area Deprivation Index (ADI).
2. Explore the association between Area Deprivation Index and bicycle helmet use.
3. Discover how Area Deprivation Index can be utilized to design and implement targeted injury prevention programs.

Rural Adolescent Attitudes and Use of Bicycle Helmets in Iowa

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Background: Head injuries are the most common cause of fatal injuries among cyclists. Helmet use can significantly decrease the risk. Our study objective was to evaluate the frequency of bicycle helmet use by rural adolescents, determine their attitudes with regards to helmets, and to identify associated demographic factors.

Methods: A convenience sample of 2022 Iowa FFA (formerly Future Farmers of America) Leadership Conference attendees completed an anonymous survey electronically by cell phone or by paper which was later entered into the Qualtrics database. Descriptive, contingency table and multivariable logistic regression analyses were performed.

Results: 1,331 rural adolescents 13-18 years of age participated. Almost three-fifths (58%) of respondents were female and 56% were 16-18 years. One-half lived on a farm, 21% lived in the country/not on a farm and 28% lived in town. Ninety percent of subject's households had at least one bicycle. Overall, 78% had ridden a bicycle in the past year. Those who lived on farms had lower proportions that had ridden a bicycle in the past year (68%) then those that lived elsewhere (82%), p<0.001. Those from farms had lower proportions that rode at least weekly (21%) as compared to those from the country/not on a farm (35%) and from towns (31%), both p<0.001. Younger teens (13-15 years) were twice as likely as older teens (16-18 years) to ride at least weekly. Median importance (rated 1-10) of wearing a helmet on a bike was 4.7 with a median of 4. Females, younger teens, those who were not non-Hispanic White, and those who did not live on farms all ascribed higher bicycle helmet importance than their corresponding peers. Fifteen percent believed there should be a law requiring the use of a helmet while riding a bicycle. Three-quarters (74%) rarely or never wore a helmet; only 13% said they always or mostly wore a helmet. There was a direct relationship between helmet use and those who rode more frequently, as well as to those who ascribed a higher importance to helmet use. Only 12% of participants stated their parents had a strict "no helmet, no bike riding rule". However, those who had such a rule had 18x greater odds of supporting a bicycle helmet law and had a higher median ascribed bicycle helmet importance (9) compared to those without such a rule (4). Moreover, those with the strict rule had 32x higher odds of wearing a bicycle helmet always or most of the time versus those who had no rule.

Conclusions: Bicycle helmet use is infrequent amongst rural adolescents. Youth whose parents had a strict "no helmet, no bike riding rule" had significantly greater helmet use, placed

greater importance on helmet use and were more supportive of bicycle helmet laws.

Objectives:
1. State the frequency of rural adolescent's use of bicycles and bicycle helmets.
2. Identify at least three rural adolescent demographic groups who ascribe lower importance to helmet use.
3. Discuss how a strict parental "no helmet, no bike riding rule" might influence bike helmet use and attitudes.

Pediatric Hospital Admissions for Unintentional Drowning in Bathtubs in Central Texas

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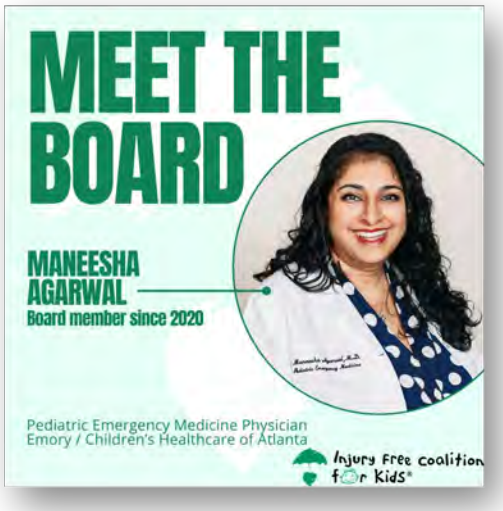
Background: In the US, more children 1-4 years old die from drowning than from any other cause. Additionally, drowning is a leading cause of death for children of all ages. Swimming pools are the most common drowning location for children 1-14 years old, but for infants under 1 year old, bathtubs are the most common drowning location. Additionally, older children may be at risk of drowning in a bathtub due to impaired development or disability, illness, or seizures. The aim of this study was to overview characteristics of patients treated for unintentional bathtub drownings at a large urban children's hospital in the US.

Methods: A 10-year retrospective study was performed using medical records for all children treated for unintentional drowning at one large hospital serving central Texas, US. Descriptive data on the drowning context and outcome were assessed for the drownings that occurred in a bathtub setting.

Results: Of the 457 children treated for drowning at the hospital, for 51 (11%), the setting of the drowning was a bathtub. Of all bathtub drowning admissions, 62.8% were female. The age of the patients ranged from 0.1 - 9.5 years. The majority of the children were <1 year old (54.9%). At the time of the incident, 94.1% were bathing during a planned bath time; the other 5.9% accessed water in a bathtub that had been filled for other reasons or filled the tub without permission. Of the 87.2% of adults intending to supervise the child around water during planned bath time, only 19.5% were supervising during the incident. In over one third of cases, the reason for a lapse in supervision was that the caregiver was performing bath-related chores, most often getting a towel. It is suspected that submersion was precipitated by a seizure in 11.8% of the children, including all children over 6 years old. Of the children who submerged in a bathtub, 45.1% were not breathing when removed from the water, 54.9% received a CPR-based rescue activity immediately after being removed from the water, and 13.7% received CPR from a medical professional. Additionally, 35.3% were discharged home from the Emergency Department following evaluation and/or treatment;13.7% of the incidents resulted in death or morbidity.

Conclusions: Bathing poses a drowning risk for children, particularly those under 1 year old and children with a history of seizures. Focused supervision is a critical layer of protection, yet lapses in supervision are common. Drowning prevention initiatives should emphasize the importance of gathering towels and clothing before starting water for a bath and avoiding distractions, including chores and other childcare when a young child is in the bath.

Objectives:
1. Overview common drowning scenarios for pediatric bathtub drowning incidents.
2. Highlight the importance of supervision for infants and toddlers while bathing.
3. Provide evidence to support bathtub water safety messaging emphasizing gathering towels and other bath supplies prior to starting water for a bath.



KEYNOTE

Pioneer Award Keynote: Looking Back/Forging Forward

Saturday, December 7, 2024, 11:30 AM to 12:30 PM

Karen Sheehan, MD, MPH
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We are excited to present this year's Pioneer Award to Karen Sheehan, MD, MPH, Professor of Pediatrics, Medical Education, and Preventive Medicine at Northwestern University's Feinberg School of Medicine. She is a dedicated injury prevention researcher and a passionate advocate for children's health and well-being. Dr. Sheehan is a founding volunteer of the Chicago Youth Programs, a community-based organization that works to improve the health and life opportunities of at-risk youth.

The Chicago Youth Programs (CYP) strives to improve the health and life opportunities of vulnerable youth by providing programs that address the children's recreational, educational, and health care needs. Dr. Sheehan realized early in training that a "once-a-year well-child care visit" was not enough to improve a child's health. Getting children out of poverty has the greatest effect on their health and thus the CYP programming focuses on helping children graduate from college or trade school. For nearly 25 years, she has directed CYP's clinic, which is staffed by volunteer medical students.

Dr. Sheehan is also the Department of Pediatrics' Associate Chair of Advocacy and frequently partners with agencies such as the Chicago Park District, Chicago Department of Public Health, and Chicago Public Schools to improve child health. For example, using a multi-sector, collaborative approach, she has led city-wide injury prevention efforts in window fall prevention and playground safety. Her paper documenting neighborhood disparities in playground safety motivated the city of Chicago to commit to replacing 350 playgrounds over 5 years. She helped create the Strengthening Chicago's Youth (SCY), which is convened by Lurie Children's and connects over 3000 community partners to prevent violence by using a public health approach.

Dr. Sheehan directs the pediatric residency advocacy/population health track (called Health and Society) at the Feinberg School of Medicine. She serves as a coach for the Department of Pediatrics, Office of Faculty Development. She is the Medical Director of Lurie Children's Injury Prevention & Research Center and the Patrick M. Magoon Institute for Healthy Communities. She has published studies on safe sleep, firearm injury prevention, social determinants of health, violence injury prevention, opioid use and child maltreatment topics just to name a few.

Dr. Sheehan's research and practice have consistently focused on community engagement, ranging from using community-based participatory research to evaluate youth development programs to applying policy-system-environmental change strategies. Dr. Sheehan has held leadership positions in the Injury Free Coalition for Kids, Kids in Danger, and the American Academy of Pediatrics' former Section on Injury, Violence and Poison Prevention. Karen has been a member and leader in Injury Free Coalition for Kids since 1993. She has presented abstracts, moderated sessions, judged presentations, mentored many young injury prevention advocates and won the PI of the year award in 2022. Those who know and love her also know she is an avid swimmer and a lover of drum karaoke night!

We are so fortunate to have Dr. Karen Sheehan as an IFCK Pioneer and are looking forward to hearing her talk on "Looking Back, Forging Forward!"

Objectives:
1. Recognize how the past informs our current and future injury prevention work
2. Examine various injury prevention interventions to address the social and physical environments
3. Discuss several injury prevention frameworks
4. Describe cross-sector strategies to promote injury prevention
5. Identify non-traditional funding mechanisms for injury prevention activities

PLATFORM PRESENTATIONS

Injury Prevention Programs

Saturday, December 7, 2024, 1:30 PM to 2:45 PM

Session Description:
This platform session will explore a variety of injury prevention programs. We will start by hearing about the success of planned community engagement events targeted at specific high-risk populations. We will then learn about the importance of injury prevention training and education efforts for both selected medical trainees as well as students on a national scale. Finally, we will hear about important work being done in implementation of pediatric Hospital-Based violence intervention programs and in partnership with poison control centers to try to decrease fatal poisonings in community youths.

Learning Objectives:
1. Identify how injury prevention programs can be replicated and evaluated in other arenas.
2. Introduction to a variety of injury prevention programs to meet the changing needs of communities.
3. How to develop and fund injury prevention educational programs.
4. Identify the importance of medical training programs to promote injury prevention advocacy.

Moderators:

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Pop-Up Safety Town: Pediatric Injury Prevention Education Reimagined

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Background: Unintentional injuries are the leading cause of death in children, with a disproportionate impact on populations experiencing health disparities. The Pop-Up Safety Town (PST) initiative, conceived by a group of pediatric emergency medicine physicians in Michigan, reimagines pediatric injury prevention education using a mobile, community driven approach to address the current barriers and limitations of traditional pediatric injury prevention education. We detail how we adapted and implemented PST in a second location to provide injury prevention education to young children living in underserved communities.

Methods: Two academic physicians from a tertiary children's hospital adapted and expanded PST with contributions from the local Safe Kids coalition. We partnered with a local community center and school district primarily serving Hispanic (95%) and low income (75%) families. During Fall 2023, we scheduled four half-day PST sessions for all K4 and K5 students. PST curriculum spanned eight domains that were identified as areas of high need by school staff, including 1) animal safety, 2) bike safety, 3) burn safety, 4) car seat safety, 5) dental safety, 6) fire safety, 7) pedestrian safety, and 8) water safety and were developed by PST program leaders using evidence-based recommendations from the American Academy of Pediatrics. A North American foundation provided a one-time grant for financial support.

Results: Over the four half-day PST sessions, we provided essential injury prevention education to over 400 students on the topics stated above. All children rotated through 15-minute stations for each topic. Volunteers, recruited from our hospital/medical school, local Safe Kids coalition, and local fire and police, engaged and educated each child at each topic station. Every child was fitted individually with an adjustable bike helmet to take with them for use at home. A drawstring backpack filled with injury prevention resources in both English and Spanish was provided to each child to share with their caregivers. Information on upcoming Safe Kids events and car seat checks was also provided to families.

Conclusions: Our PST events demonstrate the potential for a scalable, budget-friendly injury prevention model adapted to the unique needs of at-risk children living in underserved communities. Having demonstrated the program's success in

a second location, efforts are underway to secure sustained funding for its continuation for the following school year.

Objectives:
1. Unintentional injury is a leading cause of death in children, and there are substantial disparities.
2. Pop-Up Safety Town (PST) is a pediatric injury prevention program developed to address the limitations of a "traditional" Safety Town and include children and families who otherwise are unlikely to have access to injury prevention education and/or resources.
3. PST has now been shown to be adaptable and reproducible in different settings.

Back to school programming in a large metropolitan area

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Background: Back to school time is a great time to engage with families as this is a time for establishing new routines. Families are considering how they are going to be transporting kids to school, and it is a chance to emphasize ways to minimize the risks. We partnered with a local school district that serves over 44,000 students in a suburb of a large metropolitan area with a back-to-school celebration that has approximately 4000 attendees from the surrounding area to bring transportation education, bike helmets, injury prevention, first aid, and CPR education to our community.

Methods: Planning started 6 months prior to the event by determining the priorities and scope for this event. Through a partnership with our local community hospital's marketing team and our IFCK chapter, we were able to purchase bicycle helmets through the state medical association community outreach program which provides a discounted and matching program for helmets that are purchased through them. We were also able to obtain safety lights, stickers, and hand-outs on how to fit a bicycle helmet and their importance. Volunteers from our community hospital and medical school fit these helmets properly.

We provided information about vehicle safety and child passenger safety with an emphasis on child safety seats for the elementary aged child. Paper collateral was provided by our state transportation department. We used a large stuffed animal giraffe that measures just under 4'9" so participants to measure themselves and gauge if they were tall enough to be out of a booster seat. Additional information was provided regarding teen driving and pedestrian safety.

We also had information for families regarding water safety and provided participants with Water Watcher cards and other water safety information. We also sponsored a booth where attendees had a chance to learn hands only CPR and how to use EpiPens. Pocket first-aid kits were distributed.

To bring participants to our tables, we had a volunteer dressed as the hospital mascot. Their presence allowed families to feel comfortable approaching the booth and provided a memorable photo opportunity for attendees to take with them.

Results: With 25 volunteers:
~ 450 bicycle helmets fitted and distributed
~ 200 Water Watcher cards
~ 150 participants learned hands only CPR and use an EpiPen.
Even more participants learned about child passenger safety for older children and pedestrian safety.

Conclusions: Leveraging established events can be an effective way to provide safety information to our community. Opportunities for improvement include moving the CPR station indoors to increase participation. This event was in August with temperatures in the upper 90s which is a major deterrent. Most of the traffic was families with elementary/early middle school aged children. If we plan to do more older adolescent education, we need to make it clearer or locate to an area of the event targeted to teens.

Objectives:
1. Describe how to develop and fund a successful educational program within a larger community event.
2. Examine funding sources and partnerships to help make an event successful.
3. Identify how a program like this can be replicated and evaluated in other arenas.

Empowering Tomorrow's Child Advocates through the Trainees for Child Injury Prevention (T4CIP) Program

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Background: Injuries remain the leading cause of death for children in the United States, yet medical trainees inconsistently receive education about pediatric injury prevention. Likewise, though the Accreditation Council for Graduate Medical Education (ACGME) requires pediatric residency programs to provide education about advocacy, trainees often have limited experiences with implementing these skills, potentially hindering their engagement with advocacy in the future. The Trainees for Child Injury Prevention

(T4CIP) Program was created to help bridge these gaps by providing facilitated support in trainee-initiated outreach activities to promote local and national engagement in injury prevention.

Methods: T4CIP is sponsored by the Center for Injury Research and Policy in Columbus, Ohio, and the American Academy of Pediatrics Section on Pediatric Trainees and Council on Injury, Violence, and Poison Prevention. A national cohort of trainees that includes medical students, residents and fellows are recruited to participate in a year-long program. During monthly virtual sessions, national experts share education on injury prevention and advocacy and teach participants how to deliver anticipatory guidance for families, address health inequities, leverage both traditional media and social media for advocacy, build community coalitions, and engage with policymakers. T4CIP participants then apply their newly acquired skills during two Days of Action each year highlighting different pediatric injury mechanisms. Upon completion of the T4CIP program, participants can remain involved with the T4CIP alumni committee to support new trainees and work on longer-term advocacy projects.

Results: Since 2021, four cohorts consisting of 280 trainees (123 medical students, 116 residents and 41 fellows from 117 institutions across 39 states) have participated in T4CIP. Day of Action topics have included: high-powered magnet ingestions, pediatric firearm injuries, helmet use, safe sleep, drowning prevention, safe storage of cannabis edibles, and child passenger safety. Over these 7 Days of Action, the trainees have collectively shared close to 6,000 social media messages with over 20 million impressions. Participants have also published letters to the editor; appeared on television news programs; presented at hospital Grand Rounds; hosted trainee lectures; distributed and developed educational materials for community events; and drafted policy recommendations. Participants report increased knowledge with pediatric injury prevention and comfort with application of advocacy skills, with many trainees remaining engaged as program alumni.

Conclusions: This national training program successfully enriches the advocacy skills of pediatric trainees while meeting a critical gap in pediatric injury prevention education. Similar program models can be developed to promote injury prevention advocacy with different disciplines.

Objectives:
1. Identify the gaps in medical trainee education about pediatric injury prevention and advocacy.
2. Understand the impact of national Day of Action campaigns led by program participants.
3. Discuss how similar programs could be implemented in other disciplines at a local or national level.

Injury Prevention for Children and Teens: A free, innovative, choose-your-topic approach to delivering an online pediatric injury prevention course to a global audience

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Background: Pediatric injury prevention training remains underrepresented in medical and public health curricula despite pediatric injuries being the number one cause of morbidity and mortality worldwide. Additionally, the CDC's National Action Plan has underscored the critical need to broaden the scope of pediatric injury prevention education. Recognizing the challenges faced by time-constrained online learners, there is a pressing need to offer injury prevention educational programming that is free, focused, and flexible to a wider audience.

Methods: In response to this educational gap, we launched a novel and comprehensive massive open online course (MOOC) titled "Injury Prevention for Children & Teens" in 2018. Hosted on the EdX platform, the free course featured seven modules encompassing critical areas such as firearm safety, sports injury prevention, adolescent substance use, transportation safety, burn prevention, advocacy, adverse childhood experiences (ACEs), dating violence, and drowning prevention and includes over sixty videos with curated readings and corresponding quizzes. The course was constructed so that the learner could advance through topics nonlinearly, and could choose to complete all modules, or choose only specific modules and topics. Learners completing each module could request free Category 1 CME, MOC Part II (for pediatricians), and CHES credits (public health). The full course was also integrated as an online elective at our medical school, with opportunities for student feedback. Data evaluation occurred through EdX analytics and post-module surveys.

Results: Since its release, our global course has been taken by over 9,300 students from over 148 countries and the medical school elective by local 576 medical students. About 66% of all learners who filled out the evaluation reported that they were either somewhat or extremely likely to change their practice after taking this course. Among medical students specifically, almost all (99%) rated the course quality as “high”, with over 57% stating that they plan to make changes to their medical practices after taking the course. Furthermore, 89% reported a changed perception of pediatric injury prevention after course completion. Feedback highlighted the engaging content and user-friendly structure, with some feedback suggesting increased cultural context, succinct key takeaways, and increased regular content updates.

Conclusions: Our MOOC, "Injury Prevention for Children & Teens," successfully addresses the need for an accessible and flexible approach to online pediatric injury prevention education that is available for a broad audience of learners. Future development, informed by participant feedback, will aim to enhance the course with updated content and insights from new national experts in the coming year.

Objectives:
1. Describe the need for pediatric injury prevention training.
2. List criteria for an accessible injury prevention course.
3. Explain necessary components of pediatric injury prevention trainings.

Strengthening the Safety Net: Piloting a Hospital-Based Violence Intervention Program within a Level 1 Pediatric Trauma Center

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Background: Hospital-based violence intervention programs (HVIPs) are an evidence-based strategy to address the impacts of community violence and reduce incidence of reinjury and hospital readmission. However, there are limited examples of HVIPs designed to meet the unique needs of violently injured pediatric patients and their families. The integration of HVIPs into pediatric care settings could help identify high risk patients and use incidents of violent injury as “teachable moments” to promote behavior change. We piloted an HVIP within the emergency department (ED) of a level 1 pediatric trauma center, with the goals of (1) describing the pediatric patient population affected by violent injuries at our site, and (2) assessing the feasibility of providing HVIP services (safety planning, resource referral, and trauma-informed care) to these patients.

Methods: In August 2023, we piloted an HVIP program in the ED of the largest level 1 pediatric trauma center in New York state, servicing both New York City and surrounding counties. Patients were eligible if they were <18 years of age at time of admission and had sustained a gunshot wound, a stab wound, and/or injuries from a violent altercation. Patients with injuries as a result of self-harm were not eligible. Program managers used the automated trauma activation system and input from clinical staff to identify eligible patients in the ED; hospital responders then met patients and families at bedside to offer crisis support and explain the HVIP. Enrollment occurred at any point in care, including post-discharge, and required verbal consent from both the patient and a guardian. Once enrolled, responders used motivational interviewing techniques to conduct a needs assessment, followed by safety planning and referrals to health system or community-based support services as appropriate. Data analyzed were extracted from electronic medical records and case management notes; standard descriptive analyses were conducted using SPSS.

Results: Between August 1, 2023, and May 30, 2024, the HVIP engaged with 35 patients between 4-17 years old, who sustained violent injury from a firearm (40%), a stabbing (37.1%), or a violent altercation (22.9%). The majority of patients were male (88.6%), self-identified as Black/African American (65.7%) or multi-racial (14.3%) and were 15-17 years old (68.7%). Among patients who requested referrals (45.7%), 100% were successfully linked to appropriate health system and/or community-based services. Support relating to safe housing, educational assistance, and community violence intervention were the most common requests. Among patients not linked to resources, 22.9% did not request any referrals and 14.3% were lost to follow up (LTF) after discharge.

Conclusions: Pediatric HVIPs are a feasible intervention that pediatric trauma centers can implement to help identify and connect violently injured patients and their families to wrap-around support services. It also highlights the importance of sustainable partnerships with local community organizations in facilitating successful transitions post-discharge. Future goals include long-term patient follow-up and a formal process evaluation of the program’s implementation.

Objectives:
1. Attendees will be able to describe the patient population enrolled in a pediatric HVIP pilot program, including demographic makeup and injury mechanisms.
2. Attendees will be able to identify facilitators and barriers to the implementation of an HVIP in a pediatric emergency care setting.
3. Attendees will be able to apply the results and lessons learned to inform the implementation of a similar program at their institution.

Florida's Poison Control Centers Treat, Educate & Prevent

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Background: Around the country, the nation's 55 poison control centers take calls to the 24-hour 1-800-222-1222 Poison Help line, providing free, confidential triage services to poisoned patients and/or their caregivers. But poison centers also offer educational services to help prevent poisonings. While children under 5 now account for only 0.02% of fatal poisonings in the U.S., we see increasing fatalities in teens and tweens, including from self-harm. Thankfully, the techniques used to prevent these poisonings are similar to those we've always taught new parents: identify the hazardous products, reduce access, and respond fast. As the second most populous state in the nation, Florida is a microcosm of national

poison trends, and Florida's Poison Control Centers are working to meet these needs head on.

Methods: Florida's three poison centers leverage partnerships, traditional and social media, and remote/face to face events to reach 18 million residents with information about poison safety and the Poison Help line. Each poison center has educators on staff, in addition to the doctors, nurses and pharmacists treating poisonings on the hotline, 24/7. Poison center educators present data on current poisoning trends, effective prevention techniques and create materials and messaging for injury prevention partners of all stripes. Utilizing traditional partners in child safety, but also new partners in drug abuse prevention and harm reduction, poison center educators, guided by incidence data, now highlight medicine and drug overdose as the major poison threat to children and youth today. Eschewing an exclusive focus on small children, poison center educators work with families, schools and communities to protect tweens and tweens -- with a goal of creating safer adults.

Results: In 2023, Florida Poison Control Centers and their trained partners delivered 5,597 educational programs to over a million participants. The Centers also delivered over 100,000 educational materials including magnets, stickers, posters and brochures promoting poison safety and poison centers' services. Florida's Poison Centers also managed 54,000 exposure calls about children 19 and under, providing immediate assessment and treatment guidance. Despite these diligent activities, fatal poisonings in youth continue to increase, with 94 fatal poisonings in children aged 19 and under logged by the Florida Department of Health in 2022, with almost all of them involving drugs (93/94) and the bulk (79%) occurring in teens.

Conclusions: Despite increases in prevention activities and expanded work with partners, more Florida youth are dying from poisoning. While the need remains to urge families with young children to lock up household cleaners and chemicals, poison safety activities must expand to address the presence of drugs in homes and the risks associated with new products on markets legal and illegal. Florida's Poison Control Centers welcome the assistance of injury prevention partners like the Injury Free Coalition for Kids and looks forward to tackling the modern problem of poisoning in our youth.

Objectives:
1. Most fatal poisonings in children today involve drug use in teens.
2. Traditional poison prevention techniques can be expanded to protect youth.
3. Poison control centers are important partners in preventing poisonings in all youth, not only toddlers.

Saturday Workshop Sessions

WORKSHOP SESSION 3A

The Struggle is Real: Starting and Maintaining a Firearm Safe Storage Program at Your Institution

Saturday, December 7, 2024, 3:00 PM to 4:00 PM

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Description:
Best practices from the literature suggest that providing locking and storage devices to parents who are firearm owners is helpful in promoting safe firearm storage, especially during a behavioral health crisis in their child. This may reduce the likelihood of future injury or death from a firearm. However, many children's hospitals do not have such programs in place. This workshop aims to help participants learn from program managers who have successfully started such programs at their institutions so that barriers and facilitators to program success can be disseminated amongst workshop participants. Additionally, workshop leaders will assist participants in drawing up a preliminary plan to initiate a firearm safety program at their respective institutions.

Objectives:
1. Understand the rationale for programs that provide locking and storage devices to parents who are firearm owners.
2. Develop program goals, values, and mission and identify key messaging to meet the needs of the community/institution.
3. Become familiar with barriers and facilitators to a program initiation within a hospital system (e.g., political, administrative, financial).
4. Determine who your key stakeholders are to initiate and sustain a program.
5. Learn how to engage with legal leadership at your institution.
6. Learn what various distribution mechanisms are available (e.g., community events, patient bedside, outpatient and inpatient settings, Emergency Department, universal hospital screening, at-risk screening).

WORKSHOP SESSION 3B

To the Core...Standards and Indicators for Injury and Violence Prevention Programs

Saturday, December 7, 2024, 3:00 PM to 4:00 PM

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Description:
In 2016 Safe States Alliance, with support from the National Association for County and City Health Officials, launched an ambitious project with the purpose of strengthening Trauma Center injury and violence (IVP) programs and increasing the alignment of these efforts with public health practice. The goals of the project were to:

- Establish and build consensus on core components of Trauma IVP programs;
- Develop standards and indicators for Level I and II Trauma IVP programs;
- Identify opportunities to strengthen collaboration between public health and hospital trauma centers.

The Standards and Indicators for Model Level I and II Trauma Center Injury and Violence Prevention Programs was released in November 2017 to support the IVP professional and hospital leadership with tangible ideas for expanding or strengthening programs at all levels, moving beyond minimum requirements. It was the first to provide concrete, consensus-based descriptions of what constitutes a model Level I or II trauma center IVP program — one more likely to deliver the shared goals of reducing the burden and costs of injury and violence in communities across the United States.

These standards and indicators were part of a larger effort from Safe States and national partners to develop setting-specific standards and indicators and assessment tools for IVP practitioners. Earlier versions included standards and indicators for state health departments (Building Safer States developed in 1997; revised 2013) and local health departments (Standards and Indicators for Local Health Department Injury & Violence Prevention Programs developed in 2009).

During 2024, Safe States convened representatives from the various sectors to modernize and align the core components across settings and integrate anti-racism, health equity, and diversity, equity, and inclusion (DEI) principles into IVP programs as foundational elements of IVP efforts. The core components describe foundational elements essential for program success. Safe States is in the process of updating the setting-specific indicators (expected Spring 2025), and Injury Free Coalition for Kids members will be among the first to explore the revised indicators for hospital-based IVP programs. As with previous documents, it is expected the revised core components and standards and indicators will guide the work of injury and violence prevention professionals as they navigate building and strengthening their programs.

This workshop will introduce participants to the revised core components, standards and indicators, and supporting new material for garnering support from organizational leadership, as well as obtain feedback on the materials. The workshop will include an overview of the core components and standards and indicators, a facilitated discussion of the opportunities and barriers for utilization, and hands-on demonstration and practice on how to apply the assessment tools. Additionally, it will include an illustration from local hospital IVP staff on how they successfully applied the standards and indicators to strengthen support for their program.

Objectives:
1. Introduce revised core components, standards and indicators for injury and violence prevention programs.
2. Discuss opportunities and barriers for utilization.
3. Provide instruction on how to apply program assessment tools.
4. Obtain feedback on materials provided.
5. Practice techniques for engaging organizational leadership.

WORKSHOP SESSION 3C

Using the Injury Equity Matrix to Surface SUID Prevention Recommendations

Saturday, December 7, 2024, 3:00 PM to 4:00 PM

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Description:
Beginning in July 2023, the Cook County Sudden Unexpected Infant Death (SUID) Case Registry and Prevention team began using a modified Injury Equity Matrix (IEM) tailored to examine SUID. Modifications to the IEM such as including the family's Social Environment and Belief System, considering factors related to the SUID investigation, and incorporating both parent and infant intersectional identities have facilitated meaningful conversations among team members that have surfaced new ways of thinking about SUID prevention, generated ideas regarding new partnerships, and led to proactive safe sleep approaches for Chicago's newly arrived migrant population.

This workshop will provide a brief overview of the modified IEM for SUID, and lead participants through the practice of using the IEM for SUID cases. Participants will be broken into 4 groups, each led by one of the presenters, and guided through practice using the modified IEM for 2 cases. Groups will reconvene and discuss the potential prevention recommendations that emerged from this practice. Finally, participants will be challenged to modify the IEM for their own injury prevention topic (e.g. drowning, firearms) and consider who they might engage to regularly review cases using this tool.

Objectives:
1. Become familiar with the components of the Injury Equity Matrix.
2. Practice using the modified IEM to review individual SUID cases.
3. Reflect on how incorporating intersectionality illuminates new prevention approaches.
4. Determine how the IEM could be modified for other childhood injuries.

WORKSHOP SESSION 3D

Empowering Safety: Inclusive Practices for People with Disabilities

Saturday, December 7, 2024, 3:00 PM to 4:00 PM

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Description:
People with disabilities are at heightened risk of injury. This workshop delves into comprehensive strategies aimed at enhancing safety education and preparedness to reduce injuries, with a focus on people with disabilities. It showcases two recent grant initiatives pioneered in New Jersey – Living Safely with Disabilities and Special Health Needs (*Living Safely*) and Learn to Live Safely with Disabilities and Special Health Needs (*Learn to Live Safely*).

Participants will explore the integration of inclusive safety education within academic and municipal frameworks, ensuring that service providers are equipped with the necessary tools to support the safety needs of disabled individuals. Inter-professional collaborations with postsecondary academic institutions will be described as a means to develop more inclusive and sustainable safety curricula.

The workshop highlights methods for embedding accessible safety lessons in adolescent special education transition programs, addressing a critical gap in current educational practices. It sheds light on the importance of educating emergency responders and safety stakeholders about sensory and communication needs and challenges.

Participants will learn about adapted education models, including emergency preparedness, where disabled residents actively engage in assembling and maintaining emergency preparedness kits, promoting interdependence and resilience within their communities.

By expanding access to *Living Safely* and *Learn to Live Safely* tools and resources, this workshop emphasizes the importance of inclusive safety education and practices. Through interactive discussions and real-world scenarios, participants will gain practical insights that empower them to implement these strategies effectively. This is a call to action to collaborate in building the capacity of safety stakeholders and people with disabilities as we learn, teach, and practice safety skills together.

Objectives:
1. Identify comprehensive accessible and functional safety resources and tools for people with disabilities.
2. Equip service providers with inclusive safety practices.
3. Introduce accessible safety education in transition programs.
4. Educate emergency responders on sensory-communication needs and challenges.
5. Empower disabled residents to assemble emergency kits.
6. Develop collaborations within postsecondary academic institutions to build more inclusive safety curricula
7. Foster collaborative relationships between stakeholders and disabled individuals.

CHILD PASSENGER SAFETY GROUP MEETING

The future is upon us: Automated driving keeps families safer

Saturday, December 7, 2024, 5:00 PM to 6:00 PM

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Description:
Advanced Driver Assistance Systems (ADAS) and Automated Driving Systems (ADS) show great promise for reducing motor vehicle injuries and fatalities. Human error contributes to 94% of crashes, while the evolution of driver assistance features and full autonomy have the potential to reduce human error, overall crashes and crash severity. As these technologies are developed and implemented, however, it is crucial that the unique safety needs of children and families are prioritized. The Safe Kids in Advancing Vehicles Alliance (SKAVA) has been formed to facilitate stakeholder discussion, collaboration, and action toward enhancing the safety of children as these technologies evolve, thereby reducing the risk of injury and death. SKAVA has developed a child-focused Design Failure Mode & Effects Analysis (DFMEA) for identifying potential risks introduced in automated mobility. With the current advancement of automated vehicles and autonomous ride-share vehicles arriving in the near future, we will take an engaged deep dive into what a child-focused DFMEA would look like for this emerging technology, as well as, collecting and implementing feedback from the attendees.

Objectives:
1. Examine how the unique needs of children should be considered in Automated and Autonomous Vehicle design, development, and testing.
2. Describe the purpose, methodical approach, and outcomes of a Design Failure Mode & Effects Analysis.
3. Analyze potential risks to child passengers and identify their likely causes in Autonomous Ride-Share Vehicle scenarios.
4. Identify the available tools for educating about, advocating for, and the monitoring progress of child safety in and around Automated Vehicles.

PLATFORM PRESENTATIONS

Other Injury Prevention Topics

Sunday, December 8, 2024, 9:00 AM to 10:15 AM

Session Description:
Injuries affect all children but often disproportionately impact those in rural communities, those in neighborhoods with higher deprivation indices, and children with neurodevelopmental differences. In this section, we explore teenagers' attitudes toward ATV use, pediatric drowning events in relation to policy changes on pool safety, neighborhood socioeconomic disadvantage as a risk factor for window falls, helmet use and its relation to child opportunity index, the importance of child passenger safety programs tailored for autistic youth, and the epidemiology of UTV crashes in Iowa.

Learning Objectives:
1. Describe the practices and attitudes of rural adolescents regarding driving ATVs on public roads.
2. Contemplate why fatality rates from drowning did not decline following enactment of the California Pool Safety Act.
3. Know that pediatric patients who fall from a window have higher rates of neighborhood socioeconomic disadvantage and higher area deprivation indices than children who fall from other causes.
4. Understand how helmets and severity of injury may correlate with childhood opportunity indices.
5. Determine the importance of and barriers to safe transportation for children with autism.
6. Highlight where and when people are injured while using UTVs.

Moderators:

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Rural Iowa Adolescents' Use, Knowledge and Attitudes Regarding ATVs on Public Roads

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Background: Most deaths related to all-terrain vehicles (ATVs) occur on public roads with the majority being single vehicle crashes. Manufacturers state ATVS are not designed for public roads and warn against this use. Still, municipalities, counties and states across the country are passing legislation allowing increased use of ATVs on public roads. Our objective was to examine rural adolescent's use, knowledge and attitudes related to ATVs on public roads.

Methods: Attendees of the 2024 Iowa FFA (formerly Future Farmers of America) Leadership Conference were anonymously surveyed at the University of Iowa Stead Family Children's Hospital safety booth. Descriptive, contingency table and logistic regression analyses were performed using Stata 15.1 (StataCorp, College Station, TX).

Results: 1,029 FFA members 13-18 years of age participated. About two-thirds were 14-17 years. One-half lived on a farm, one-fifth were from the country/not a farm, and 30% lived in a town. The vast majority (96%) were non-Hispanic White. Two-thirds of respondent's families owned an ATV and 86% had driven/ridden an ATV. Of those who had driven/ridden an ATV, 91% had driven/ridden on an unpaved public road (44% reported doing so at least weekly) and 77% had been on a paved road (25% reported doing so at least weekly). Males and owners of ATVs had greater odds of having driven/ridden on unpaved public roads and of driving/riding on them more frequently. Males, older teens, and ATV owners had higher odds of driving/riding on paved roads and of doing so more frequently. Overall, 69% and 63% stated it was safe to drive ATVs on unpaved and paved public roads, respectively, while 69% and 43% stated ATVs were designed for unpaved and paved roads, respectively. Males (1.7x), older teens (1.6x) and those that had ridden on public roads (3.4x) all had greater odds of stating it was safe to drive ATVs on both unpaved and paved roads than their comparative peers. Less than half agreed that most ATV deaths occur on public roads. Over half agreed to assertions that ATV manufacturers state ATVs are safe on unpaved (58%) and paved (51%) public roads.

Generally, males, older teens, ATV riders, those who had ridden on public roads and more frequent riders all had greater proportions that held these misconceptions. Only 18% knew one had to be 18 years old to legally drive on Iowa county roads with an ATV.

Conclusions: A high proportion of study participants had driven/ridden an ATV and most had been on public roads. The majority held misconceptions and believed falsehoods related to ATVs on public roads with higher proportions of frequent riders and those that had driven/ridden on public roads having these beliefs. Targeted education and enforced legislation prohibiting use on public roads may be critical in decreasing ATV-related deaths and injuries.

Objectives:
1. Describe present practices of rural adolescents regarding driving ATVs on public roads.
2. Discuss the attitudes rural adolescents have related to the driving of ATVs on public roads.
3. State at least three demographic groups that had higher proportions who held misconceptions and falsehoods related to ATVs on public roads.

Drowning Among 1–4-Year-Old Children in California, 2017-2021

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Background: Drowning, the leading cause of unintentional injury death among California children less than 5 years averaged 49 annual fatalities for the years 2010-2021. The California Pool Safety Act aims to reduce fatalities by requiring safety measures around residential pools. This study was designed to analyze annual fatality rates and drowning incidents in California among 1-4-year-old children from 2017 to 2021.

Methods: Data for this study were obtained from the EpiCenter California Injury Data Online website. This is a comprehensive source of injury data limited to California residents. EpiCenter data includes fatalities, injury hospitalizations, and emergency department (ED) visits. Drowning fatalities were identified from the California Department of Public Health using ICD-10 cause-of-death codes appearing in the underlying cause-of-death field as follows: W65–W74, X71, X92, Y21, W65–W74, X71, X92, and Y21. Fatality rates were calculated from the California Department of Finance's Report P-3: Complete State and County Projections Dataset (Baseline 2019 Population Projections; Vintage 2020 Release).

Results: Over the five-year study period, 4,166 drowning incidents were identified; 234 were fatalities, 846 were hospitalizations, and 3,086 were ED visits. The observed difference in fatality rates from 2017 to 2021 failed to achieve statistical significance (p= 0.875). Location-based analysis of the 234 fatal drowning incidents revealed that pools were the most common injury site, accounting for 65% of the cases. The case fatality ratio for the 1-year-old age group stood at 7.86% (6.32% to 9.64%), which was higher than other age groups (p<0.001).

Conclusions: Drowning remains the leading cause of unintentional injury-related death among California children 1-4 years of age, as the annual rate of fatality over the five-year study period did not decline. While the EpiCenter California Injury Data Online website is excellent for analyzing annual rates of drowning incidents among California residents over time, it is limited in providing insight into modifiable risk factors and event circumstances that can further inform prevention. The development of robust integrated fatal and nonfatal local, state, and national systematic data collection systems can aid in moving the needle in decreasing pool fatalities among young children.

University of California Irvine IRB #1735

Objectives:
1. Drowning fatality rates among 1-4 year-old California children has not declined in the last 5 years, despite enactment of the updated 2017 Pool Safety Law.
2. The state database based on vital statistics and hospital discharge data is limited in addressing event circumstances.
3. Integrated fatal and nonfatal systematic data collection will contribute to improved prevention strategies.

A Window of Opportunity: Understanding Pediatric Falls Using Area Deprivation Index

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Background: The purpose of our study is to assess neighborhood socioeconomic disadvantage (NSD) as a risk factor for window falls (WF) in children.

Methods: A single institution retrospective review was performed of patients ?18 years old with fall injuries treated at a Level I trauma center between 2018 and 2021. Demographic, injury, and NSD characteristics which were collected from a trauma registry were analyzed and compared between WF versus non-window falls. Area Deprivation Index (ADI) was used to measure NSD levels based on patients' home address 9-digit zip code, with greater NSD being defined as ADI quintiles 4 and 5. Property type was used to compare falls that took place at single-family homes versus apartment buildings

Results: Among 1545 pediatric fall injuries, 194 were WF, of which 60 % were male and 46 % were Hispanic. WF patients were younger than NWF patients (median age WF 3.2 vs. age 4.3, p<0.047). WF patients were more likely to have a depressed Glasgow Coma Scale (GCS score ?12, WF 9 % vs. 3 %) and sustain greater head/neck injuries (median AIS 3vs. AIS 2, p<0.001) when compared to NWF. WF patients had longer hospital and ICU lengths of stay than NWF patients (p<0.001 and p<0.001, respectively). WF patients were more likely to live in areas of greater NSD than NWF patients (53 % vs. 35 %, p<0.001), and 73 % of all WF patients lived in apartments or condominiums.

Conclusions: Window fall injuries were associated with lower GCS, greater severity of head/neck injuries, and longer hospital and ICU length of stay than non-window falls. ADI research can provide meaningful data for targeted injury prevention programs in areas where children are at higher risk of window falls.

Objectives:
1. The definition of Area Deprivation Index.
2. The association of area deprivation of index to window fall in children.
3. How ADI can be used for targeted injury prevention programs.

Mapping the Association Between Pediatric Injuries During Activities Where Helmet Use is Recommended and the Child Opportunity Index

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Background: Unintentional injuries, including traumatic brain injuries (TBI) sustained during activities where helmet usage is recommended (AWHUR), are a leading cause of pediatric morbidity and mortality in the US. While advocacy and education are proven measures to address sport safety, community resources in a child's neighborhood also have a large impact on health. Our objective was to evaluate injuries sustained during AWHUR, and correlate with community resources, utilizing the Child Opportunity Index (COI) in conjunction with geographical information system (GIS) mapping.

Methods: Utilizing the trauma registry at two pediatric trauma centers in a major metropolitan area from 2018 to 2022, we performed a retrospective chart review and GIS mapping on patients with injuries sustained during AWHUR. The data was analyzed in association with COI data. Inclusion criteria was children 0 to 17 years old who presented with AWHUR-associated injuries. Data extracted from the trauma registry included: mechanism, demographics, insurance status, helmet usage, head injury and Injury Severity Score (ISS). Data was then overlayed with the COI to assess community resources including education, housing, environmental, and socioeconomic factors in relation to injury characteristics.

Results: 1425 children were analyzed over the 5-year period. The most common injury mechanisms included: bicycle 34.0%, ATV 18.2%, skateboard 13.3%, scooter 9.2%, and dirt-bike 7.4% (p<0.001). 381 children were in low or very low COI neighborhoods versus 784 children in high or very high COI neighborhoods. Most patients in very low and low COI were publicly insured, respectively 81.9% and 63.2%; while 65.8% of high COI injured patients were privately insured patients (p<0.001).

Low COI was associated with higher rates of being unhelmeted (78.4%) versus children from very high COI [48.4% (p<0.001)]. The odds of helmet usage in areas of high COI was 1.96 the odds of helmet usage in low COI. For those injured while wearing a helmet, the odds of higher ISS was 34% less likely than the odds of those who were unhelmeted at time of injury. Additionally, GIS mapping identified specific communities with higher injury rates and lower helmet use in relation to low and very low COI.

Conclusions: Children with lower COI were more likely to be publicly insured and unhelmeted at time of injury. Overlapping injury data and COI better identified high risk communities where low resources may contribute to injury severity. This data can be used to inform injury prevention efforts and highlights the importance of community factors.

Objectives:
1. Unhelmeted injuries were more often in areas of low COI.
2. Mapping identified specific areas with low COI and poor helmet utilization that can be an area of focus for prevention measures.
3. Wearing a helmet was associated with a lower Injury Severity Score.

Child Passenger Safety Program for Autistic Youth with Unsafe Car Behavior: A Program Description

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Background: Autism is a common neurodevelopmental condition that impacts 1 in 36 children. Behavioral concerns are common among autistic youth and may be dangerous and a significant source of stress for families, particularly when exhibited while driving. When children with behavioral concerns are able to leave their safety car seat/harness/seat and travel around the vehicle when it is in motion, the risk of motor vehicle collision is increased. Particularly concerning behaviors may include aggression towards the driver, destruction to the vehicle, or vehicle elopement. Helping families identify appropriate devices to prevent the child from leaving their seat is a crucial strategy to prevent injury. When implementing this, other aspects of autism spectrum disorder (e.g., sensory sensitivities, communication deficits) are important to consider to maximize access to care and success of recommendations.

Methods: We developed a Child Passenger Safety Program tailored for autistic youth. The program is housed in a specialized autism clinic in the southeastern United States with a Board Certified Behavior Analyst certified as a Child Passenger Safety Technician with support from an occupational therapist. An initial assessment evaluates need and collects information about behavioral concerns. The therapist then provides recommendations and guides the caregiver through applying for and receiving appropriate reimbursement (when available) for an appropriate safety device. A subsequent appointment is scheduled for installation and follow-up on recommendations.

Results: Over 9 months, the program has received 146 referrals and seen 45 unique patients. Of those 45 patients, we successfully installed 38 had safety devices. Based on a caregiver-completed questionnaire from patients seen in the program, the most common behavioral concerns in the car were elopement (100%), aggression (91%), and disruption (89%). 86% of caregivers endorsed difficulty transporting their child with one caregiver; 91% avoided taking their child places; and 63% missed appointments due to behavioral concerns. Most caregivers stopped a moving vehicle due to their child's behavior (94%); 69% reported injuries from these behaviors; and 60% reported damage to the vehicle. Thus far, the program has been sustained financially through coverage from the child advocacy department of the affiliated children's hospital and external philanthropic funds. Documented programmatic barriers include: the need for multidisciplinary collaboration for insurance to pay for devices, identifying devices for older clients, time-commitment to maintain the program (e.g., scheduling, following up on paperwork), and lack of CPT codes to cover the service.

Conclusions: There is a high need for programs that target transportation safety for autistic youth. By involving therapists that specialize in autism and tailoring appointment appropriately, we have successfully installed safety devices for this population. Future directions include improving the clinic's financial sustainability, assessing acceptability, and evaluating efficacy with pre/post measures of car safety.

Objectives:
1. Attendees will be able to describe why autistic youth may exhibit a high rate of behaviors that create safety issues during transportation.
2. Attendees will describe how antecedent-based strategies (such as installing safety devices in a car) may reduce safety issues.
3. Attendees will identify barriers to sustaining programs related to transportation safety for autistic youth.

Utility Task Vehicle Crashes and Injuries in Iowa

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Background: Side-by-side vehicles, termed recreational off-highway vehicles (ROVs) but often referred to as utility task vehicles (UTVs), have become increasingly popular and have outsold all-terrain vehicles (ATVs) in recent years. Few investigative reports regarding these vehicles have been published. Our study objective was to describe the epidemiology of UTV crashes and injuries in Iowa.

Methods: A comprehensive database was created of UTV crashes and injuries by combining data from the Iowa Department of Transportation, State Trauma Registry and Department of Natural Resources, as well as from newspaper articles from 2002-2019. Data of individuals were matched by patient name, gender, date of birth, crash date, and the county where the crash occurred using Link Plus Version 2.0. Frequencies and contingency table analyses were performed with SPSS (Version 29).

Results: UTV crashes involving 448 injured individuals were identified with increasing numbers during the study period. Children <16 years were 31% of the total and 16–17-year-olds were 8.3%. Two-thirds (69%) were male. Passengers were one-third and operators two-thirds of those injured. Only 10 % and 32% were wearing a helmet and a seatbelt, respectively. Of those tested, 13% were positive for alcohol. One-fifth involved a collision with another motor vehicle, 11% were collisions with an object, and most (70%) were non-collision events (rollover/ejection). In nearly two-thirds of the cases the victim fell or was thrown from the vehicle and in a quarter the person was hit or pinned by the vehicle. For those with known location, over three-fifths (61%) occurred on public roadways. In 6% of cases, the individual died. For those with injury data, victims with abnormal Glasgow Coma Scale scores and Injury Severity

Scale scores >15 both had increased days in the hospital (p=0.004) and intensive care unit (p<0.001), and crashes on roadways were associated with worse GCS scores (p=0.008). Children <16 years in UTV crashes had higher proportions than those older of being a passenger rather than the driver (52% vs 24%, p<0.001), having the crash occur in the summer (58% vs 38%, p<0.001), having been in a non-collision event such as a rollover or ejection (77% vs 66%, p=0.019), and of being hit/pinned by the vehicle (41% vs 19%, p<0.001). Children had lower proportions than those ?16 years of being involved in a crash on public roadways (52% vs 65%, p=0.019), having alcohol involved (0% vs 18%, p<0.001), and having a nighttime crash (9% vs 31%, p<0.001). Those who were hit or pinned by the vehicle had higher proportions who were in a non-collision event (37% vs 8%, p<0.001) and were off-road (55% vs 9%, p<0.001). Victims thrown or ejected had higher proportions that were hit or pinned by the vehicle (42% vs 10%, p<0.001).

Conclusions: UTV crashes and injuries are increasing in frequency and often associated with severe injuries. Driving on public roads and not wearing a seat belt were associated with more severe outcomes/injuries.

Objectives:
1. Describe factors that put individuals, especially children, at risk when on a UTV.
2. Discuss why UTVs are at particular risk for crash and injury on public roads.
3. State at least 3 safety practices that decrease the risk of crash and injury when on UTVs.

LIGHTNING ROUND PRESENTATIONS

Sunday Lightning Round

Sunday, December 8, 2024, 10:30 AM to 11:15 AM

Session Description:
In this exciting session, presentations will discuss a myriad of pediatric injuries related to lawnmowers, sudden unexplained infant death, and motor vehicles, as well as injury prevention strategies including safe firearm storage, mobile safety vans, opioid harm reduction, and child passenger safety seat distribution. Amazing work! Be prepared to view their posters after the session.

Learning Objectives:
1. Identify factors that put children at risk for bystander riding lawnmower-related injuries and why careful supervision is so important.
2. Describe the disparity in self-reported driving intentions among adolescents by neighborhood opportunity.
3. Characterize safe firearm storage device distribution programs among IFCK sites.
4. Describe characteristics of SUID that occur during temporary living situations.
5. Describe the nature, mechanism of injury and associated mortality among serious pediatric trauma-related injuries in a Level 1 Trauma Center.
6. Explain concepts of the safe system approach and cite an example of its use to expand our scientific knowledge of pediatric motor vehicle fatal injury pre-Covid-19 and in the Covid-19 era.
7. Understand importance of developing partnerships with insurance agencies.
8. Identify avenues to increase community access to naloxone.
9. Understand the structure and purpose of a statewide car seat distribution program.

Moderators:

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Contributing factors for pediatric bystander lawn mower-related injuries: A qualitative study

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Background: Riding lawnmowers are the most frequent cause of major limb amputation in young U.S. children, and in the majority of these events the child is a bystander. Pediatric lawn mower injury research has been minimal. Our objective was to investigate the circumstances of pediatric bystander riding lawn mower injuries and identify behaviors that may precipitate these events.

Methods: Followers/members of both a public and a private lawn mower injury support and prevention Facebook page who had or were aware of children who had suffered a lawn mower-related injury were invited to complete an electronic survey on Qualtrics which included open-ended questions regarding supervision and circumstances of the event. Injuries involving push mowers and duplicate cases were removed. Qualitative analysis of responses was independently performed by three research team members, and differences in coding were resolved through an iterative process. Descriptive analyses of responses were performed.

Results: Of the 140 injured children identified, 97 were bystanders. Major themes identified that contributed to the injury event included: Supervision Issues (40%), Child Not Perceiving Danger (40%), Child Allowed to be in Vicinity of Mower (23%), Mowing in Reverse (51%), and Other Mower-Related Issues (15%). Sub-themes for Supervision Issues included: Distracted Supervisor (34%)--which was sub-categorized into attending other children, doing another task, visiting/talking with other adults, and supervisor was mower operator, and Child Not Supervised (7%)—which was sub-categorized into miscommunication, supervisor could not see child, and no designated supervisor. Sub-themes for Child Not Perceiving Danger included Lawn Mower Rides (17%)—which was sub-categorized as child running up to mower wanting a ride, and child had received a mower ride day of injury, and Child Approached Mower (24%)—which was sub-categorized as child approached mower for a specific reason, child approached mower with no specified motive, and child engaging in play activities with lawn mower or mower operator. Sub-themes for Child Allowed to be in Vicinity of the Mower included Child Playing Near Mower (17%) and Child Doing Another Activity/Not Playing Near Mower (5%). Other Mower-Related Issues included the sub-themes: Ability to Mow in Reverse (7%), Mower Guard/Chute Issue (4%) and Blind Spots (4%).

Conclusions: Contributing risk factors for child bystander lawn mower injuries were identified and reinforce many safety directives including close supervision of children by someone other than the operator, and not allowing children outside when mowing is being performed. Many injured child bystanders were, or may have been, approaching the mower to get rides. Mower rides likely desensitize children to the inherent dangers and lead them to seek rides when the mower is being used. Mower design preventing blade operation when traveling in reverse and not giving children rides on lawn mowers may be critical in decreasing lawn mower-related injuries.

Objectives:
1. Describe factors that put children at risk for bystander riding lawnmower-related injuries and why careful supervision is so important.
2. Discuss why giving rides to children on lawnmowers increases their risk for lawn-mower-related injury as bystanders.
3. State why mowing in reverse is a problem related to child bystander lawnmower-related injuries and how engineering changes might decrease the risk.

Adolescent Driving Intentions and Licensure by Neighborhood Opportunity

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Background: Low-income teens are more likely to delay driver licensing to 18 or older. It is not known whether this delay reflects disparities in intentions to drive or barriers to licensure. The Childhood Opportunity Index (COI) is a multi-dimensional indicator of neighborhood opportunity conducive to healthy child development that may be associated with driving intention and licensure. Little is known on the intersection of COI and these outcomes.

Methods: We conducted a cross-sectional analysis of electronic health data for adolescents aged 15-18 years seen within a large 31-site Primary Care Network from February 2022-October 2023. Adolescents were included if they completed their annual Adolescent Health Questionnaire (AHQ). The AHQ assesses health risks, including self-reported driving intention and licensure status. Neighborhood opportunity was measured using score quintiles of the Childhood Opportunity Index (COI) based on adolescents' addresses. Mixed effects logistic regression separately estimated the association between neighborhood COI and driving intention for 15-year-olds and licensure status of 17-18-year-olds. Regression models were adjusted for adolescent sex, race/ethnicity, health insurance payor, and urbanicity.

Results: Adolescents (n=17,622) were 51% Non-Hispanic White, 70% privately insured, and 65% lived in neighborhoods

with “high” or “very high” COI. 77% of 15-year-olds from “low” or “very low” COI neighborhoods planned to learn to drive within the next year, compared to 83% from “high” or “very high” COI neighborhoods. 38% of 17-18-year-olds from “low” or “very low” COI neighborhoods reported having a permit or license, compared to 84% in “high” or “very high” COI neighborhoods. In adjusted models, being in the lowest two vs the highest two COI quintile neighborhoods was not significantly associated with intention to start driving in 15-year-olds (OR: 0.85, 95% CI: 0.62, 1.16), but was associated with 58% lower odds of 17-18-year-olds having their permit or license (OR: 0.42, 95% CI: 0.34, 0.51).

Conclusions: Although driving intentions are similar in 15-year-olds from neighborhoods with lower vs higher COI, our findings indicate a large disparity in licensure at age 17-18. Future studies should examine barriers that limit progress from driving intention to licensure in order to develop approaches to address this disparity.

Objectives:
1. Describe the disparity in self-reported driving intentions among adolescents by neighborhood opportunity
2. Describe the disparity in self-reported licensure status among adolescents by neighborhood opportunity
3. Demonstrate a method for collecting adolescent driving intention and licensure status in a preventive care visit workflow

Preventing firearm injuries in children: a nationwide survey of safe storage device distribution

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Background: Firearms are the number one cause of death in children in the United States. The presence of a firearm in a home represents an independent risk factor for increased risk of unintentional firearm injury, death and suicide in children. Despite this risk, many gun owners choose to keep their firearms loaded and accessible leading to increased risk of accidental or nonaccidental trauma in children of all ages. Safe storage devices, such as gun locks, trigger locks, gun safes or lock boxes, have been shown to decrease the risk of unintentional injury and suicide and are important tools in decreasing firearm injury and death in children. However, access and resources can be a barrier to obtaining these devices. In an effort to protect children, institutions have begun to provide these devices to children and families. Despite literature documenting this practice and evidence to support effectiveness, there is limited data on the national prevalence of this practice. Together with the Injury Free Coalition for Kids firearm injury prevention subcommittee , we aim to glean a better understanding of this practice and provide much needed data that could expand provision of safety devices to families and guide future advocacy and policy efforts.

Methods: We conducted a multi-center cross-sectional mixed methods study of injury-free coalition representatives at IFCK sites nationwide. We sent a survey to the PI and PC at each IFCK site. The survey consisted of 16 questions including both quantitative and qualitative data to characterize the prevalence and details of physician or hospital provided safe storage devices. Analysis included demographic data, descriptive statistics and analysis of common themes derived from qualitative questions.

Results: Survey responses were collected from 40 IFCK representatives across the U.S. Among the 40, 38 stated their site is allowed to work on firearm injury prevention. Results include how many IFCK sites currently provide safe storage devices, which devices are provided, how many devices are provided each year, how this is funded, who receives devices, and barriers to providing devices.

Conclusions: IFCK efforts to decrease firearm injuries in children include education and provision of safety equipment such as safes and trigger locks. This study describes the various efforts, common barriers and sources of funding used by IFCK sites.

Objectives:
1. Firearm injury is the number one cause of death in children in the United States.
2. Safe storage of firearms is a proven effective method of preventing firearm injury in children.
3. Survey results indicate widespread provision of firearm safety devices at centers across the United States and support expansion of these efforts.

Understanding Sudden Unexpected Infant Death during Temporary Living Situations

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Background: In the first year of life, Sudden Unexpected Infant Death (SUID) is the leading cause of death from 1-month to 1-year-old in the United States, claiming ~3500 lives each year. In 2019, Cook County joined the Center for Disease Control and Prevention’s national SUID surveillance system in efforts to expand knowledge and improve prevention strategies. Nearly all SUID in Cook County have been found to occur in unsafe sleep environments. Non-Hispanic Black (NHB) and Hispanic infants from high hardship communities die more often than their White counterparts. Families from high hardship communities in Cook County experience housing instability and crowded housing. We aim to describe the characteristic differences between SUID that occurred in temporary living

situations compared to those that occurred in an infant's usual home to identify actionable prevention approaches.

Methods: Data from the Cook County IL SUID Case Registry between 2019 and 2022 were analyzed to compare SUID that occurred in the infant's usual home with those that occurred when an infant was not in their usual home, or "temporary stay" SUID. SUID were analyzed for statistically significant differences between groups using chi-squared tests for infant age, sex, and combined race/ethnicity; maternal age and supervisor age and relationship; sleep position, bedsharing, bed-sharers and whether a crib was available for use. SUID narratives were reviewed to further identify patterns and themes to supplement the descriptive analysis between groups.

Results: Of 181 SUID in Cook County from 2019-2022, 173 were sleep-related. Of these sleep-related SUID, 143 (83%) occurred in the infant's usual home and 30 (17%) occurred during a temporary stay. Peak age for usual home SUID was 1-2-months and peak age for temporary stay SUID was 4-months. Ninety-eight (68.5%) usual home SUID and 30 (100%) temporary stay SUID were NHB infants ($p<0.05$). Thirty-one (22%) usual home SUID and 12 (40%) temporary stay SUID were bedsharing with both adults and children ($p<0.05$). Supervisors were non-parental relatives for 2 (1%) usual home SUID and 10 (33%) temporary stay SUID ($p<0.05$). Twenty-five (18%) usual home SUID and 10 (33%) temporary stay SUID had no crib available for use ($p<0.05$). Narrative review of temporary stay SUID revealed a pattern of young parents (<25 years-old) whose parents were also young when parenting them as infants.

Conclusions: Nearly 1 in 5 SUID in Cook County involve a temporary living situation. SUID during temporary stays were older, less likely to have a crib available for sleep, more likely to be bedsharing with both adults and children, more often supervised by a relative and more often non-Hispanic Black infants. Practicing safe sleep may be especially challenged in temporary stay situations. Housing instability plays a role in putting infants at risk of SUID. These findings have implications for providing contextual safe sleep counseling as parents want or need their infants to temporarily stay with others. Exploring the environmental and social reasons for temporary stays may improve relevant guidance for families facing similar circumstances.

Objectives:
1. Describe characteristics of SUID that occur during temporary living situations
2. Recognize situational circumstances that inhibit safe sleep practices
3. Consider changes to safe sleep counseling for families requiring alternate living or caregiving situations

Referral pattern for Pediatric Trauma Patients at a Level 1 Trauma Center

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Background: Level 1 Pediatric trauma requires multidisciplinary care including our community partners. However, there is a paucity of literature regarding categorizing incidence of multidisciplinary care during the hospitalization and follow up of patients with serious pediatric trauma. This is valuable information for communication between health care organizations and community partners. Our study aims to categorize these referral patterns for serious pediatric trauma at a Level 1 Trauma Center with comparison of unintentional and intentional trauma with mortality and survival.

Methods: The subjects were identified from a Level 1 Trauma center's trauma registry between January 2019 to December 2020 among patients aged 0-18 years with serious pediatric trauma. Serious pediatric trauma was defined as trauma that either led to death or admission to the Intensive Care Unit (ICU). A retrospective chart review was performed from hospital Electronic Medical Record, and pertinent data was obtained from the Medical Examiner's office and Texas Department of Family Protective Services (DFPS)/Child Protective Services (CPS). Statistical analysis was done using t-tests and Chi-square tests.

Results: There were 263 subjects identified as having serious pediatric trauma during the study period. Among them, 224/263 (85%) experienced non-intentional trauma and 39/263 (15%) experienced intentional trauma. Most frequent mechanism of injury among non-intentional trauma subjects was Motor Vehicle Collision (MVC) (92/224, 41%) and among non-intentional trauma was Gun Shot Wound (GSW) (23/39, 59%). Intentional trauma patients were more likely to have mortality compared to non-intentional trauma (13% vs 41%, 28/224 vs 16/39, $p =< 0.001$). The Child Abuse Pediatric (CAP) team was statistically more likely to see intentional trauma compared to non-intentional trauma (26% vs.12%, $p = 0.01$). In GSW non-intentional trauma, social work was consulted in 79% and CAP team in 3% of cases. In subjects where CAP was consulted, social work was consulted in 100% of those cases. For the intentional trauma subjects admitted to the PICU, social work was consulted 100% of the time, while the CAP team was only consulted for 43%. Of the 44/263 mortality cases, social work was consulted in 71%, CAP team in 11%, and DFPS/ CPS reporting was done in 30% of cases.

Conclusions: Findings from this study help to evaluate the pattern of referral and reporting in Level 1 pediatric trauma. There were missed opportunities for involving social work, CAP team, and reporting to DFPS for specific types of serious pediatric trauma and potential suboptimal care. Findings from this study help to implement processes to have timely consults

and reporting to our in-hospital services and community partners.

Objectives:
1. Describe the nature, mechanism of injury and associated mortality among serious Pediatric Trauma in a Level 1 Trauma Center.
2. Describe the types of trauma and patterns of referrals made at a Level 1 Trauma center.
3. Discuss the missed opportunities for involvement of social work, the CAP team, and CPS.

Using the Safe System Framework to Examine Pediatric Mortality on U.S. Roadways Pre-Covid-19 and in Covid-19 Era

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Background: The U.S. experienced a significant increase in all age motor vehicle mortality during the Covid-19 pandemic that has not returned to pre-Covid-19 levels. A better scientific understanding of the Covid-19 impact on motor vehicle mortality in the pediatric population could aid in designing and conducting more effective prevention efforts.

Methods: A census database of all U.S. roadway deaths, the Fatality Analysis Reporting System (FARS), was employed to investigate pandemic changes in motor vehicle mortality in the U.S. pediatric population aged 0-19 years. The pre-pandemic era was defined from 04/01/2017 to 12/31/2019 (n=9,566) and the Covid-19 era from 04/01/2020 to 12/31/2022 (n=10,692). FARS variables were mapped to the Safe System five pillar framework and compared across the two timeframes for: 1) road users; 2) roadways; 3) vehicles; 4) speeds; and 5) post-crash care. To control for seasonal differences, the two time periods were exact matched by month and length of study time. Deaths occurring during a buffer period from 01/01/2020 to 03/31/2020 were excluded. In this ongoing study, statistical analyses will include Chi Sq for bivariate analyses and multivariable logistic regression for unadjusted and adjusted odds with 95% CI.

Results: The pandemic period was associated with more than 1,100 excess pediatric motor vehicle deaths compared to an identical length period in the pre-Covid timeframe. Mortality increased by 11.8% in ages 0-19 years during the pandemic, but this varied significantly by age. Percent increase in mortality was highest in ages 10-14 (18.1%) and second highest in 15-19 years (13.8%) than other age groups (p=0.005). Mortality increased by approximately 10% in drivers with a full or a GDL license, but by 52.5% in drivers without a driver's license (p<0.0001). There was a 40.5% increase in failure to use safety equipment (p<0.0001) and a 37.8% increase in underaged alcohol-impaired drivers (p=0.002). Urban roadway mortality increased more than rural roadways (21.2% vs. 2.4%, p<0.0001). Mortality decreased during inclement weather, but increased significantly in clear conditions (p<0.0001) and at night (p=0.0001). Mortality increased by approximately 11.8 to 14.8% for trucks, cars, and SUVs, but by 20.3% for motorized 2 and 3 wheelers and 43.2% for nearly 1,000 "other" vehicle types (p<0.001). Vehicle ejections were up by 27.5% p<0.0001). Speed related crashes increased by 32.2% (p<0.0001). Post crash care had a 17.9% increase in died on the scene and not transported for emergency care during the Covid era (p=0.004).

Conclusions: The U.S. pediatric population experienced an increase in pandemic mortality despite stay-at-home orders, entertainment shuttering, and school closures. Use of the five pillar Safe System framework was valuable in identifying pandemic-associated road user behavior, roadway, vehicle, speed, and post-crash factors contributing to the pediatric pandemic mortality increase.

Objectives:
1. Explain concepts of the safe system approach and cite an example of its use to expand our scientific knowledge of pediatric motor vehicle fatal injury pre-Covid-19 and in the Covid-19 era;
2. Identify emerging issues and trends in the pediatric population experiencing fatal roadway injury;
3. Discuss how these scientific findings can be used to focus and inform prevention efforts.

Safety Quest- A Mobile Classroom Experience

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Background: Unintentional injuries are the leading cause of death in children. These injuries represent a significant public health concern globally, often resulting in devastating consequences for children and their families. These injuries encompass a broad spectrum, including falls, burns, drowning, poisoning, bites, and motor vehicle collisions. Despite advancements in safety measures and injury prevention strategies, children continue to be vulnerable to these incidents due to their natural curiosity, and lack of awareness about potential hazards.

Methods: Our hospital partnered with a local insurance agency to create Safety Quest, a large RV with several games about safety including interactive media games geared toward 4th-5th grade students. This program emphasizes how children can be safe and responsible for themselves and others. Safety Quest comprises 4 games, each focusing on different aspects of safety. Home Hazard Hunt, Street Smarts, Fire Escape and Charades. Home Hazard Hunt walks the children through a home and playground and identifies the hazards that might be found throughout these environments. Street Smarts focuses on paying attention to surroundings while walking or biking in public and on sidewalks. Fire Escape teaches the students what to do in a fire emergency in their homes and simulates escaping a fire emergency in a home. Charades is an acting game all about safety. Students will engage in discussion about why certain everyday items may be important for them to learn more about. Participants are given pre and post surveys to evaluate comprehension, as well as improve the content.

Results: In the 2023- 2024 school year, Safety Quest has visited approximately 40 schools and about 2,000 5th grade students have participated.

Conclusions: Unintentional injuries are the leading cause of death in children. Safety Quest brings awareness and education to 4th and 5th grade students about fire safety, pedestrian safety, bicycle safety, water safety, poison safety, home safety, and playground safety. Future directions are to analyze the pre and post survey responses in order to improve the content, as well as evaluate the comprehension of the participants.

Objectives:
1. Developing partnerships with insurance agencies.
2. Methods of game development for injury prevention.
3. The importance of collaboration with school systems.

Opioid Overdose Prevention and Harm Reduction Program

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Background: Drug overdose is now a leading cause of injury death among children and young adults in the program region: from 2019 to 2022 the rate of deaths involving opioids nearly doubled among children and young adults. In this region, deaths from drug overdose in people ages 0 to 24 now outpace the number of deaths caused by firearms and motor vehicles - the two leading causes of injury death nationally for this age group. As access to fentanyl increases, harm reduction programming tailored to young people should be implemented to reduce overdose fatalities.

Methods: The hospital's Community Health team developed a strategic program plan with the goal to deliver education and services that appropriately respond to the opioid overdose crisis among young people, reduce stigma around substance use disorder, support access to resources for safe medicine storage and disposal, and ultimately reduce morbidity and mortality. Primary audiences include youth, families, and clinicians. We've used the socioecological model to frame delivery of education and services to parents, caregivers, and adults who care for children and teens in the program region.

Results: We've piloted an opioid overdose recognition and response education model to deliver to community. Between March and May 2024, approximately 150 community members received education on opioid overdose, and 100 naloxone kits were distributed in the program region through an event. All the people who received naloxone at the event and completed a survey reported that they were at least somewhat likely to carry naloxone within the next month, and 94% reported increased confidence to use naloxone after attending the event.

We've also developed and implemented an educational presentation for pediatric medical residents to highlight the urgency of this issue in the pediatric population and to illuminate existing clinical resources and medication treatment options. To date, approximately 31 medical residents have received training to support adolescent opioid awareness and harm reduction, with initial pilot results suggesting increased confidence in providing patient counseling on overdose recognition and naloxone administration.

Currently, this program pilot is funded by the hospital and a limited supply of naloxone was provided by the state department of health.

Conclusions: Program education has been well received by community members and medical residents in the program region. There is momentum to expand the program's reach through collaboration with clinicians, community health team members, school-based health centers, and community organizations. We plan to use the transtheoretical model and health belief model to further develop program interventions for clinicians and youth audiences.

Objectives:
1. Understand opioid overdose prevention and harm reduction program goals, objectives, and evaluation design for a pediatric hospital.
2. Identify avenues to increase community access to naloxone.
3. Demonstrate ways to collaborate cross-departmentally and with community organizations to develop and implement opioid overdose prevention and harm reduction initiatives.

Statewide Child Restraint Distribution

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Background: The State is the smallest State in the country, but has a very robust Child Passenger Safety program. There are currently 157 Child Passenger Safety Technicians (CPST's) certified in the State. Sixty five percent of these CPSTs, which equates to 102, are law enforcement. The remaining 35% of the CPSTs are spread out among The Injury Prevention Center, the State's only Children's Hospital. community partners, and volunteer fire departments. The State's Department of Transportation (DOT), is the sole funding source for all Child Passenger Safety (CPS) activities for law enforcement, IPC, and community partners. In the past, law enforcement agencies were given a set amount of money to purchase car seats. Those car seats had to last the entire grant year since there was no additional funding. High performing agencies would run out of seats, and be left with no car seats to distribute to caregivers who were in need. Based on this issue, a pilot program was created for a single car seat repository for all agencies and community partners who receive grant money from DOT.

Methods: The car seat distribution program is coordinated out of the Injury Prevention Center. DOT has supplied a single funding source where car seats can be purchased by the IPC. The car seats are stored in an off site storage unit. In conjunction with DOT, it was determined that each police department and community partner would receive a set amount of car seats to start with. Three convertible seats, one high back booster, and one no back booster would be given to each agency. The time frame was from 10/1/23 - 9/30/24. The IPC delivered to a total of 36 agencies (31 municipal police departments, 4 State Police barracks, and 1 Community partner). A total of 108 convertible seats, 36 high back booster seats, and 36 no back booster seats were delivered. Agencies would sign a "contract" at the time of delivery of the seats indicating they understood the terms of the program. This "contract" is filled out each time an agency receives additional car seats. Once an agency distributed a car seat, they send my office a form indicating the why, and what type of seat was distributed. To acquire more car seats, the CPST will email me to set up a time to come to the IPC.

Results: The results have been positive. As previously stated, 36 agencies have participated in the program. No agency has run out of car seats, which equates to a 100% success rate as caregivers have not been turned away which occurred in the past. A total of 22 seats as of 5/30/24 have been distributed by 7 agencies. All data is maintained by the Project Coordinator. At this time, we have not had any challenges.

Conclusions: For the first year of the program, we have seen success with the statewide car seat distribution program. The intent is to fund this program again for FY 25.

Objectives:
1. Understand the structure and purpose of the statewide car seat distribution program.
2. Identify the key stakeholders and their roles in the initiative.
3. Evaluate the effectiveness of the pilot car seat distribution model.

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Moderator and Presenter Biographies

Sarah Beth Abbott, BS, EMT-LP — Sarah Beth Abbott, BS, EMT-LP is the Pediatric Injury Prevention and Outreach Education Coordinator at Children's Memorial Hermann Hospital in Houston, TX. She has experience delivering health education to stakeholders within the local community and has extensive background in program planning, team building and regulatory experience. She received her Bachelor of Science with a focus on Health Education from University of Houston. She is the program coordinator for the Injury Free Coalition for Kids – The University of Texas Health Science Center at Houston – McGovern Medical School (UTH) and Children's Memorial Hermann Hospital (CMHH).

Maneesha Agarwal, MD, FAAP — Dr. Maneesha Agarwal is an associate professor in pediatrics and emergency medicine at Emory University School of Medicine and an attending physician in pediatric emergency medicine at Children's Healthcare of Atlanta. She received her undergraduate and medical school degrees at the University of North Carolina in Chapel Hill followed by pediatrics residency in the Boston Combined Residency Program in Pediatrics and pediatric emergency medicine fellowship at Carolinas Medical Center in Charlotte. She is passionate about injury prevention, and her previous work encompasses multiple fields including poisoning prevention, child passenger safety, teen driving, firearm safety, consumer product safety, and adverse childhood experiences. Dr. Agarwal enjoys research, advocacy, education, and mentoring the next generation of injury prevention leaders. She co-founded the Children's Healthcare of Atlanta Injury Prevention Program (CHIPP) and serves as the pediatrics expert for the Injury Prevention Research Center at Emory. She is also faculty for the national Trainees for Child Injury Prevention program.

Phyllis Agran, MD, MPH — Dr. Agran is Professor (Emeritus), UC Irvine School of Medicine, Departments of Pediatrics and Emergency Medicine with American Board of Pediatrics certification in both general pediatrics and pediatric gastroenterology (clinical activities.) Her research is focused on the epidemiology and prevention of childhood injury and has expanded to school nurses and school health services. Translating research findings to public awareness, professional education, and advocacy for policy change best defines her professional career and goals. She received her BA degree at UC Berkeley, an MPH degree at Harvard University and Medical Degree at UC Irvine. She was awarded the 2024 Orange County, CA Medical Association Physician of the Year. She is the proud recipient of the Injury Free Coalition for Kids Pioneer Award in 2018.

Nina Agrawal, MD — Dr. Agrawal is a pediatrician with expertise in child abuse pediatrics. She chairs the Injury and Violence Prevention Committee of NY state - AAP, Chapter 3. She is a researcher, educator, and advocate for violence prevention for children. She is currently an MPH student at CUNY- School of Public Health. She enjoys writing and has been published in the New York Times. She lives in New York City (and is a child-less cat lover).

Pallavi Arora, MPH, MA — Pallavi Arora is a recent graduate from the full-time MPH program at Johns Hopkins Bloomberg School of Public Health. She is also a trained mental health professional from India and is passionate about improving access to healthcare and health outcomes for women and youth. Her research interests span violence prevention, mental health interventions, therapeutic processes and outcomes, and health inequities. When not working, she spends her time completing all the NYT puzzles, dreaming of good food (which she doesn't need to cook) and convincing herself to exercise.

Amanda Batlle, MSN, RN, CPNP-PC, NPD-BC – Amanda Batlle is the Manager of Injury and Illness Prevention for Child Advocacy at Children's Healthcare of Atlanta. Amanda also serves as the State Leader for Safe Kids Georgia which supports a network of local coalitions across the state in injury prevention efforts. Additionally, Amanda is the Atlanta Chapter Program Coordinator for Injury Free Coalition for Kids. Her work focuses on the top causes of preventable deaths in Georgia's children including motor vehicle safety, firearm safety, drowning prevention, and safe sleep practices through program development, implementation, and evaluation. Amanda is a primary care pediatric nurse practitioner and board-certified nursing professional development specialist. Prior to joining Children's, Amanda supported children in a number of ways, including teaching, nursing and working as a provider in both a private pediatric practice and a Federally Qualified Health Center serving the under- and uninsured. Seeing the various disparities in health outcomes, access to health services, and access to resources, Amanda became committed to ensuring all children have equitable access to the best care.

Kirsten Bechtel, MD — Dr Bechtel is a Professor of Pediatrics and Emergency Medicine at Yale School of Medicine. Dr. Bechtel is Medical Director, Pediatric Sexual Assault Forensic Examiner (SAFE) Program; Chairperson, Yale Traffic Safety Subcommittee; Co-Chairperson, State of Connecticut Child Fatality Review Panel; and Principal Investigator, Injury Free Coalition for Kids at Yale-New Haven Children's Hospital. Dr. Bechtel's academic career has focused on the social welfare and medical well-being of children and injury prevention. Her clinical research has focused on the evaluation of children with head trauma; the prevention of Abusive Head Trauma, recognition of Child Abuse and neglect by emergency medical service providers; the evaluation of children and adolescents after Sexual Assault; the evaluation of children and adolescents who are involved in Domestic Minor Sex Trafficking; the prevention of Traffic Injury; and the prevention of Post-Traumatic Stress Symptoms in children with traumatic injury. She currently serves as an Executive Committee Member for the AAP Section on Child Death Review and prevention. She also serves on the Editorial Boards of AAP Grand Rounds and for AAP PREP-EM. She has extensive experience in writing policy, technical and white papers on child health and injury prevention. She was honored by Yale University with the Seton Elm Ivy Award in 2015 for her work to prevent traffic injury. She was honored by the Department of Pediatrics with the Ather Ali Award for Humanism in Medicine in 2020, and honored by the Yale School of Medicine with the David Leffell Award for Clinical Excellence in 2021.

Jaya Bhalla, BS — Ms. Bhalla recently graduated from UCLA with a BS degree in Molecular, Cell, and Developmental Biology and a Minor in Public Health. She has been the research assistant on our American Academy of Pediatrics-Orange County Injury and Violence Prevention Initiative for 6 years in the areas of Drowning Prevention, Child Passenger Safety, Sudden Unexpected Infant Death, and Firearms Safety. Additionally, she served as a community outreach student coordinator for Clinic in the Park, a fiscally sponsored program of the American Academy of Pediatrics-Orange County. Ms. Bhalla also contributes to clinical research and patient care in her other roles as she pursues a career in medicine.

Katelin Blackburn, MD, MPH — Katelin Blackburn is an adolescent medicine physician in Boston, Massachusetts where she provides primary and subspecialty care for adolescents at a safety net hospital. She is Co-chair of the Violence Prevention Committee for the Society of Adolescent Health and Medicine. Her research focuses on decreasing the incidence and impacts of adolescent relationship abuse. Within her community, Dr. Blackburn sits on the

Board of Directors for a domestic violence prevention organization, through which she has liaisoned with multiple other community-based organizations to expand the reach of dating violence prevention education for youth in Massachusetts.

Lauren Brewer, MD — Lauren Brewer is a third year pediatric resident at the University of Alabama- Birmingham. She graduated from Lipscomb University with a Bachelor's of Science in applied biochemistry. She then attended medical school at the University of Tennessee Health Science Center in Memphis, TN. She plans to pursue a career in Pediatric Emergency Medicine. Her current areas of interest include ingestion management, sexual assault prevention, child passenger safety, and Taylor Swift.

Kristy Brinker Brouwer, MS, CPST — Professor Kristy Brinker Brouwer currently teaches Mechanical Engineering courses, specializing in Dynamic Systems and Mechanics, at Kettering University in Flint, Michigan. She received both her BS and MS at Kettering University in Mechanical Engineering - Bioengineering Applications. Her diverse background includes 25 years of wide-ranging experience in several industries including: driveline components, safety restraints and federal regulation testing, military robotics and autonomous vehicles, as well as, athletic shoe testing, osteoarthritis and breast cancer research in biomechanics laboratories at Michigan State University and Oakland University. She has two US patents in airbag technologies including one that reduces airbag deployment risk with rear-facing child seats. For the past 15 years, in her free time, she has been actively teaching and volunteering as a certified Child Passenger Safety Technician Instructor for SafeKids Worldwide all over the country. Professor B is also serving on the Advisory Board for Safe Kids in Automated Vehicle Alliance and advocates for the unique needs of our most precious cargo in the emerging world of Automated Mobility.

John Brooks — John Brooks is CEO of Little Feet Safety Systems, LLC. John is the inventor of a patented wireless machinery injury prevention system and is the founder of "Lawn Mower Injury Support and Prevention", an open community page on Facebook that highlights lawn mower injuries and serves as a conduit for survivors. John also found a private support group of 800 families that have been impacted by a lawn mower injury.

Shea Buckley, MEd, BCBA, CPST — Shea Buckley, M.Ed., BCBA, CPST is a master's level Board Certified Behavior Analyst who provides applied behavioral (ABA) services to children diagnosed with autism spectrum disorder (ASD) in the Complex Behavior Support Program at the Marcus Autism Center. Shea began her career in the public school system as a special education teacher and, later, as a behavior intervention specialist for the school district. She is responsible for developing and conducting individualized assessment and treatment packages aimed at reducing maladaptive behaviors, such as aggression, disruption, elopement, and self-injurious behavior. Shea is also a Child Passenger Safety Technician and oversees the Child Passenger Safety Program at Marcus which provides assessment and intervention to children who exhibit unsafe behaviors while being transported in a motor vehicle.

Monica Cardenas, MD — Monica Cardenas, MD is a pediatric pulmonologist, Assistant Professor of Pediatrics and Director of the Newborn Screening Program for Cystic Fibrosis at the University of Miami and Jackson Health Systems. Her quality improvement initiative for asthma care earned Holtz Children's Hospital the Asthma Friendly designation from the Florida Asthma Coalition. Dr. Cardenas cares for children with a wide variety or respiratory diseases and inequity experiences.

Michael Chappell, CPST-I — Michael Chappell graduated from the University of Rhode Island with a Bachelor of Science degree in consumer studies. He is currently a project coordinator for the Injury Prevention Center and is the Rhode Island state child passenger safety contact. He oversees a variety of programs including Safe Kids Rhode Island, the 4-Safety Program, and the Seats 4 Safety Program. He is a certified Child Passenger Safety Technician Instructor (CPSTI) and administers the national child passenger safety training course multiple times per year. He travels throughout the State of RI assisting at car seat checkup events at State, and Municipal Police Departments. Additionally, he supports community agencies with many injury prevention topics such as car seat safety, bicycle safety, and pedestrian safety. Prior to his employment at the IPC, he served 25 years as a police officer in South Kingstown RI. He has been devoted to injury prevention for over 25 years, working to keep the children of Rhode Island safe and free from injury.

Sofia Chaudhary, MD, FAAP — Sofia Chaudhary is an Assistant Professor in Pediatrics and Emergency Medicine at Emory University School of Medicine and a Pediatric Emergency Medicine Attending Physician at Children's Healthcare of Atlanta. She completed her pediatric residency at Emory University and her pediatric emergency medicine fellowship at the Children's Hospital of Philadelphia. She is currently the co-PI of the Atlanta Chapter for Injury Free Coalition for Kids, co-chair of the Violence Prevention Task Force for Injury Prevention Research Center at Emory, and Chair of the Council of Injury, Violence, Poison Prevention for the GA Chapter of the American Academy of Pediatrics. Outside of caring for children in the pediatric emergency room, her primary academic research and advocacy focus has been on pediatric injury prevention with a specific focus on firearm injuries. She has authored multiple injury prevention-related publications and spoken as an injury prevention expert at national scientific meetings. She enjoys working with trainees and mentoring them as they become injury prevention advocates. She co-founded the Children's Healthcare of Atlanta Injury Prevention Program (CHIPP) and serves on the steering committee for the Injury Prevention Research Center at Emory.

Brooke Cheaton, MBA — Brooke Cheaton has over 20 years working in advocacy and support for underserved populations. She obtained her undergraduate degree from the University of Wisconsin – Madison later earning her MBA in Healthcare Administration from Cardinal Stritch University in Milwaukee. She began her career organizing youth development programming for afterschool and summer programming and later transitioned to violence prevention and intervention work at Children's Wisconsin first as a direct service, frontline worker with Project Ujima. Brooke is currently serving as the manager for Project Ujima-Children's Wisconsin, where she's been a part of the team for over 14 years. She has co-authored many scholarly articles surrounding violence intervention and prevention efforts and worked collaboratively with both clinical and community based-teams to improve victim services in the Milwaukee community. Her continued motivation and passion focus upon victim's rights, advocacy, access and sustainability of program services and funding.

Felicia Clark, D-ABMDI — Felicia A. Clark, D-ABMDI, is a Certified Medicolegal Death Investigator. She worked as the Child Death Investigator for the Cook County Medical Examiner's Office for over 10 years. After retiring from the CCMEO in February 2021, she partnered with the Cook County SUID Case Registry to establish and serve as Prevention Coordinator for Community Partnership Approaches to Safe Sleep (CPASS)-Chicago. Felicia also serves on the Illinois Child Death Review Team for Cook County and the Family Focus Advisory Board, in Cicero, IL. Felicia can be found throughout Chicagoland communities creatively engaging, equipping and empowering families to practice safe sleep and distributing safe sleep education material and cribs to underserved communities. Felicia is a Follower of Christ, a wife to Thomas, a mother to 3 adult children, one of whom has special needs, and a grandmother to one granddude.

Lindsay D. Clukies, MD, FAAP — Dr. Clukies is a pediatric emergency medicine physician at St. Louis Children's Hospital. She completed her undergraduate degree at McGill University in Montreal, Canada and medical school at New York Medical College. She went on the pediatrics residency and pediatric

emergency medicine fellowship at Washington University in St. Louis/St. Louis Children's Hospital where she stayed on as faculty. She is the associate trauma medical director and has particular interests in injury prevention, clinical guidelines, firearm injuries and pre-hospital care. When she is not working she is keeping busy with her 3 sons and 3 rescue dogs.

Joseph M. Colella, CPST-I — Joe Colella has been a child passenger safety advocate since 1994, and has worked on occupant protection for children in 48 states and 5 additional countries. He currently serves as a writer, consultant, presenter, instructor, media spokesperson, and more. Joe has been an instructor for the National Standardized CPS Training Program since its inception, is a past chair of the National CPS Board, actively participates on the the SAE Child Restraint Systems Standards Committee, serves on the editorial board of Safe Ride News, co-chairs the CPS Track for Lifesavers, and has many other roles.

Shannon Coleman, MD — Shannon Coleman is in her 3rd year of Emory University's Pediatrics Residency Program. Her background includes obtaining a BS in Public Health from American University in Washington, DC and an MD from University at Buffalo Jacob's School of Medicine, in her hometown of Buffalo, NY. Her interests have focused on Social Determinants of Health and Global Health throughout her education, with a newfound passion for Injury Prevention since starting residency. After graduation, she plans to work as a nocturnist and continue research before ultimately pursuing a fellowship in Pediatric Critical Care.

Emma Cornell, MPH — Emma is the Senior Clinical Research Program Manager at Northwell Heath's Center for Gun Violence Prevention. Emma's portfolio spans over half a dozen research projects, with the primary aim to help further the evidence base for firearm injury prevention strategies across all levels of healthcare. She oversees the implementation and expansion of Northwell Health's universal screening program for firearm injury risk, and directs the Cohen Children's Medical Center's first-ever hospital-based violence intervention program. Emma holds an MPH from Columbia's Mailman School of Public Health, where she pursued a specialized course in injury and violence prevention, focusing on firearm injury.

Barbara D. Cosart, MLIS, MPH, CHES — Barbara Cosart is the Injury Prevention Coordinator for the Dell Children's Drowning Prevention and Water Safety Program in Austin, Texas, which aims to plan, implement, and evaluate drowning prevention projects and interventions, as well as conduct research to inform drowning prevention initiatives. Barbara is assisting in the formation of the Texas Water Safety Coalition and the forthcoming Texas Water Safety Strategy. She also facilitates the Central Texas Drowning Prevention Action Team, working closely with other water safety stakeholders to prevent drownings throughout Texas and in our local area. As the mother of a teen child on the autism spectrum, Barbara has a personal interest in preventing injuries among children with autism.

Jordan Couceyro, MD — Jordan is currently a first-year Emergency Medicine Resident at Emory University. He attended medical school at Emory as well, and originally hails from Miami, FL. His academic interests include pediatric (head) injury prevention and evaluation, toxic ingestions of all kinds (but specifically water beads), and using music to promote wellness in healthcare practitioners. He recently adopted an orange kitten, and can confirm the rumors of their mono-neuronal nature.

Emily Dicksa, MaT, BSPH, CPST — Emily Dicksa began her work with children and families in 2010 in early childhood development with a focus on health and wellness. In 2016, she received a Bachelor's of Science Degree from Oregon State University in Public Health, with a minor in research and writing. Emily then directed an elementary school-based program for low-income families and children which focused on nutrition, academics, and safe care, before going on to receive her Master's Degree in Teaching from OSU in 2019. During her work in elementary schools, Emily became acutely aware of the many barriers low-resourced families face in keeping their kids safe and healthy. Her passion for Public Health brought her to a new position in 2023 with Randall Children's Hospital in Portland, Oregon as a Child Injury Prevention Health Educator and Child Passenger Safety Technician. In her current role, Emily focuses on in-patient trauma rounding to provide injury prevention education to families, in-patient and out-patient child passenger safety education, and outreach classes and events to provide injury prevention education in the community.

Kiesha Fraser Doh, MD — Kiesha Fraser Doh, M.D., is a Pediatric Emergency Physician at Children's' Healthcare of Atlanta and Associate Professor of Pediatrics and Emergency Medicine at Emory University. She is Co-Chair of American Academy of Pediatric Firearm Injury Prevention-Special Interest Group, Co-Chair of Children's Injury Prevention Program and Co-Chair of Pediatric Emergency Care Research Network Injury Prevention Interest Group. Dr. Fraser Doh is passionate about firearm injury prevention research, having published numerous articles in this area. She is a co-author of the AAP's Firearm Injury and Harm Reduction Policy Statement. Dr. Fraser Doh has worked for Children's' Healthcare of Atlanta/Emory University for over 12 years.

Rada Drca, MA, LPC — Rada Drca, M.A., LPC, is an experienced Clinician that provides staffing, training and consultation to community providers and Care Coordinators to help identify and support individuals experiencing severe mental illness including psychosis, crisis and trauma. As a Licensed Professional Counselor, she has provided therapeutic healing to children, adolescents and their families with emphasis in treating childhood trauma and attachment. She is certified TF-CBT therapist, has completed training in narrative attachment therapy, as well as Training for Adoption Competency (TAC) program. Rada is well versed in implementing the SIPS: Structured Interview for Psychosis Risk Syndromes assessment tool and identifying youth who are at Clinical High Risk for Psychosis (CHR-P). Rada has a strong passion in building awareness and support for individuals experiencing psychosis. Rada has been with Wraparound Milwaukee for over 5 years.

Dominick Dunbar, BS, CPST — Dominick Dunbar is a recent addition to the field of injury prevention as a graduate of Worcester State in 2022. He has been the Injury Prevention Education Specialist for UMass Memorial Medical Center in Worcester, MA for just over a year, and serves as a Child Passenger Safety Technician. He is currently enrolled in a Master's Public Health program at the University of New England. At UMass Memorial Medical Center he assists in running programs such as Safety Quest, Aging Gracefully, Stop the Bleed and more.

Rachel Eisenhauer, BS — Rachel is a third year medical student at McGovern Medical School at UT Health Houston. She received her undergraduate degree in Cell and Molecular Biology from Northeastern University.

Eliot England, MPH — Eliot England (she/her) is a third-year medical student at Rush Medical College with a strong foundation in public health and research. She holds an MPH from Emory University and a B.S. in Neurobiology and Sociology from the University of Wisconsin-Madison. Her current interests include pediatric medicine, infectious disease, OBGYN, and public health advocacy. Eliot is excited and passionate about advancing medical knowledge and improving SUID outcomes through this research.

Caitlin Farrell, MD — Caitlin Farrell is a pediatric emergency medicine physician at Boston Children's Hospital where she leads the Section on Pre-Hospital Care and Emergency Medical Services (EMS). Dr. Farrell's research interests focus on pediatric trauma and injury prevention. Her prior work has included pediatric fractures, motor vehicle safety, firearm-associated injury, and child abuse fatalities. She has a special interest in the pre-hospital care of ill and injured children and works closely with local and regional

EMS providers to improve pediatric care through education and collaboration.

Symone Ferguson — Symone Ferguson is a Senior Project Coordinator at the Child Abuse Death Review Unit within the Florida Department of Health, Division of Children's Medical Services. In this role, she manages legislative-funded projects aimed at enhancing child safety and reducing fatalities. She spearheads the planning and logistics for initiatives aimed at preventing child fatalities, drawing on her experience in project management, data analysis, and administrative leadership. Her diverse background has equipped her with a broad range of skills, including expertise in coordinating large-scale initiatives, leading prevention initiatives, and navigating complex regulatory environments. She supports multidisciplinary committees through the planning and execution of prevention initiatives, leveraging her project management skills, honed through her Lean Six Sigma Advanced Yellow Belt certification. By attending national conferences, she remains current with developments in child fatality review and prevention, which broadens Florida's impact in these crucial areas in a national scale. Symone's commitment to continuous education and staying informed helps drive forward the unit's mission to improve child safety through evidence-based strategies and collaboration.

Sarah Frances, BS — Sarah Frances is a second-year Master of Public Health student at Columbia University's Mailman School of Public Health, specializing in Sociomedical Sciences. She holds a dual Bachelor's degree in neuroscience and public health from Tulane University. At Columbia, under the mentorship of Dr. James Noble, she focuses on concussion prevention research, particularly among youth populations. Sarah collaborates with the NCAA-DOD CARE Consortium, studying concussion epidemiology and health disparities across racial and ethnic groups in football and basketball. Her research also evaluates successful concussion monitoring programs nationwide to develop generalizable statewide models. Additionally, Sarah serves on the Board of Directors of the New York State Public Health Association as a Student Representative and assists with concussion health education materials for the Brain Injury Association of New York State.

Olivia Frank, MPH — Olivia is the Injury & Violence Prevention Program Manager at Northwell Heath's Center for Gun Violence Prevention. Olivia's work focuses on implementing and evaluating the Center's community-and-patient-facing programs, including the Hospital Violence Intervention Program (HVIP), and strengthening collaborations with surrounding New York City and New York State community violence intervention organizations. Olivia holds an MPH from Columbia's Mailman School of Public Health, where she pursued a specialized course in injury and violence prevention, focusing on the intersections of adverse childhood experiences and community violence. Olivia has extensive experience across diverse community and healthcare settings and has conducted research on substance use, intimate partner violence, and child maltreatment.

Adrienne R. Gallardo, BSW, MAOM, CPST-I — Adrienne is the Program Manager for the OHSU Doernbecher Injury Prevention Program at OHSU Doernbecher Children's Hospital in Portland, Oregon. Adrienne completed undergraduate studies in social work and obtained a master's degree in organizational management. She has dedicated her professional focus on Injury Prevention and advocating for children. She has been a Child Passenger Safety Technician since 2002, and an instructor since 2012. Adrienne has led the development of the Injury Prevention Program at OHSU Doernbecher Children's Hospital which includes an Injury Control Program benefiting patients and their families along with an Injury Prevention outreach program serving Oregon, SW Washington and Portland Metro communities. Adrienne currently is a member of the Injury Free Coalition for Kids Board of Directors and received the Injury Free Program Coordinator of the Year Award in 2022.

Mikayla Gibson, BS — Mikayla Gibson graduated from the University of Iowa with a Bachelor of Science in Human Physiology in May 2024. She grew up in Des Moines, Iowa, and now works in the emergency department at Iowa Methodist Hospital as an EMT. Mikayla hopes that her research will raise awareness about the dangers of riding lawnmowers for children and reduce these injuries in the future.

Pnina Goldfarb, PhD — Pnina Goldfarb, Ph.D. has been a research consultant since 2009 for Wraparound Milwaukee, a program that serves system and non-system youth who have been diagnosed with mental illness. She has over 40 years of experience with children and youth who experience mental & behavioral health issues in a breadth of professional arenas including public and private schools, hospitals, clinics, and universities. Dr. Goldfarb has served as an educator, teacher trainer, school consultant, curriculum developer and researcher. She is a published academic and has widely presented papers within the State of Wisconsin and nationally.

Jonathan Green, MD, MSCI — Jonathan Green is an Assistant Professor of Surgery and Pediatrics at the UMASS Chan Medical School in Worcester, Massachusetts. He is a practicing pediatric general and trauma surgeon, as well as the Director of Injury Prevention at UMASS Memorial Health Children's Medical Center in Worcester, MA. He currently serves as the principal investigator for Worcester Massachusetts Injury Free Coalition for Kids (IFCK). He received his undergraduate and medical degree from the University of Florida. He completed his general surgery residency at UMASS Chan Medical School, in Worcester, Massachusetts and his pediatric surgery fellowship at Oklahoma Children's Hospital in Oklahoma City, Oklahoma. His work in injury prevention, spans from firearm safety in the community, safe driving programs for teenagers, development of a helmet distribution program and multidisciplinary education programs for car seat safety among NICU patients.

David Greenky, MD — David Greenky is a pediatric emergency medicine physician at Emory University School of Medicine / Children's Healthcare of Atlanta (Children's). He has expertise in pediatric disaster preparedness and special pathogens. He leads the federally funded "Gulf-7" Pediatric Disaster Care Center of Excellence at Emory University and is also a physician leader of the Special Care Unit at Children's, one of two pediatric-specific biocontainment units in the United States. He has published extensively on global preparedness, including disaster preparedness in the refugee population, working with interpreters in the pediatric emergency department, and the travel screen in the pediatric emergency department. Prior to medical school, he spent four years working at a company dealing with global security with a focus on the Middle East.

Taylor Hautala, MPH — Taylor has been part of the University of Michigan Injury Prevention Center (UM IPC) since 2021. In her role, she supports training and outreach across all of the UM IPC's focus areas of injury prevention. Taylor holds a Master of Public Health Degree in Health Behavior & Health Education from the University of Michigan School of Public Health and has experience in health communications, child/adolescent health, and substance abuse research.

Sarah Haverstick, CPST-I — Sarah Haverstick serves as the Senior Manager of Safety Advocacy and Consumer Care for Evenflo. Sarah is currently celebrating her 17th year in child passenger safety. She is a certified Child Passenger Safety Technician Instructor and an instructor in the safe transportation of children with disabilities. She has held positions on numerous local, state and national boards related to injury prevention. Sarah is a former chair of the National Child Passenger Safety Board and the Manufacturers Alliance for Child Passenger Safety. In 2021, she was inducted into the Child Passenger Safety Hall of Fame. Sarah received her bachelor's in Political Science from Rutgers University and lives in Bradenton, Florida.

Elizabeth Hendrickson, MD — Elizabeth Hendrickson, MD, is a first year pediatric emergency medicine fellow at the University of Alabama at Birmingham/Children's of Alabama. She received her Bachelors of Science in Science and Religion from Samford University before obtaining her medical degree at the University of Alabama at Birmingham Heersink School of Medicine. She completed her pediatrics residency at Washington University in St. Louis/Saint Louis Children's Hospital where she developed a passion for injury prevention and advocacy. Her other research interests include using qualitative methods to investigate the physician-patient relationship in critical and emergency care.

Owen S. Henry, MD — Owen Henry, MD graduated Phi Beta Kappa from the University of Massachusetts with a B.S. in biochemistry, molecular biology, and classical piano performance before earning his medical degree at the Cooper Medical School of Rowan University in Camden, New Jersey. A member of the Gold Humanism Honor Society, Dr. Henry has published 23 peer-reviewed articles in the fields of pediatrics, surgery, and healthcare disparity. He comes to this year's conference as a PGY-1 resident intern at the Rady Children's Hospital and University of California San Diego with research focus primarily in the realms of equity, novel methodology, and public health.

Cheryl Holder, MD — Cheryl Holder, MD is a National Health Service Corp Scholar, internist and HIV specialist, and founding faculty of the Florida International University's Herbert Wertheim College of Medicine, where she served as the Associate Dean of Diversity, Equity, Inclusivity and Community Initiatives. She co-founded Florida Clinicians for Climate Action in 2018 and now serves as its executive director. Additionally, she is co-chair of Miami-Dade Heat Health Task Force and member of NASEM's Climate Collaborative. Her TED Talk "The link between climate change, health and poverty" garnered over 300,000 views.

Jamie Holland, MD — Dr. Jamie Holland is a pediatric emergency medicine fellow at the Medical College of Wisconsin. She obtained her medical degree from the University of Nebraska Medical Center and completed her general pediatrics residency training at University of Utah/Primary Children's Hospital. She has an interest in advocacy and injury prevention.

Pam Hoogerwerf, BA — Pam Hoogerwerf is the Program Manager of the Injury Prevention and Community Outreach division at the University of Iowa Health Care Stead Family Children's Hospital. Her passion is injury prevention as she leads many efforts at the hospital including All-Terrain Vehicle Safety, Bike Safety, Firearm Injury Prevention, Safe Sleep, Lawn Mower Safety and Child Passenger Safety to name a few. She is a certified child passenger safety technician. She serves on many collegiate, state, regional, and national committees for the Children's Hospital. She is the program coordinator for the Injury Free for Kids site at the hospital.

Romeo C. Ignacio, MD, MS, MPath, FACS, FAAP — CAPT (Ret.) Romeo C. Ignacio is a veteran who served in the U.S. Navy for 24 years. He is a Clinical Professor of Surgery at the University of California San Diego School of Medicine and an academic pediatric surgeon at Rady Children's Hospital in San Diego (RCHSD). Dr. Ignacio serves as the Trauma Medical Director, Chief - Section in Pediatric Surgery, and the Director of Clinical Research program for the Division of Pediatric Surgery at Rady Children's Hospital San Diego. He has been recently nominated as a Central Member of the American College of Surgeons (ACS) Committee on Trauma and the ACS Chapter California Medical Associates delegate. He has over 90 peer-reviewed articles, 190 presentations, and is the co-editor of the textbook, Pediatric Trauma Care. His research and advocacy work has involved window falls, bicycle/e-bike injuries, drownings, and healthcare disparities in pediatric trauma.

Kristyn Jeffries, MD, MPH — Dr. Kristyn Jeffries is an assistant professor in pediatrics at University of Arkansas for Medical Sciences and an attending physician in pediatric hospital medicine at Arkansas Children's Hospital. She completed medical school at Indiana University School of Medicine followed by pediatrics residency at University of Alabama in Birmingham and pediatric hospital medicine fellowship at Children's Mercy in Kansas City. She is co-chair of the Injury Free Social Media committee and helps manage the Injury Free Instagram. She currently serves as the medical director of Infant Child Death Review at Arkansas Children's, a member of the Trainees for Child Injury Prevention Alumni committee, and serves on the Arkansas AAP Chapter Board of Directors. She is passionate about injury prevention and advocacy, and loves when she can share these passions with trainees.

Charles Jennissen, MD — Charles Jennissen, MD, is a pediatric emergency medicine physician and a Clinical Professor in the Departments of Pediatrics and Emergency Medicine at the University of Iowa Carver College of Medicine. Dr. Jennissen grew up on a dairy farm in central Minnesota. This plays a large part in his interest in safety and injury prevention, particularly regarding children and teens, and those who work and live on farms. Most of his research projects have addressed injury-related issues, especially those involving off-road vehicles.

Molly B. Johnson, M.AmSAT, PhD — Dr. Molly Johnson is the research scientist for the Dell Children's Medical Center's Drowning Prevention and Water Safety Program in Austin, TX and an adjunct Kinesiology Professor at the University of the Incarnate Word. Her research focuses on drowning risk and prevention in children. Dr. Johnson also maintains a private practice as a Shaw Method swimming instructor and an Alexander technique specialist, working with clients to reduce pain and injury risk. As a member of the leadership team of the Texas Water Safety Coalition, Dr. Johnson is helping write the first Texas Water Safety Strategy and build a network of professionals devoted to drowning prevention.

Karolina Kalata, BS — Karolina Kalata is a third-year medical student at the Medical College of Wisconsin, pursuing her Doctor of Medicine degree and hoping to apply to Psychiatry for residency. She holds a Bachelor of Science in Psychology with a focus on Behavioral Neuroscience from the University of Illinois at Urbana-Champaign where she also minored in Spanish. Karolina has an extensive background in research, particularly in the fields of suicide prevention and cognitive development. She has contributed to various research projects, including analyzing the impact of COVID-19 on youth suicidal behaviors and assessing the effectiveness of refugee health curricula on medical trainees.

Sadiqa A. I. Kendi, MD, MPH, CPST — Sadiqa A.I. Kendi, MD, MPH, FAAP, CPST is pediatric emergency medicine physician at Children's National Hospital, and Chief Medical Officer of Safe Kids Worldwide. She is an expert in injury prevention and health equity. Dr. Kendi graduated from the Yale School of Medicine and received her pediatrics training from the Social Pediatrics Program at The Children's Hospital at Montefiore, where she spent an additional year as chief resident. She completed her fellowship training in pediatric emergency medicine at The Children's Hospital of Philadelphia, and her MPH training as a Bloomberg American Health Initiative Fellow at the Johns Hopkins University Bloomberg School of Public Health. Kendi is a certified child passenger safety technician and a member of the executive committee of the American Academy of Pediatrics Council on Injury Violence and Poison Prevention.

Narmeen Khan, MD — Dr Khan grew up in Chicago and currently resides in Milwaukee. She advocates for violence recovery for patients and families who have been affected by interpersonal violence. She is training for a career in pediatric emergency medicine and violence interruption.

Esther Kim, MD — Dr. Esther Kim, Ethne Health co-founder and COO, is a Board Certified Family Medicine Physician. Dr. Kim was born and raised in Johor, Malaysia until age 12, when her family moved to Texas. She received her B.S. from Texas A&M University and M.D. from Texas A&M College of Medicine, and completed her

Family Medicine Residency in Memphis, Tennessee. Prior to Clarkston GA, Esther and her husband had the opportunity to serve in inner-city Memphis as well as overseas on medical missions. She loves the diversity and vibrancy of the Clarkston community, and being surrounded by myriads of foods, scents, celebrations, and cultures. The way she views and experiences the world is richer because of all the friends she has met in Clarkston. She hopes to bring creative solutions to health care disparities in under-resourced communities. A few of her passions include women's health, nutrition, and refugee and immigrant health. She loves to hike and play music with her family.

Amber Kroeker, MPH, CPST — Amber Kroeker is the Child Injury Prevention Program Supervisor at Randall Children's Hospital in Portland Oregon. While completing her public health internship in pediatric trauma 14 years ago, Amber became certified as a CPST. She was 8 months pregnant with her son at the time but still managed to rock a tight installation. Amber fell in love with the public health side of child injury prevention and works closely with families to keep children safe.

Melissa H. Kwan, MD, FAAP — Melissa Kwan, MD FAAP is an Assistant Professor with the UT Health Houston McGovern Medical School, Director of Community Pediatric Hospital Medicine for the UT Houston and Memorial Hermann Community Hospitals, and the Chief of Staff for Memorial Hermann Sugar Land. She is also one of the Co-Chairs for the Texas Pediatric Society Injury Prevention Committee and is the co-PI for her IFCK chapter. She has a focus in child passenger safety, infant sleep safety, firearm prevention, and water safety. She also spends her summers at Texas Lions Camp in Kerrville, Texas where she is medical staff for their camp for children with Type 1 Diabetes. She lives in Sugar Land, TX with her cello loving four-year-old and amazing architect husband, Danny Rigg.

Shannon Landers, MS — Shannon Landers is a second-year medical student at Kansas City University. She grew up in Palos Heights, Illinois, and completed her undergraduate studies at the University of Iowa where she majored in biochemistry. She also completed her Master of Biomedical Science at Kansas City University. In her free time, Shannon enjoys reading thriller novels, baking, and playing with her three-legged cat, Gibbs. Shannon is passionate about pediatric medicine and hopes that this research in injury prevention will help bring awareness regarding bicycle safety.

Garry Lapidus, PA-C, MPH — Mr. Lapidus provides institutional leadership for the PA's and APRN's at Connecticut Children's as Co-Director, Office of Advanced Practice. In addition, he provides clinical care as a physician assistant to sick and injured children in the Department of Emergency Medicine. Mr. Lapidus is former Director and Co-Founder of the Injury Prevention Center at Connecticut Children's (1990-.2020) He is a national leader in injury prevention research, education and training, community based programs, and public policy. In recognition of his contributions, he received the Charles Huntington Award from the Connecticut Public Health Association (2013) and the Distinguished Career Award from the American Public Health Association (2020). Mr. Lapidus holds a senior faculty appointment as an Associate Professor, Pediatrics & Public Health, at the UCONN School of Medicine.

Christie Lawrence, DNP, RNC-NIC, APN/CNS — Christie Lawrence is an Assistant Professor in the Department of Women, Children, and Family Nursing at Rush University. She received a Doctorate of Nursing Practice from Rush University and has over 23 years of clinical experience caring for mothers and critically ill infants which solidifies her passion for providing equitable and just care for NICU families. Dr. Lawrence seeks to expand best practices in maternal-child health that promote equity and social justice and decrease morbidity and mortality in African American newborns. Her special interests include breastfeeding, skin-to-skin care, developmental care, and safe sleep to decrease SUID's. She currently serves as a chairperson on the Hospital Safe Sleep Taskforce, a member of Community Partnership Approaches to Safe Sleep- Chicago (CPASS), and is the Birth Hospital Outreach Education Coordinator for the Cook County SUID Case Registry. She continues to work with General Entry Master's (GEM) Nursing students and Clinical Nurse Specialist students at the doctoral level facilitating projects in neonatal and pediatric care.

Lois K. Lee, MD, MPH, FACEP, FAAP — Dr. Lee is a pediatric emergency medicine physician at Boston Children's Hospital and Associate Professor of Pediatrics and Emergency Medicine at Harvard Medical School. At Boston Children's Hospital she is the Associate Program Director for Public Policy at the new Sandra L. Fenwick Institute for Pediatric Health Equity and Inclusion. She has published seminal research on pediatric emergency medicine, health disparities, and injury prevention. She is a leader in the field of child injury prevention and is Chair of the American Academy of Pediatrics Council on Injury, Violence, and Poison Prevention. Her expertise has been recognized with her election to the National Academy of Medicine. With her passion for improving the lives of children, she promotes child health through her clinical work, research, teaching, and advocacy.

Michael Levas, MD, MS — Dr. Levas has been with the Medical College of Wisconsin's Section of Pediatric Emergency Medicine since 2011. He is a product of the south side of Milwaukee and completed his undergraduate work at Saint Norbert College in De Pere, WI. Following graduation from the Medical College of Wisconsin, he completed his pediatric residency and emergency medicine fellowship training in Kansas City, MO. He completed his Masters in Clinical and Translational at the Medical College of Wisconsin. Since joining the faculty at the Medical College, Dr Levas has been intimately involved with health care disparities, youth violence, and injury prevention policy and research. He is the Medical Director of Project Ujima, one of the premier hospital-based youth violence prevention/intervention program in the United States. He currently serves as Vice Chair of Diversity in the Department of Pediatrics and as Associate of the Comprehensive Injury Center at the Medical College of Wisconsin. He Is currently President-Elect of Injury Free Coalition for Kids and serves on the board for the Hospital Alliance for Violence Intervention.

Gina S. Lowell, MD, MPH — Gina Lowell MD, MPH is an academic general pediatrician at Rush University Children's Hospital in Chicago with specialty interests in childhood injury prevention, child abuse and neglect, and early relational health. As Director of Community Health for Pediatrics she collaborates with public health agencies and community-based organizations to develop and promote maternal-child health initiatives that support Chicago's communities and advance maternal-child health equity. She is the current Principal Investigator for the CDC-funded Sudden Unexpected Infant Death Case Registry and Prevention for Cook County, IL. Beginning in July 2023, the Cook County SUID-CR team began applying the Kendi-Macy Injury Equity Matrix to their monthly reviews of Cook County SUID, iteratively adapting the matrix for SUID-specific attributes and reviewing over 50 SUID to date in this manner.

Lorrie Lynn, MA, CPSTI — Lorrie Lynn is the Manager of Injury Prevention Programs within the Center for Healthier Communities at Rady Children's Hospital San Diego. She is the site Coordinator for Injury Free Coalition for Kids and Coordinator for Safe Kids San Diego. These roles dovetail to highlight projects that address the leading causes of injury and death for children 0 to 14 years old in San Diego County. Projects addressing this population include Safe Sleep for Infants, Window falls, Water Safety and Drowning Prevention, Pedestrian and Bicycle Safety, Child Passenger Safety and Teen Safe Driving. Lorrie is also a member of the Injury Free Coalition for Kids Board.

Ryan Manahl — Ryan Manahl is the co-founder of Tate's Army Foundation. A non-profit agency that's mission is to educate, support and advocate for lawn mower and machinery safety

awareness. The foundation offers direct financial assistance for families affected by injuries involved lawn mower and machinery equipment. Ryan is the father of Tate, who was severely injured with life threatening injuries to his abdominal organs and both legs on August 30, 2017, at 3 years of age.

Erin Mannen, PhD — Dr. Erin Mannen is an Associate Professor in the Mechanical & Biomedical Engineering Department at Boise State, and Director of the new Boise Applied Biomechanics of Infants (BABI) Lab. She earned her B.S. and Ph.D. at the University of Kansas, worked as a Postdoctoral Fellow at the University of Denver, and began her faculty career at the University of Arkansas for Medical Sciences before moving to Boise in the Summer of 2020. Dr. Mannen's lab explores how babies move and use their muscles in common baby gear and orthopaedic devices, and what that movement means for safety and musculoskeletal development. Her favorite thing about the lab is the people – friendly, helpful, hard-working, and hilarious. In her free time, Erin enjoys all the outdoors adventures Idaho has to offer with her husband and two little kids.

Jennifer E. McCain, MD — Jennifer E. McCain, MD is an Assistant Professor of Pediatrics at UAB where she is a board-certified Pediatric Emergency Medicine physician in the Children's of Alabama Emergency Department. She has been the representative from District 3 (the counties directly surrounding Birmingham) to the board of the Alabama Chapter of the AAP for the last eight years and is a voting member of COPEM (Committee on Pediatric Emergency Medicine) with the national AAP. After 12 years as a general pediatrician, she returned to this academic position where she actively cares for patients in the ED, participates in education of residents and students, and participates in research. Dr. McCain has a specific interest in injury prevention. She has been actively involved in developing relationships in urban Birmingham as well as in rural Alabama counties to address safe sleep for infants. Additionally, she has been working with groups through the Alabama Chapter of the AAP as well as with leaders at Children's of Alabama to advocate for firearm injury prevention.

Sandy McKay, MD, FAAP — Sandra McKay, MD, FAAP, is an associate professor and Division Chief of Community and General Pediatrics at the University of Texas Health Science Center at Houston (UTHealth). She graduated medical school from the University of Missouri-Columbia and completed her residency at Saint Louis University (SLU)/Cardinal Glennon Children's Hospital. Dr McKay is the Director of Population Health and Advocacy for the Department of Pediatrics and the principle investigator for the Injury Free Coalition for Kids Houston site. Dr McKay is also a nonresident fellow at Rice University's Baker Institute for Public Policy. Dr McKay has served as a strong advocate for children, and is a past president of the Missouri Chapter of the American Academy of Pediatrics. She is active in the Texas Pediatric Society and serves as the co-chair of the Executive Legislative Committee. She has worked to develop innovative educational programs to improve firearm safety counseling workshops within the clinical encounter and active in advocacy in firearm safe storage. She is a firearm injury prevention researcher, working with firearm retailers in the community on safe firearm storage counseling at point of sale and temporary voluntary firearm storage.

Marlene Melzer-Lange, MD — Marlene Melzer-Lange is Professor of Pediatrics at the Medical College of Wisconsin and an Attending Physician at the Emergency Department/Trauma Center of Children's Hospital of Wisconsin. As a native of Milwaukee, she is interested in promoting safe, injury free neighborhoods for children and families. She is a graduate of Marquette University and the Medical College of Wisconsin. Her academic interests include injury prevention, violence prevention, adolescent emergencies and adolescent pregnancy. She is married and has two children.

Kathy W. Monroe, MD, MSQI — Kathy Monroe is Professor of Pediatrics and Division Director for Children's of Alabama Emergency Department. Dr. Monroe serves as principal investigator for Alabama Injury Free Coalition for Kids (IFCK) and has served on the national IFCK Board of Directors and abstract selection/publications committee. She is currently the program chair and President elect for IFCK. Her work in injury prevention has focused on safe teen driving consisting of funded teen driving events and creation of a teen driving toolkit for pediatricians. She secured grant funding for construction of two Allstate Foundation "Little Hands" playgrounds in high-risk areas, participated in multi-center studies on child passenger safety and regularly leads Baby Safety Showers. She has published multiple manuscripts on Teen Driving Behavior, ATV Injuries, Pediatric Burn Injuries and Child Passenger Safety.

Colleen M. Moreland, DO — Colleen M. Moreland, DO is a board-certified orthopaedic surgeon with fellowship training in pediatrics. A former Army physician, Dr. Moreland completed her active duty residency training at Fort Gordon in Augusta, Georgia and subsequently was stationed at Fort Bragg, North Carolina. Assigned to a forward resuscitative surgical team, she deployed to the Middle East in support of Operation Inherent Resolve. As an Army officer Dr. Moreland took special interest in extremity trauma and firearm injury prevention. She expanded on this interest during her fellowship at Children's Mercy Hospital in Kansas City, Missouri, where she spearheaded an initiative to improve access to safety net services for pediatric patients affected by extremity firearm injury. Currently Dr. Moreland is an Assistant Professor of Orthopaedic Surgery at Albany Medical College in upstate N.Y.

Brittany Lee Murray, MD, MPhil — Dr. Murray is a board-certified emergency medicine and pediatric emergency medicine physician with an academic focus in global health education and improving care for underserved populations. She is an associate professor at Emory University School of Medicine where she is the director of the Global Health and Equity Office. She is also a pediatric emergency medicine physician at Children's Healthcare of Atlanta. Prior to joining the faculty at Emory, she lived and worked full-time in Dar es Salaam, Tanzania where she partnered with Tanzanian physicians and nurses to build sustainable education systems in emergency care and help patients get to those services. Dr. Murray's academic and research interests focus on strengthening of healthcare systems for emergency care, the education of healthcare providers, and empowering underserved patients both locally and overseas.

Joanna O'Donnell, BA, GC-C — As the project manager for Injury Prevention and Death Review, Joanna's focus is working with local child death review teams to review infant and child death for the purpose of preventing future child deaths.

Joanna worked closely with grieving families at a Milwaukee area cemetery prior to working for the Alliance. She received her bachelor's degree in English from UW-Milwaukee and is a certified grief counselor. Joanna is currently pursuing her master's in counseling from Concordia University. In her free time, she is a voracious reader and loves to laugh with her family and friends.

Savannah Olsen, MSW, APSW — Savannah Olsen, MSW, APSW is an experienced Program Evaluator with a strong commitment to advancing outcomes through data-driven decision-making. Currently serving as a Program Evaluator at Wraparound Milwaukee, Savannah has experience in assessment and data analysis. As a doctoral candidate at the University of Southern California, she is focused on fostering safer, more inclusive communities through rigorous analysis and innovative approaches. With a rich background in social work, Savannah has held key roles in child welfare, early intervention for substance use, and community outreach. She has led significant projects addressing mental health, substance use, and social services, working collaboratively with stakeholders to implement sustainable, data-informed solutions that positively impact the lives of individuals and communities.

Micaela Parson, MS4 — Micaela Parson is a current fourth-year medical student at the University of Louisville School of Medicine,

she is applying for categorical pediatrics in the upcoming ERAS cycle. Hailing from Richmond, Virginia, she earned her Bachelor of Science in Biology from the University of Richmond in 2018, where she also excelled as a Division I basketball player. With a strong passion for injury prevention, she wants to focus on developing targeted safety strategies to address community-specific injury issues. She is set to graduate with her medical degree in the spring.

Victoria Pennington, LMSW, CCLS, CPST — Vikki has been a child life specialist for over twenty years, obtaining her Bachelor's degree in Human Environmental Science with an emphasis in child development at the University of Arkansas. She received her Masters of Social Work from the University of Houston. Her career as a child life specialist started at Arkansas Children's Hospital (ACH), where she completed her internship. With her internship completed, she obtained employment with Texas Children's Hospital in the Emergency Center for almost four years. An opportunity arose to work for Shriner's Hospitals for Children for Orthopedics, Rehab/Subacute, and Cleft Lip & Palate, where she stayed for eleven and half years. For the last 8 years, she has worked at Children's Memorial Hermann in the Neonatal ICU IV and recently moved into the Pediatric Inpatient Rehabilitation unit at TIRR Memorial Hermann. Vikki has also been a Child Passenger Safety Technician for about 20 years. She has always had an interest in making sure children were safer leaving than they came into the hospital. Along the way, Vikki has grown a passion for helping others with grief, bereavement, and trauma and has been able to do that through the Code Lilac peer-to-peer psychological first aid program. Being a founding member of Code Lilac in 2015, Vikki continues to lead this program system wide. Vikki's dedication and commitment to supporting children, families, and peers has shown through her achievements over the years.

Maura Powell, MPH, MBA — Maura is the Senior Manager of The Possibilities Project (TPP), an exciting initiative to reengineer primary care at The Children's Hospital of Philadelphia. In her role she is charged with overseeing the development of innovative solutions across the primary care network. Prior to her role with TPP, Maura worked in the Center for Healthcare Quality and Analytics at The Children's Hospital of Philadelphia as a Senior Improvement Advisor, where she combined improvement science and clinical data analysis to facilitate clinical improvement across the enterprise. She has a background in global public health, research and quality improvement.

Joyce C. Pressley, PhD, MPH — Dr. Joyce Pressley is Faculty in the Departments of Epidemiology and Health Policy and Management at Columbia University where she teaches and directs the Outreach Core for the Columbia Center for Injury Science and Prevention (CCISP). Dr. Pressley's experience in research, teaching and injury prevention is multidisciplinary–crossing the disciplinary boundaries of public health policy, epidemiology, emergency medicine, critical care, economics and health care management. She has authored studies and mentored students doing research in occupant protection across the age span covering issues such as substance use, child endangerment, vehicle and crash characteristics and outcomes across the age span, the impact of policies and laws on MV occupant safety and the economic burden of MV injury. She is active with the Transportation Research Board at the National Academies where she has chaired the Occupant Protection Committee and is a member of the Impairment in Transportation Committee. She is a former chair of APHA's Injury Control and Emergency Health Services Section and SAVIR's Council of Centers, and a recipient of the SAVIR President's Award. Her PhD (1996) is from Duke.

Kyran P. Quinlan, MD, MPH — Kyran Quinlan MD, MPH is an academic general pediatrician, educator, researcher and advocate in Chicago. He serves on Child Death Review for Cook County, Illinois and founded the CDC-funded Sudden Unexpected Infant Death-Case Registry for Cook County. He and his team established the Community Partnership Approaches to Safe Sleep (CPASS)-Chicago which has targeted innovative prevention activities in areas of greatest risk of SUID based on their geocoded SUID-Case Registry surveillance data. At the 2024 Pediatric Academic Societies Meeting in Toronto, Dr. Quinlan presented with Drs. Kendi and Macy on the application of their Injury Equity Matrix to the issue of Sudden Unexpected Infant Death.

Brenna Radigan — Brenna Radigan is the Prevention Specialist with the Child Abuse Death Review Unit (CADR) at the Florida Department of Health (FDOH) since 2018. Before coming to FDOH, Brenna has served in multiple roles within child welfare, including Child Protection Investigations and case management, Guardian Ad Litem and Forensic Interviewing. With a passion for public health and a commitment to making a difference, Brenna is dedicated to promoting childhood safety through information sharing, parental education, and strengthening families' protective factors. She participates in several workgroups, including the Florida Dept of Health's Human Trafficking, Child Suicide Prevention, Watersmart Florida, and Infant Safe Sleep and has presented/co-presented at various conferences and summits showcasing her knowledge around data driven prevention initiatives related to child death. Brenna has a Bachelor of Science Degree in Rehabilitation Counseling Services from Florida State University, where she also participated in some master's level classes for Policy Administration. Brenna has lived in Tallahassee for over 30 years and likes to spend time with family and friends, watch documentaries, read books and is very active in the yoga community.

DeShanta Richardson — DeShanta Richardson is a dedicated leader committed to safeguarding children in Florida. As the Project Coordinator for the Florida Department of Health's Child Abuse Death Review (CADR), she spearheads statewide initiatives to prevent child abuse and fatalities. DeShanta began her Florida Department of Health (FDOH) career in 2022 as an Administrative Assistant in the Communal Diseases division, transferred to Children's Medical Services in March 2023, and was promoted to Project Coordinator in September 2023. A proud alumna of Florida State University with a BA in English and a minor in sociology, she quickly mastered Ariba on Demand and purchasing policies, demonstrating her adaptability. DeShanta facilitates educational meetings with state and local teams and develops initiatives to prevent child abuse and deaths. Married with three children, she balances her professional and personal life with grace, embodying resilience, and dedication. Her commitment drives positive change, making her an invaluable asset to the FDOH and the community.

Adrienne P. Robertiello, BS, ACDS — Adrienne is the Interim Autism Program Coordinator and Specialized Health Care Educator at Children's Specialized Hospital (CSH), the nation's leading provider of inpatient and outpatient care for children from birth to 21 years of age facing special health challenges. She collaborates with experts, organizations, agencies, individuals with disabilities, and families to educate and provide practical resources that promote inclusion, access, and equity. In 2021, Adrienne coordinated an Inclusive Healthy Communities grant (Living Safely with Disabilities and Special Health Needs) from the New Jersey Department of Human Services, Division of Disability Services. She developed a team, including disability advocates to establish the Living Safely Online Center for Safety – an extensive compilation of accessible and practical safety tools, resources, and guidance documents. Her leadership contributed to a second IHC grant – Learn to Live Safely with Disabilities and Special Health Needs which embeds inclusive safety education in academic and municipal systems. Adrienne has developed initiatives including Autism and Safety – It's Unpredictable and Real-Life Tips for Kids with Autism. A Seton Hall University graduate, her experiences as a person with a disability and parent of an autistic adult shape her worldview and provide a meaningful connection with the efforts and outcomes of her work.

Isabell Sakamoto, MS, CHES — Isabell is a Certified Health Education Specialist (CHES), and graduate from The University of

Illinois at Urbana-Champaign where she obtained a Master of Science degree in Health Communications. She is also a graduate from Western Washington University where she obtained a Bachelor of Science degree in Community Health with a minor in Psychology. Currently, Isabell is the Manager of Community Health, a Youth Mental Health First Aid Instructor, and a Better Babysitters Instructor for Seattle Children's. Isabell has supported Seattle Children's health and safety efforts for the past eight years including community focused safe firearm storage, water safety and drowning prevention, bike helmet safety, safe medication storage and disposal, and suicide prevention.

Judy Schaechter, MD, MBA — Judy Schaechter, MD, MBA, is Professor Emerita of Pediatrics at the University of Miami, where she also teaches Public Health. Formerly, she served as Chair of Pediatrics at the University of Miami and Chief of Child Health at Jackson Health Systems. Recently, she was President and CEO of the American Board of Pediatrics and a Robert Wood Johnson Foundation Health Policy Fellow, working with the Senate Health, Education, Labor and Pensions Committee.

Kelsey Schoenmeyer, BS — Kelsey Schoenmeyer is currently a fourth-year medical student at the UAB Heersink School of Medicine. She plans to specialize in pediatrics with a focus on primary care. Her current scholarly interests include primary care, underserved populations, and injury prevention.

Felicia Scott-Wellington, MD — Felicia Scott-Wellington is Interim Division Chief and Fellowship Director of Adolescent Medicine at the University of Illinois at Chicago. She serves as consultant and primary care physician for teens and young adults ages 12-25. She is an active member of the Injury Free Coalition for Kids Chicago Medical District Chapter and Co-chair of the Violence Prevention Committee for the Society of Adolescent Health and Medicine. Her interest includes youth violence prevention, adolescent health disparities, and adolescent health advocacy.

Karen Sheehan, MD, MPH — Karen Sheehan, MD, MPH is a Professor of Pediatrics, Medical Education, and Preventive Medicine at Northwestern University's Feinberg School of Medicine. Dr. Sheehan is the Medical Director of the Patrick M. Magoon Institute for Healthy Communities, Associate Chair of Advocacy for the Department of Pediatrics, and the Medical Director of Lurie Children's Injury Prevention & Research Center. As a Northwestern University Medical Student, Dr. Sheehan was a founding volunteer of the Chicago Youth Programs (CYP), a community-based organization that works to improve the health and life opportunities of youth living in poverty. Her primary areas of research interest are injury and violence prevention and improving the health of vulnerable populations.

Rohit P. Shenoi, MD — Rohit P. Shenoi is a Professor of Pediatrics at Baylor College of Medicine and an Attending Physician in the Emergency Center at Texas Children's Hospital. Dr. Shenoi has a long-standing interest in injury prevention, specifically - drowning, opioid stewardship, and screening youth for suicide and drugs in the Emergency Department

Asia Simpson, BS, CPSTI — Asia Simpson has been the Injury Prevention Coordinator at UMass Memorial Medical Center for over 7 years. She previously worked with youth and teen parents coordinating education and prevention programs. She continues to collaborate with local organizations to provide injury prevention programs to the community including child passenger safety, Stop the Bleed courses, Safety Quest, teen driving safety, helmets safety, gun buybacks, and senior fall prevention.

Lin Snowe, CPST-I — Lin Snowe is a coalition and program coordinator focused on the prevention of unintentional injuries in children for the last ten years. Primary areas of work have been with underserved communities and building partnerships to effectively disseminate prevention education. Certified child passenger safety technician instructor.

Jill Solomon, MPH, CHES — Jill Solomon is a Research Area Specialist at the University of Michigan Injury Prevention Center. In her role at the Center, she supports training and outreach across all of the U-M IPC's focus areas of injury prevention. Jill holds a Master of Public Health Degree in Health Behavior & Health Education from the University of Michigan School of Public Health and is a Certified Health Education Specialist (CHES). She has experience in health literacy, motivational interviewing, and mHealth development.

Wendy Blair Stephan, PhD, MPH — Dr. Wendy Stephan is the educator and epidemiologist for the Florida Poison Information Center in Miami. For the last 17 years, Wendy has promoted the use of poison control and worked to prevent poisonings of all kinds, including from medication, household chemicals, and environmental hazards. Wendy completed her PhD in Epidemiology and her Master of Public Health degree at the University of Miami and currently serves on the Board of Directors of America's Poison Centers.

Parker Sternhagen — Parker Sternhagen is a 4th year undergraduate student at the University of Iowa College of Liberal Arts and Sciences. He grew up in Delhi, Iowa, and is completing his major in biochemistry with a chemistry minor. His passion is emergency medicine and hopes his research will bring attention to the dangers of UTVs and how to prevent these injuries.

Tanya Charyk Stewart, MSc — Tanya Charyk Stewart is the Injury Epidemiologist & Data Specialist at London Health Sciences Centre and has appointments with both the Departments of Paediatrics and Pathology & Laboratory Medicine at Schulich School of Medicine & Dentistry at Western University. With over 50 peer-reviewed publications and several national and international research awards, Tanya's research interests include injury prevention evaluations, road safety and injury research. Tanya is the Past-Chair of the Research Committee for the Pediatric Trauma Society and a founding member of the Trauma Registry Information Specialists of Canada (TRISC) and has served on the Executives of TRISC and the Interdisciplinary Trauma Network of Canada for many years. She was instrumental in making London the first international site of Injury Free in 2013 and is now an individual member of IFCK.

Christa Thelen, MA, CHES — Christa Thelen, MA, CHES, is a Program Manager at Safe States Alliance and is located in Grand Rapids, Michigan. She currently manages sub-recipient grantee and partnership activities, coordinates membership outreach efforts, and produces the Safe States' IVP INdepth podcast. She received her Bachelor of Arts in Exercise and Health Science from Alma College and her Master of Arts in Health Promotion and Program Management from Central Michigan University. She has been a Certified Health Education Specialist since 2017.

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Aedan Villegas, BS — Aedan Villegas is a graduate of the University of Houston with a B.S. in Biochemistry. Aedan was introduced to this project by Dr. Shenoi through a college program a year ago, and since then, has developed a deep interest in injury prevention and surveillance, with a focus on improving swimming protocols and practices.

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Cole Wymore, BS — Cole Wymore is a fourth-year medical student at the University of Iowa Carver College of Medicine. He grew up in Des Moines, Iowa, and completed his undergraduate studies at the University of Iowa where he majored in Human Physiology. Cole hopes his work will lead to implementation of injury prevention strategies at both an individual and population level.

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David Zima — David Zima has worked as a technologist and engineer in both the United States and Europe. He is presently principal RF/Microwave design engineer and president of RF Laboratories. David's technical background covers many areas, including RF and microwave hardware design, antenna design, regulatory compliance/EMI, H-field backscatter, bio-medical telemetry, embedded software and wireless contract manufacturing. David has worked for a wide variety of clients, including NASA, Raytheon, ITT, Larsen Antenna, Xerox(PARC) (Palo Alto Research Center), Microchip and Shell Oil Company. In addition to his science and engineering background, his multi-lingual abilities have enabled him to serve as a technical translator for a number of European wireless companies including Alcatel Kirk, Instrutek and Marconi Italiana. For more than 10 years, he has helped Z-Wave, Lora and other IoT developers improve the wireless performance of their products through effective antenna design, matching techniques and simulation as well as sound regulatory and compliance practices. David is formally educated in the US and Europe. He is a BSEE, CCEMTP, and holds an FCC General Radiotelephone Operators License with Radar Endorsement.

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Contents

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Rural adolescent attitudes and use of helmets while riding ATVs, motorcycles and dirt bikes

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Abstract

Background Head injuries are the most common cause of death in some motorized vehicles for which helmet use can significantly decrease the risk. Our objective was to determine rural adolescents' attitudes regarding helmets and their use while riding ATVs, motorcycles and dirt bikes.

Methods A convenience sample of 2022 Iowa FFA (formerly Future Farmers of America) Leadership Conference attendees were surveyed. After compilation, data were imported into the statistical program, R (https://www.R-project.org/). Descriptive statistics, contingency table, logistic regression and non-parametric alternatives to ANOVA analyses were performed.

Results 1331 adolescents (13–18 years) participated. One half lived on a farm, 21% lived in the country/not on a farm and 28% were from towns. Nearly two-thirds (65%) owned an ATV with 77% of all having ridden one in the past year. Farm residents had the highest ATV ownership (78%) and having ridden (80%) proportions, both $p < 0.001$. Overall, ownership and ridership for motorcycles (22% and 30%, respectively) and dirt bikes (29% and 39%, respectively) was significantly less than ATVs, all $p < 0.001$. Of ATV riders, those living on farms or in the country/not on a farm rode them more frequently than those from towns, $p < 0.001$. Higher percentages always/mostly wore helmets when riding dirt bikes (51%) and motorcycles (57%) relative to ATVs (21%), $p < 0.001$. Those from farms had lower proportions wearing helmets versus those living elsewhere for all vehicles. Helmet use importance ratings (1–10, 10 high) were not different for motorcycles (mean 8.6, median 10) and dirt bikes (mean 8.3, median 10), but much lower for ATVs (mean 6.1, median 6). Females, non-owners, and helmet law supporters all had higher helmet use importance ratings. Males, those from farms, and owners and riders of the vehicles all had lower proportions that supported helmet laws. Support for helmet laws was significantly lower for ATVs (30.7%) than dirt bikes (56.3%) or motorcycles (72.3%),

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both $p < 0.001$. Those whose families had strict ATV "No Helmet, No Riding" rules had much higher helmet use and helmet importance ratings.

Conclusions Our study indicates that the safety culture surrounding helmet use is relatively poor among rural adolescents, especially on farms, and deserves targeted interventions.

Keywords Adolescent, All-terrain vehicle, Dirt bike, Farm, Helmet, Head injury, Law, Motorcycle, Rural, Safety, Youth

Background

All-terrain vehicles (ATVs), dirt bikes and motorcycles are all significant threats for morbidity and mortality in pediatric populations. These motorized vehicles pose particular risks to riders because of their speed and acceleration capabilities, their relative instability, their lack of external protection and seat belts, and their propensity for riders to be thrown in a crash. Data from the National Electronic Injury Surveillance System reveal ATV-related incidents are responsible for an estimated 95,000 emergency department (ED) visits per year with over a third (37%) of those injured being < 18 years old (Zhang 2022; Wiener et al. 2022). In fact, more children under 16 years of age in the U.S. die in ATV-related incidents than from bicycle crashes (Helmkamp et al. 2009). In addition, an estimated 23,800 youth ≤ 19 years are treated in EDs with dirt bike-related injuries per year with 7.5% of these requiring hospitalization (Centers for Disease Control and Prevention (CDC) 2006). Moreover, more than 6,000 U.S. motorcyclists died in 2021 (Institute and for Highway Safety ((IIHS), Highway Loss Data Institute (HLDI). 2023), and motorcyclists have 6 times the fatality rate of passenger car occupants involved in crashes (Blincoe et al. 2010). While the total number of motor vehicle fatalities has decreased, motorcycle crash deaths are now nearly 3 times greater than in 1997 (Institute and for Highway Safety ((IIHS), Highway Loss Data Institute (HLDI). 2023; Blincoe et al. 2010).

Crashes in these three motorized vehicles often result in traumatic head injuries (Larson and McIntosh 2012; Denning et al. 2013a, 2013b, 2014; Denning and Jennissen 2018; Ganga et al. 2023). Adolescents in ATV crashes are more likely to be primarily ejected or in collisions that lead to being thrown or falling from the vehicle than other ATV riders (Denning et al. 2014; Unni et al. 2012). For those injured on ATVs, 16–44% have injuries to the head, neck and face region (Bhutta et al. 2004; Mangano et al. 2006; Collins et al. 2007; Kirkpatrick et al. 2007; Shults et al. 2013). In one study, nearly half of the dirt bike motocross riders suffered at least one episode of concussive symptoms over a 4 month racing season, for which three-quarters required medical treatment (McIntosh and Christophersen 2018). Youth with head trauma, including intracranial hemorrhage, brain contusions and concussions, more often require hospitalization and rehabilitation treatment than children with no neurologic injuries (Bhutta et al. 2004; Mangano et al. 2006; Humphries et al. 2006; Nabaweesi et al. 2018). Moreover, head injuries are the most frequent cause of death in crashes involving ATVs, dirt bikes and motorcycles (Denning et al. 2013a, 2013b, 2014; Bhutta et al. 2004; Mangano et al. 2006; Collins et al. 2007; Kirkpatrick et al. 2007; Shults et al. 2013; Humphries et al. 2006; Barron et al. 2021; Testerman et al. 2018; Helmkamp et al. 2008; Denning and Jennissen 2016; Keenan and Bratton 2004; Miller et al. 2006; Shannon et al. 2018; Bowman and Aitken 2010; Linnaus et al. 2017; Kelleher et al. 2005; GAO 2010).

The use of helmets has been highly effective in preventing head injuries. In fact, for both ATVs and motorcycles, helmets may reduce fatal head injuries by ~ 40% and nonfatal brain injuries by 60% or more (Denning et al. 2013a, 2013b; Bowman et al. 2009; Merrigan et al. 2011; Rodgers 1990; Liu et al. 2008; Coben et al. 2007). Youth wearing helmets on ATVs had lower Injury Severity Scores and shorter hospital stays as compared to those unhelmeted (Gittelman et al. 2006; Holt et al. 2022; Brown et al. 2002). Likewise, ATV crash victims without a head injury had fewer hospital and intensive care unit (ICU) admissions and lower healthcare costs (Bowman et al. 2009; Merrigan et al. 2011; Brown et al. 2002; Carr et al. 2004; Myers et al. 2009). Motorcycle and dirt bike studies have found similar findings (Abdelgawad et al. 2013). Helmeted motorcycle crash victims have fewer injuries to the head and face, less hospital and ICU admissions, less need for mechanical ventilation, and lower mortality (Barron et al. 2021; Khor et al. 2017; Patel et al. 2019; Lawrence et al. 2009). The National Highway Traffic Safety Administration (NHTSA) estimates that for every 100 motorcycle riders killed in crashes without helmets, 37 could have been saved if all had worn a helmet (NHSTA 2021).

Despite the proven benefits of helmets, use among ATV crash victims is generally low (Levy et al. 2023; Denning and Jennissen 2018; Denning et al. 2014; Linnaus et al. 2017; GAO 2010; Holt et al. 2022; Ho et al. 2017). In several survey studies of youth, only 17–45% reported always or almost always wearing a helmet with the most frequent riders often reporting the lowest helmet use (Shults and West 2015; Hafner et al. 2010; Burgus et al. 2009; Jennissen et al. 2014). Dirt bike riders often

have higher helmet use than those on ATVs suggesting a stronger safety culture regarding head protection (Nichols et al. 2022; Vittetoe et al. 2022). The National Occupant Protection Use Survey (NOPUS) conducted by NHTSA found that 67% of motorcycle riders wore a Department of Transportation (DOT)-approved helmet in 2022 (Boyle 2023).

Rural adolescents and those living on ranches and farms are a particularly at-risk ATV riding population (Gerberich et al. 2001; Goldcamp et al. 2006; Hendricks et al. 2001; Jennissen et al. 2022). Few published studies have investigated rural teenager's use of and attitudes towards helmet use on ATVs, and there is even less data regarding their operation of dirt bikes and motorcycles. The objective of our study was to determine rural adolescents' attitudes regarding helmets while riding ATVs, dirt bikes and motorcycles, the frequency of helmet use on these vehicles, their level of support regarding helmet laws, and how demographic factors may be associated.

Methods

Survey was conducted among a convenience sample of attendees at the 2022 Iowa FFA Leadership Conference (April 10–12, 2022). FFA, previously known as Future Farmers of America, is a national youth organization that focuses on agricultural education and leadership development. In 2023, there were 19,200 members across 260 Iowa FFA chapters (Iowa FFA Association 2024). Conference participants were recruited at the University of Iowa Stead Family Children's Hospital (SFCH) safety booth to complete the survey either on paper or electronically via their cell phone onto a software platform (Qualtrics International, Inc, Provo, UT). Surveys were anonymous and completed independently. Written surveys were reviewed for completeness by the safety booth staff. As an incentive for completing the survey, participants were given the opportunity to play a Plinko game to obtain a small prize.

Survey

Members of the SFCH's Off-Road Vehicle Task Force developed the survey through a collaborative and iterative process. To ensure validity, surveys were administered to twelve volunteers aged 13–20 years. Participants were encouraged to seek clarification on any unclear sections of the survey. A comparison of both written and verbal responses was conducted to ensure consistency, and final survey design was shaped by these findings.

Demographic variables included age (years), gender (male, female, non-binary, other), where they live (on a farm, in the country but not on a farm, in town) and race/ethnicity (White, Black/African American, Asian, Latino/Latinx, other). The survey included similar questions for sections on ATVs, dirt bikes and motorcycles. Photos of each vehicle were placed next to the name to assure that participants understood the vehicle to which they were being referred.

Survey questions included whether their family owned the vehicle, and the respondent's frequency of riding the vehicle in the past year with response options: daily, weekly, monthly, just a few times a year or less, and haven't ridden in the past year. Additionally, participants were queried about their helmet use when on the vehicle in the past year with the following responses: always, most of the time, sometimes, rarely, never, and haven't ridden in the past year. The importance of helmet-wearing was measured on a scale of 1–10, with 1 being "not important at all" and 10 being "extremely important." For ATVs only, respondents were asked whether their parents had a strict "No helmet, No Riding" rule for them. Finally, participants expressed their opinion on whether they thought there should be a law requiring helmet use when riding each vehicle.

Data analysis

Electronic and written surveys were provided to the research team for analysis. All conference attendees were allowed to take the survey, but analysis was restricted to participants 13–18 years of age. Since the analysis was being done on an existing, anonymous dataset, the university's institutional review board determined the study was exempt. Written surveys were entered into Qualtrics with the survey responses previously entered by cell phone. Data were aggregated and exported into the statistical software program, R (https://www.R-project.org/), for analysis.

Descriptive statistics (frequencies), contingency table (chi-square, Fisher's exact test), and multivariable logistic regression analyses were performed. Sixteen respondents (1.2%) stated "non-binary" for gender and, because of the low number, were not included in comparative analyses. Due to limited diversity in the study population, the race/ethnicity variable was dichotomized into "non-Hispanic White" and "other," introducing significant heterogeneity within the latter group. This approach, however, facilitated the inclusion of the variable in the data analysis. Regarding helmet importance, comparison of the median was performed instead of the mean given the asymmetry of the data, and non-parametric tests, the Wilcoxon rank sum test or Kruskal–Wallis test depending on number of groups tested, was utilized. All p-values were two-tailed, and

a value < 0.05 was considered statistically significant. Missing data were not included in analyses.

Results

1331 adolescent FFA members (12–18 years) participated in the study. See Table 1. Just over two-fifths were male and more than two-thirds were 15–17 years. One half lived on a farm, about one-fifth lived in the country but not on a farm and more than a quarter were from towns. The vast majority (96%) were non-Hispanic White.

Ownership of ATVs, dirt bikes and motorcycles

ATV ownership by respondent families was significantly higher than that for dirt bikes or motorcycles. See Table 2. For all three vehicles, male respondents had higher proportions that reported owning them than females. Those that lived on a farm or in the country/not a farm as compared to those from towns and non-Hispanic Whites as compared to those of other races/ethnicities had higher percentages owning ATVs and dirt bikes. Farm residents had the highest ownership of ATVs. Logistic regression analysis controlling for the other variables in Table 2 (data not shown) indicated the odds of non-Hispanic White families owning ATVs was 4.0 times (95% CI 1.3–11.7) greater than that of other races/ethnicities. In addition, respondents from farms and the country/not a farm had 5.0 (95% CI 2.3–10.6) and 2.5 (95% CI 1.2–5.7) times higher odds, respectively, of owning ATVs versus town residents.

Table 1 Demographic variables of survey respondents at the 2022 Iowa FFA Leadership Conference

	n (col %)[a]
Group *N*	1331
Sex	
Male	543 (41)
Female	770 (58)
Nonbinary	16 (1.2)
Other	0 (0)
Age	
13 years	66 (5)
14 years	171 (13)
15 years	337 (26)
16 years	300 (23)
17 years	272 (21)
18 years	166 (13)
Residence	
Farm	670 (50)
Country/not farm	285 (21)
Town	376 (28)
Race	
Non-Hispanic White	1320 (96)
Black/African American	17 (1)
Asian	8 (0.5)
Latino/Latinx	35 (3)
Other	13 (1)

[a] The sum of *n* may not equal the total group *N* due to missing values

Ridden an ATV, dirt bike and/or motorcycle in the past year

Around twice the proportion of participants reported riding an ATV in the past year as compared to dirt bikes and motorcycles. See Table 3. Similar to ownership, higher percentages of males had ridden each of the three vehicles as compared to females. Still, 70% of females had ridden an ATV in the past year. Greater percentages of participants from farms and from the country/not a farm had ridden an ATV and a dirt bike in the past year as compared to those that lived in towns. Non-Hispanic Whites also had higher proportions that had ridden an ATV in past year versus other races/ethnicities. Those whose families owned each of the vehicles had much higher proportions having ridden them in the past year as compared to non-owners. Logistic regression analysis demonstrated males had odds 2.3 (95% CI 1.1–4.9) times greater to have ridden a dirt bike as females (data not shown).

Frequency of riding ATVs, dirt bikes and motorcycles in the past year

Of participants that reported riding these vehicles in the past year, higher proportions of ATV riders rode at least weekly as compared to riders of dirt bikes and motorcycles. See Table 4. Males had higher proportions who rode dirt bikes and motorcycles at least weekly as compared to females, but similar percentages of male and female ATV riders rode at least weekly. Older teens as compared to younger teens and participants from farms and the country/not farms as compared to those from towns had higher proportions of riding ATVs at least weekly. Respondents whose families owned the vehicle had much higher percentages riding them at least weekly versus non-owners. Logistic regression analysis showed males had 2.9 (95% CI 1.3–6,1), 3.3 (95% CI 1.3–8.5) and 5.9 (95% CI 1.8–19.5) times higher odds of riding ATVs, dirt bikes and motorcycles, respectively, at least weekly as compared with females (data not shown). Participants from farms had 2.5 (95% CI 1.1–5.8) times greater odds of riding ATVs at least weekly versus those from towns.

Helmet use on ATVs, dirt bikes and motorcycles

Higher proportions of participants stated they always/most of the time wore a helmet when riding motorcycles and dirt bikes as compared to ATVs. See Table 5. Moreover, higher proportions of participants stated they

Table 2 Contingency table analyses regarding whether the families of 2022 Iowa FFA Leadership Conference survey respondents owned a motorcycle, ATV or dirt bike

Contingency table analyses									
	Motorcycle			ATV			Dirt bike		
	Owned	Did not own	*p* value	Owned	Did not own	*p* value	Owned	Did not own	*p* value
	n (row %)[a]	*n* (row %)[a]		*n* (row %)[a]	*n* (row %)[a]		*n* (row %)[a]	*n* (row %)[a]	
All	291 (22)	1029 (78)		833 (65)	445 (35)		381 (29)	930 (71)	
Sex									
Male	136 (25)	403 (75)	0.02	368 (71)	152 (29)	< 0.001	183 (34)	352 (66)	< 0.001
Female	150 (20)	613 (80)		456 (61)	286 (39)		192 (25)	566 (75)	
Age									
16–18 yrs	155 (21)	575 (79)	0.656	472 (66)	239 (34)	0.361	215 (30)	512 (70)	0.863
13–15 yrs	128 (22)	443 (78)		350 (64)	199 (36)		164 (29)	402 (81)	
Residence									
Farm	137 (21)	526 (79)	0.42	500 (78)	140 (22)	< 0.001	210 (32)	448 (68)	< 0.001
Country[b]	69 (24)	214 (76)		182 (67)	91 (33)		99 (35)	181 (65)	
Town	85 (23)	289 (77)		151 (41)	214 (59)		72 (19)	301 (81)	
Race									
NH White	275 (22)	971 (78)	1.0	813 (67)	397 (33)	< 0.001	369 (30)	869 (70)	0.024
Other[c]	16 (22)	57 (78)		20 (30)	47 (70)		12 (17)	60 (83)	

ATV all-terrain vehicle, *yrs* years, *NH White* non-Hispanic White

[a] The sum of *n* for a variable may not equal the total group *N* due to missing values

[b] Respondents who live in the country, but not on a farm

[c] Respondents who were races and ethnicities other than non-Hispanic White

never wore helmets riding ATVs (49%) as compared to motorcycles (21%) and dirt bikes (21%), $p < 0.001$ for both (data not shown in a table). Females had higher proportions stating they always/mostly wore helmets on motorcycles but were not different from males for ATVs and dirt bikes. Overall, those who lived on farms had lower helmet use for all three vehicles versus those who lived elsewhere, $p < 0.04$ for all three comparisons (data not in table), with only 15% reporting always/mostly wearing helmets when on ATVs.

Owners of dirt bikes had higher proportions using helmets always/mostly versus non-owners which was not true related to motorcycles and ATVs. More frequent ATV riders (at least weekly) had lower percentages always/mostly using helmets as compared to less frequent riders. For ATV riders whose parents had a strict "No Helmet, No Riding" rule, 62% (111/178) stated they always/mostly wore a helmet which was far higher than any other demographic group. In fact, those with strict helmet rules had odds 12.1 (95% CI 5.1–28.8) times greater of using helmets always/mostly as compared to those without such a rule (data not shown). In addition, those with a strict ATV helmet rule also had greater helmet use when riding dirt bikes (74%) and motorcycles (75%) than those that did not have that rule.

Helmet laws for ATVs, dirt bikes and motorcycles

A greater proportion of respondents supported laws requiring helmets for riding motorcycles as compared to dirt bikes, and they supported helmet laws for motorcycles and for dirt bikes by greater percentages than ATVs. See Table 6. Females had higher percentages supporting helmet laws then males for all three vehicles. Those living on farms had less support for helmet laws than those living elsewhere. Owners and riders of all three vehicles had lower proportions supporting helmet requirement laws than non-owners and non-riders, respectively. Respondents whose families had a strict "No Helmet, No Riding" rule had the highest proportion supporting helmet laws for ATVs (nearly two-thirds), greater than any other demographic group. Logistic regression analysis showed that those with strict helmet rules had 10.0 (95% CI 4.2–23.8) times higher odds of supporting an ATV helmet law versus those without a rule (data not shown).

Helmet use importance

Helmet use importance (rated from 1 to 10, 10 high) were not different between motorcycles (mean 8.6, median 10) and dirt bikes (mean 8.3, median 10), but much lower for ATVs (mean 6.1, median 6). See Table 7. Females, non-owners, and those supporting helmet laws all had

Table 3 Contingency table analyses regarding whether 2022 Iowa FFA Leadership Conference survey respondents had ridden a motorcycle, ATV or dirt bike in the past year

Contingency table analyses									
	Motorcycle			ATV			Dirt bike		
	Ridden	Never ridden	*p* value	Ridden	Never ridden	*p* value	Ridden	Never ridden	*p* value
	n (row %)[a]	*n* (row %)[a]		*n* (row %)[a]	*n* (row %)[a]		*n* (row %)[a]	*n* (row %)[a]	
All	406 (31)	896 (69)		979 (77)	293 (23)		516 (40)	778 (60)	
Sex									
Male	208 (38%)	335 (62)	< 0.001	427 (79)	116 (21)	< 0.001	265 (49%)	278 (51)	< 0.001
Female	187 (24%)	583 (76)		539 (70)	231 (30)		242 (31%)	528 (69)	
Age									
16–18 years	220 (30)	518 (70)	0.541	551 (75)	187 (25)	0.448	271 (37)	467 (63)	0.091
13–15 years	181 (32)	393 (68)		417 (73)	157 (27)		238 (41)	336 (59)	
Residence									
Farm	183 (27)	487 (73)	0.037	533 (80)	137 (20)	< 0.001	266 (40)	404 (60)	< 0.001
Country[b]	98 (34%)	187 (66)		218 (76)	67 (24)		132 (46)	153 (54)	
Town	125 (33%)	251 (67)		228 (61)	148 (39)		118 (31)	258 (69)	
Race									
NH White	384 (31)	873 (69)	1.0	951 (76)	306 (24)	< 0.001	495 (39)	762 (61)	0.092
Other[c]	22 (30)	51 (70)		28 (38)	45 (62)		21 (40)	52 (60)	
Ownership									
Yes	203 (70)	88 (30)	< 0.001	800 (96)	33 (4)	< 0.001	330 (87)	51 (13)	< 0.001
No	202 (20)	827 (80)		179 (40)	266 (60)		186 (20)	744 (80)	

ATV all-terrain vehicle, *yrs* years, *NH White* non-Hispanic White

[a] The sum of *n* for a variable may not equal the total group *N* due to missing values

[b] Respondents who live in the country, but not on a farm

[c] Respondents who were races and ethnicities other than non-Hispanic White

higher helmet use importance ratings as compared to their peers. There was a difference in the level of importance ascribed to helmet use for all three vehicles based on helmet use frequency. Those whose families had a strict ATV "No Helmet, No Riding" rule had higher helmet importance (median 9) than those with no such rule (median 5).

Discussion

A significant proportion of adolescents in the study were exposed to ATVs, motorcycles and dirt bikes, and helmet use (always/most of the time) was not greater than 58% for any of the vehicles. Ownership was highest for ATVs (65%) and more than three-quarters of all had ridden an ATV in the past year. While over half of riders reported using helmets always or most of the time on motorcycles and dirt bikes, this was only 21% for ATVs. The mean importance of helmet use and their level of support for helmet laws mirrored helmet use for each vehicle. In addition, the greater the importance participants ascribed to helmet use for a vehicle, the more frequently they wore a helmet when riding.

Respondents from farms as compared to those living elsewhere had the lowest helmet use and the least support of helmet laws for all three vehicles, even though their median rating of the importance of helmet use was not significantly different from their peers. Similar to adolescents from farms in our study, farmers have reported low ATV helmet use (Irwin et al. 2022; Mcintosh et al. 2016; Jennissen et al. 2017). Specifically, a study of attendees of the 2012 and 2013 Farm Progress Show, the largest U.S. outdoor farm show, found that among respondents, farmers had the lowest ATV helmet use with nearly three-fifths (58%) stating they never/almost never wore a helmet (Jennissen et al. 2017). Other studies have demonstrated low helmet use on ATVs among adolescents from farms (Hafner et al. 2010; Burgus et al. 2009; Goldcamp et al. 2006; Jinnah and Stoneman 2016).

Helmet use and the importance ascribed to wearing a helmet was much lower for ATVs than dirt bikes and motorcycles in the study. However, research has shown that pediatric ATV crash victims have a relatively high morbidity and mortality (Collins et al. 2007; Nabaweesi et al. 2018; Linnaus et al. 2017; Elzaim et al. 2022; Shults

Table 4 Contingency table analyses regarding the frequency 2022 Iowa FFA Leadership Conference survey respondents had ridden a motorcycle, ATV or dirt bike in the past year

Contingency table analyses									
	Motorcycle			ATV			Dirt bike		
	Few times a year/monthly	Weekly/daily	*p* value	Few times a year/monthly	Weekly/daily	*p* value	Few times a year/monthly	Weekly/daily	*p* value
	n (row %)[a]	*n* (row %)[a]		*n* (row %)[a]	*n* (row %)[a]		*n* (row %)[a]	*n* (row %)[a]	
All	343 (84)	63 (16)		517 (51)	500 (49)		364 (71)	152 (29)	
Sex									
Male	160 (77)	48 (23)	< 0.001	159 (37)	268 (63)	0.525	164 (62%)	101 (38)	0.005
Female	147 (93)	11 (7)		148 (40)	225 (60)		138 (75%)	46 (25)	
Age									
16–18 yrs	186 (85)	34 (15)	1.0	116 (30)	276 (70)	< 0.001	133 (63%)	78 (37)	0.225
13–15 yrs	153 (85)	28 (15)		201 (48)	216 (52)		164 (69%)	74 (31)	
Residence									
Farm	154 (84)	29 (16)	0.956	197 (37)	336 (63)	< 0.001	183 (69%)	83 (31)	0.595
Country[b]	67 (83)	14 (17)		64 (42)	88 (58)		69 (66%)	36 (34)	
Town	105 (84)	20 (16)		152 (67)	76 (33)		85 (72%)	33 (28)	
Race									
NH White	328 (85)	56 (15)	0.061	461 (48)	490 (52)	1.0	352 (71%)	143 (29)	0.054
Other[c]	15 (68)	7 (32)		9 (47)	10 (53)		8 (47%)	9 (53)	
Ownership									
Yes	149 (73)	54 (27)	< 0.001	323 (40)	477 (60)	< 0.001	190 (58%)	140 (42)	< 0.001
No	193 (96)	9 (4)		156 (85)	23 (15)		174 (94%)	12 (6)	

ATV all-terrain vehicle, *yrs* years, *NH White* non-Hispanic White

[a] The sum of *n* for a variable may not equal the total group *N* due to missing values

[b] Respondents who live in the country, but not on a farm

[c] Respondents who were races and ethnicities other than non-Hispanic White

et al. 2005; Acosta and Rodriguez 2003). In fact, the severity of injuries on ATVs is more comparable to motor vehicle collisions than that of other sports and recreational activities (Nabaweesi et al. 2018). One study found that youth in ATV crashes were 7 times more likely to be hospitalized than other trauma causes and twice as likely as patients in motor vehicle crashes (Shults et al. 2005). In addition, the proportion of head injuries is higher in ATV-related crashes than with motorcycles (Collins et al. 2007; Linnaus et al. 2017; Acosta and Rodriguez 2003). Studies have shown many parents and adolescents do not consider driving ATVs to be dangerous and perceive the risk of serious injury to be low (Adams et al. 2013; Wymore et al. 2020). Undoubtedly, these distorted beliefs are likely factors in the low use of helmets on ATVs. Although few children and adolescents receive formal ATV training, this training has been positively associated with increased helmet use (Burgus et al. 2009; Jennissen et al. 2022).

There are no helmet laws in Iowa except the requirement to use them in public off-highway vehicle parks (Institute and for Highway Safety ((IIHS), Highway Loss Data Institute (HLDI) 2023; Iowa Department of Natural Resources. Off-highway vehicle reference guide 2024). Over half of the study FFA members supported laws mandating helmet use for dirt bikes and motorcycles, whereas ATV helmet law support was less than one-third, even though the risk for head injury is similar. Universal helmet laws covering all riders have been shown to be the most effective way to increase helmet use (NHTSA 2009; Houston and Richardson 2008) and are associated with a 36–45% decline in motorcycle crash mortality (Nortica et al. 2020 Nov). Nineteen states and the District of Columbia have universal laws (Institute and for Highway Safety ((IIHS), Highway Loss Data Institute (HLDI). 2023). Partial laws covering certain ages (usually those that are younger) have not been effective (NHTSA 2009; Houston and Richardson 2008; Nortica et al. 2020).

Nearly all states had universal laws by the early 1970's after they were required to enact helmet legislation in order to qualify for Federal funding related to highway construction and some safety programs (NHTSA 2019). However, this requirement was removed in 1976 and in the subsequent four years almost half the states had

Table 5 Contingency table analyses regarding the frequency 2022 Iowa FFA leadership conference survey respondents wore a helmet while riding a motorcycle, ATV or dirt bike

Contingency table analyses									
	Motorcycle			ATV			Dirt bike		
	Always/mostly	Never/rarely/ sometimes	*p* value	Always/mostly	Never/rarely/ sometimes	*p* value	Always/mostly	Never/rarely/ sometimes	*p* value
	n (row %)[a]	*n* (row %)[a]		*n* (row %)[a]	*n* (row %)[a]		*n* (row %)[a]	*n* (row %)[a]	
All	232 (58)	170 (42)		206 (21)	766 (79)		261 (51)	248 (49)	
Sex									
Male	103 (50)	101 (50)	0.008	98 (23)	327 (77)	0.23	131 (50)	133 (50)	0.452
Female	119 (64)	66 (36)		105 (20)	429 (80)		126 (53)	110 (47)	
Age									
16–18 years	120 (55)	97 (45)	0.257	100 (25)	308 (75)	0.008	136 (51)	133 (49)	0.789
13–15 years	110 (61)	69 (39)		106 (19)	447 (81)		121 (52)	111 (48)	
Residence									
Farm	88 (49)	92 (51)	0.003	80 (15)	446 (85)	< 0.001	123 (46)	142 (54)	0.073
Country[b]	66 (69)	29 (31)		66 (30)	152 (70)		71 (55)	58 (45)	
Town	77 (62)	48 (38)		60 (36)	168 (63)		66 (58)	48 (42)	
Race									
NH White	217 (57)	162 (43)	0.533	200 (21)	744 (79)	1.0	252 (52)	236 (48)	0.428
Other	14 (67)	7 (33)		6 (21)	22 (79)		8 (40)	12 (60)	
Ownership									
Yes	124 (63)	77 (37)	0.122	164 (21)	630 (79)	0.444	183 (56)	143 (44)	0.004
No	106 (54)	92 (46)		42 (24)	136 (76)		77 (42)	105 (58)	
Riding frequency									
Monthly/few	195 (58)	143 (42)	1.0	115 (24)	361 (76)	0.033	174 (49)	184 (51)	0.089
Daily/weekly	36 (58)	26 (42)		91 (18)	405 (82)		86 (57)	64 (43)	
Strict helmet rule[d]									
Yes	42 (75)	14 (25)	0.003	111 (62)	67 (38)	< 0.001	67 (74)	24 (26)	< 0.001
No	139 (52)	127 (48)		93 (12)	695 (88)		155 (45)	193 (55)	

ATV all-terrain vehicle, *NH White* non-Hispanic White

[a] The sum of *n* for a variable may not equal the total group *N* due to missing values

[b] Respondents who live in the country, but not on a farm

[c] Respondents who were races and ethnicities other than non-Hispanic White

[d] Respondent's family had a strict ATV "no helmet, no riding" rule. For motorcycles and dirt bikes, this only includes those that were also ATV riders

repealed their universal laws. An immediate increase in motorcycle fatalities was seen as exemplified by Michigan, one of the most recent to change its law in 2013, which experienced an 18% increase in motorcycle fatalities (NHTSA 2019). Similarly, states with more ATV safety laws have lower fatality rates, including for children (Helmkamp 2001; Helmkamp et al. 2012). One of the most effective way for states to save motorcycle, dirt bike and ATV rider lives is the passage and enforcement of universal helmet laws.

Over 60% of study participants who reported a strict ATV "No Helmet, No Riding" rule in their family wore a helmet always or most of the time when riding ATVs. Although there is still room for improvement, this proportion was by far higher than that of any other demographic group. We did not ask participants whether they had "No Helmet, No Riding" rules for other vehicles, but those who had strict ATV rules were also found to have higher helmet use on motorcycles and dirt bikes. In addition, the rating of helmet importance was much higher for those with a strict ATV helmet rule (median 9) as compared to those without (median 5).

Previous studies have shown that firm rules requiring helmet use are critical to helmet wearing by children (Miller et al. 1996; Berg and Westerling 2001; Khambalia et al. 2005; Keezer et al. 2007). One study found that a strict rule increased the likelihood of bicycle helmet use 46-fold (Miller et al. 1996). Parents stated in another

Table 6 Contingency table analyses regarding whether 2022 Iowa FFA Leadership Conference survey respondents believed there should be a law requiring helmet use while riding a motorcycle, ATV or dirt bike

Contingency table analyses									
	Motorcycle			ATV			Dirt bike		
	Law	No law	*p* value	Law	No law	*p* value	Law	No law	*p* value
	n (row %)[a]	*n* (row %)[a]		*n* (row %)[a]	*n* (row %)[a]		*n* (row %)[a]	*n* (row %)[a]	
All	942 (72)	360 (28)		382 (31)	862 (69)		724 (56)	562 (44)	
Sex									
Male	304 (57)	227 (43)	< 0.001	126 (25)	379 (75)	< 0.001	222 (42)	303 (58)	< 0.001
Female	625 (83)	128 (17)		247 (34)	476 (66)		492 (66)	252 (34)	
Age									
16–18 years	489 (68)	229 (32)	< 0.001	191 (28)	501 (72)	0.012	390 (55)	322 (45)	0.188
13–15 years	441 (78)	125 (22)		184 (34)	350 (66)		326 (59)	230 (41)	
Residence									
Farm	452 (69)	204 (31)	0.018	155 (25)	470 (75)	< 0.001	345 (53)	304 (47)	0.037
Country[b]	206 (75)	69 (25)		88 (33)	182 (67)		154 (57)	117 (43)	
Town	284 (77)	87 (23)		139 (40)	210 (60)		225 (61)	141 (39)	
Race									
NH White	891 (72)	338 (28)	0.669	358 (30)	824 (70)	0.279	685 (56)	532 (44)	1.0
Other[c]	50 (69%)	22 (31)		23 (38)	38 (62)		38 (56)	30 (44)	
Ownership									
Yes	180 (63)	108 (37)	< 0.001	199 (24)	615 (76)	< 0.001	163 (44)	211 (56)	< 0.001
No	761 (75)	252 (25)		183 (43)	247 (57)		561 (62)	351 (38)	
Ridden in past year									
Yes	242 (61)	157 (39)	< 0.001	235 (25)	720 (75)	< 0.001	212 (42)	293 (58)	< 0.001
No	691 (78)	199 (22)		145 (51)	141 (49)		506 (66)	266 (34)	
Riding frequency									
Monthly/few	216 (64)	121 (36)	0.002	126 (27)	339 (73)	0.842	156 (44)	201 (56)	0.265
Daily/weekly	26 (42)	36 (58)		109 (28)	281 (72)		56 (38)	92 (62)	
Strict helmet rule[d]									
Yes	–	–	–	112 (64)	63 (36)	< 0.001	–	–	
No	–	–	–	124 (16)	653 (84)		–	–	

ATV all-terrain vehicle, *NH White* non-Hispanic White

[a] The sum of *n* for a variable may not equal the total group *N* due to missing values

[b] Respondents who live in the country, but not on a farm

[c] Respondents who were races and ethnicities other than non-Hispanic White

[d] Respondent's family had a strict ATV "no helmet, no riding" rule

study that the most effective method for getting their children to wear helmets on bicycles and ATVs was a non-negotiable "No Helmet, No Riding" rule (Wymore et al. 2020). Adolescents shared in a focus group that the main reason they wore ATV helmets was that their riding club or parents mandated it (Adams et al. 2013). Even adolescents, whose adherence to rules at times may be lacking, have higher proportions that use helmets when parents have strict requirements than when none exist (Berg and Westerling 2001). Parents should be encouraged to start helmet use early, be good helmet-wearing role models, and to implement a non-negotiable "No Helmet, No Riding" rule that is strictly enforced with negative consequences (e.g., riding privileges revoked for a week) for non-compliance.

Limitations

Our study was performed in a single Midwestern state with a population primarily rural and non-Hispanic White. Thus, our findings may not be generalizable to other states, urban settings or areas of greater racial/ethnic diversity. Moreover, comparisons by race/ethnicity should be interpreted with caution given the category "Other" was quite small and diverse. We

Table 7 Comparisons of the median importance ascribed by 2022 Iowa FFA Leadership Conference survey respondents to helmet use while riding a motorcycle, ATV or dirt bike

	Median comparisons of helmet use importance					
	Motorcycle		ATV		Dirt Bike	
	Median importance (1–10)[a]	*p* value	Median importance (1–10)[a]	*p* value	Median importance (1–10)[a]	*p* value
All	10		6		10	
Sex						
Male	9	< 0.001	6	< 0.001	9	< 0.001
Female	10		7		10	
Age						
16–18 years	10	0.211	6	0.001	10	0.574
13–15 years	10		7		9	
Residence						
Farm	10	0.326	5	0.065	9	0.561
Country but not on a farm	10		7		10	
Town	10		7		10	
Race						
NH White	10	0.101	6	0.033	9	0.018
Other races[b]	10		7		10	
Ownership						
Yes	9	< 0.001	5	< 0.001	9	< 0.001
No	10		8		10	
Ridden in past year						
Yes	10	0.069	6	0.067	9	0.111
No	10		10		10	
Riding frequency						
Monthly/few times a year	9	0.003	6	< 0.001	9	0.099
Daily/weekly	8		5		8	
Helmet use						
Always	10	< 0.001	10	< 0.001	10	< 0.001
Mostly	9		8		8	
Sometimes/rare	7		6		7	
Never	5		4		5	
Helmet law						
Support	10	< 0.001	10	< 0.001	10	< 0.001
Against	8		5		7	
Strict "no helmet, no ride" rule[c]						
Yes	–		9	< 0.001	–	
No	–		5		–	

ATV all-terrain vehicle, *NH White* non-Hispanic White

[a] Median importance was 1–10, with 1 being "not at all important" and 10 being "extremely important"

[b] Respondents who were races and ethnicities other than non-Hispanic White

[c] Respondent's family had a strict ATV "no helmet, no riding" rule

also used a convenience sample of FFA members that were mostly from rural areas, so our results may not be representative of adolescents across the entire state. However, the vast majority of Iowa counties were represented in the sample. Data collected was self-reported so is likely subject to recall bias and social desirability. Surveys were anonymous and completed independently which should have decreased the social desirability effect.

Conclusions

ATV ownership and use by adolescents in the study was extremely common, especially those from farms. The importance of wearing a helmet while riding motorcycles and dirt bikes was much higher than for ATVs, and helmet use mirrored their importance rating. Farm youth had lower proportions wearing helmets for all vehicles and less support for laws mandating helmet use. Whereas, over one-half of study participants supported a helmet law for motorcycles and dirt bikes. Respondents whose families had an ATV "No Helmet, No Riding" rule had higher ratings of helmet importance and more frequent helmet use than those without a strict rule. Our study indicates that the safety culture surrounding helmet use is relatively poor among rural adolescents, especially on farms, and deserves targeted interventions. The passage and enforcement of universal helmet laws is one of the many essential ways of improving the safety culture surrounding these vehicles and thereby preventing deaths and injuries among rural adolescents who ride them.

Abbreviations

ATV	All-terrain vehicle
DOT	Department of Transportation
ED	Emergency department
e.g.	Exempli gratia (for example)
FFA	Formerly Future Farmers of America
ICU	Intensive care unit
NHTSA	National Highway Traffic Safety Administration
NOPUS	National Occupant Protection Use Survey
SFCH	Stead Family Children's Hospital
U.S.	United States

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Author contributions

All authors have read and approved the final manuscript. Each author significantly contributed to and takes public responsibility for one or more aspects of the study. Specifically: CAJ was the primary investigator of the study and had overall responsibility for the interpretation and analysis of the results, and final writing and preparation of the manuscript for submission. SRK was involved with interpretation and analysis of the results, literature review, and writing and preparation of the manuscript for submission. BJI participated in survey development, data collection, data compilation and organization, and revision of the manuscript. DES completed analysis and interpretation of the results and helped revise the manuscript. KMW was involved with survey development, validation processes, data collection and revision of the manuscript. BV participated in survey development, data collection and revision of the manuscript. SRL was involved in survey development, data collection and revision of the manuscript. PJH participated in survey development, validation processes, data collection and revision of the manuscript.

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Availability of data and materials

Data and materials are available to other parties for research purposes after a data sharing agreement plan is agreed to and signed. Those interested should contact the corresponding author.

Declarations

Ethics approval and consent to participate

The University of Iowa Institutional Review Board considered this study exempt as the analysis was performed on an existing dataset that had been collected anonymously.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests or financial relationships relevant to this article to disclose.

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References

Abdelgawad AA, Maxfield D, Tran S, Mclean S, Kanlic EM. Dirt bikes injuries in children. Musculoskelet Surg. 2013;97(3):211–5.

Acosta JA, Rodriguez P. Morbidity associated with four-wheel all-terrain vehicles and comparison with that of motorcycles. J Trauma. 2003;55:282–4.

Adams LE, Aitken ME, Mullins SH, Miller BK, Graham J. Barriers and facilitators to all-terrain vehicle helmet use. J Trauma Acute Care Surg. 2013;75(4 Suppl 3):S296–300.

Barron S, Falank C, Ontengco J, Chung B, Carter DW. Severity and patterns of injury in helmeted vs. non-helmeted motorcyclists in a rural state. J Safety Res. 2021;77:212–6.

Berg P, Westerling R. Bicycle helmet use among school children–the influence of parental involvement and children's attitudes. Inj Prev. 2001;7(3):218–22.

Bhutta ST, Greenberg SB, Fitch SJ, Parnell D. All-terrain vehicle injuries in children: injury patterns and prognostic implications. Pediatr Radiol. 2004;34(2):130–3.

Blincoe, LJ, Miller TR, Zaloshnja E, Lawrence BA. The economic impact of motor vehicle crashes. 2010. (revised). May 2015 Revised. National Highway Traffic Safety Administration, Washington, DC. (Publication

No. DOT HS 812 013). Available at: https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812013 Accessed 2 Feb 2024.
Bowman SM, Aitken ME. Still unsafe, still in use: ongoing epidemic of allterrain vehicle injury hospitalizations among children. J Trauma. 2010;69(6):1344–2134.
Bowman SM, Aitken ME, Helmkamp JC, Maham SA, Graham CJ. Impact of helmets on injuries to riders of all-terrain vehicles. Inj Prev. 2009;15(1):3–7.
Boyle L. Motorcycle helmet use in 2022-overall results. Aug 2023. Traffic Safety Facts Research Note. (Report No. DOT HS 813 505). National Highway Traffic Safety Administration. Available at: https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813505 Accessed 2 Feb 2024.
Brown RL, Koepplinger ME, Mehlman CT, Gittelman M, Garcia VF. All-terrain vehicle and bicycle crashes in children: epidemiology and comparison of injury severity. J Pediatr Surg. 2002;37(3):375–80.
Burgus SK, Madsen MD, Sanderson WT, Rautiainen RH. Youths operating all-terrain vehicles–implications for safety education. J Agromed. 2009;14(2):97–104.
Carr AM, Bailes JE, Helmkamp JC, Rosen CL, Miele VJ. Neurological injury and death in all-terrain vehicle crashes in West Virginia: a 10-year retrospective review. Neurosurgery. 2004;54(4):861–6.
Centers for Disease Control and Prevention (CDC). Nonfatal injuries from off-road motorcycle riding among children and teens—United States, 2001–2004. MMWR Morb Mortal Wkly Rep. 2006 9;55(22):621–4.
Coben JH, Steiner CA, Miller TR. Characteristics of motorcycle-related hospitalizations: comparing states with different helmet laws. Accid Anal Prev. 2007;39(1):190–6.
Collins CL, Smith GA, Comstock RD. Children plus all nonautomobile motorized vehicles (not just all-terrain vehicles) equals injuries. Pediatrics. 2007;120(1):134–41.
Denning GM, Jennissen CA. All-terrain vehicle fatalities on paved roads, unpaved roads, and off-road: evidence for informed roadway safety warnings and legislation. Traffic Inj Prev. 2016;17(4):406–12.
Denning G, Jennissen C. Pediatric and adolescent injury in all-terrain vehicles. Res Sports Med. 2018;26(S1):38–56.
Denning G, Harland K, Ellis D, Jennissen C. More fatal all-terrain vehicle crashes occur on the roadway than off: Increased risk-taking characterises roadway fatalities. Inj Prev. 2013a;19:250–6.
Denning G, Jennissen C, Harland K, Ellis D, Buresh C. All-terrain vehicles (ATVs) on the road: a serious traffic safety and public health concern. Traffic Inj Prev. 2013b;14(1):78–85.
Denning G, Harland K, Jennissen C. Age-based risk factors for pediatric ATV-related fatalities. Pediatrics. 2014;134(6):1094–102.
Elzaim JS, Vatcheva K, Torres-Reveron A, Pequeno G, Betancourt-Garcia MM. Comparative analysis of all-terrain vehicles, motorcycle and automobile-related trauma in a rural border community of the USA. BMJ Open. 2022;12(9):e054289.
Ganga A, Kim EJ, Araia ES, Hagan M, Shao B, Svokos K, Klinge PM, Cielo DJ, Fridley JS, Gokaslan ZL, Toms SA, Sullivan PZ. Pediatric all-terrain vehicle (ATV) related head injury rates and patterns: a 10-year nationwide analysis. Am J Emerg Med. 2023;67:56–62.
GAO. All-terrain vehicles: how they are used, crashes, and sales of adult-sized vehicles for children's use. 2010 report to congressional committees (GAO-10–418). Available at: www.gao.gov/new.items/d10418.pdf. Accessed 3 Feb 2024.
Gerberich SG, Gibson RW, French LR, et al. Injuries among children and youth in farm households: regional Rural injury study-I. Inj Prev. 2001;7(2):117–22.
Gittelman MA, Pomerantz WJ, Groner JI, Smith GA. Pediatric all-terrain vehicle-related injuries in Ohio from 1995 to 2001: using the injury severity score to determine whether helmets are a solution. Pediatrics. 2006;117(6):2190–5.
Goldcamp EM, Myers J, Hendricks K, Layne L, Helmkamp J. Nonfatal all-terrain vehicle-related injuries to youths living on farms in the United States, 2001. J Rural Health. 2006;22(4):308–13.
Hafner JW, Hough SM, Getz MA, Whitehurst Y, Pearl RH. All-terrain vehicle safety and use patterns in central Illinois youth. J Rural Health. 2010;26(1):67–72.
Helmkamp JC. A comparison of state-specific all-terrain vehicle-related death rates, 1990–1999. Am J Public Health. 2001;91(11):1792–5.
Helmkamp JC, Furbee PM, Coben JH, Tadros A. All-terrain vehicle-related hospitalizations in the United States, 2000–2004. Am J Prev Med. 2008;34(1):39–45.
Helmkamp JC, Aitken ME, Lawrence BA. ATV and bicycle deaths and associated costs in the United States, 2000–2005. Public Health Rep. 2009;124(3):409–18.
Helmkamp JC, Aitken ME, Graham J, Campbell CR. State-specific ATV-related fatality rates: an update in the new millennium. Public Health Rep. 2012;127(4):364–74.
Hendricks KJ, Layne LA, Goldcamp EM, Myers JR. Injuries to youth living on U.S. farms in 2001 with comparison to 1998. J Agromed. 2005;10(4):19–26.
Ho CV, Dunne JR, Stroud WR, Fonseca AH, Davis FE, Bromberg WJ. Analysis of all-terrain vehicle trauma data: implications for increased regulation and injury prevention. Am Surg. 2017;83(4):348–53.
Holt MF, Fortmann J, Testerman GM. Trauma surgeon-led and funded injury prevention program decreases number of all-terrain vehicle-related admissions. Am Surg. 2022;88(4):638–42.
Houston DJ, Richardson LE. Motorcyclist fatality rates and mandatory helmet-use laws. Accid Anal Prev. 2008;40:200–8.
Humphries RL, Stone CK, Stapczynski JS, Florea S. An assessment of pediatric all-terrain vehicle injuries. Pediatr Emerg Care. 2006;22(7):491–4.
Insurance Institute for Highway Safety ((IIHS)/Highway Loss Data Institute (HLDI). Fatality facts 2021: motorcycles and ATVs. May 2023. Available at: https://www.iihs.org/topics/fatality-statistics/detail/motorcycles-and-atvs Accessed 17 Jan 2024.
Insurance Institute for Highway Safety ((IIHS)/Highway Loss Data Institute (HLDI). Motorcycle helmet use laws. February 2024. Available at: https://www.iihs.org/topics/motorcycles/motorcycle-helmet-laws-tables.org) Accessed 2 Feb 2024.
Iowa Department of Natural Resources. Off-highway vehicle reference guide. Available at: https://www.iowadnr.gov/portals/idnr/uploads/atv/ohvreferenceguide.pdf Accessed 2 Feb 2024.
Iowa FFA Association. About Iowa FFA. 2024. Available at: https://www.iowaffa.com/about.aspx Accessed on 18 Jan 2024.
Irwin A, Mihulkova J, Berkeley S, Tone L-R. "No-one else wears one:" exploring farmer attitudes towards all-Terrain vehicle helmets using the COM-B model. J Safety Res. 2022;81:123–33.
Jennissen CA, Harland KK, Wetjen K, Peck J, Hoogerwerf P, Denning GM. A school-based study of adolescent all-terrain vehicle exposure, safety behaviors, and crash experience. Ann Fam Med. 2014;12(4):310–6.
Jennissen CA, Harland KK, Wetjen K, Hoogerwerf P, O'Donnell L, Denning GM. All-terrain vehicle safety knowledge, riding behaviors and crash experience of Farm Progress Show attendees. J Safety Res. 2017;60:71–8.
Jennissen CA, Denning GM, Aitken ME. A comprehensive report on all-terrain vehicles and youth: continuing challenges for injury prevention. Pediatrics. 2022;150(4):e2022059280.
Jennissen CA, Champoux KL, Hoogerwerf PJ, Wetjen KM, Mulford LJ, Schaeffer SE, Okoro UE, Denning FM. All-terrain vehicle exposure and the association of ertified training on adolescent safety behaviors and crash experiences. Inj Epidemiol. 2022;9(Suppl 1):36.
Jinnah H, Stoneman Z. Age- and gender-based patterns in youth all-terrain vehicle (ATV) riding behaviors. J Agromed. 2016;21(2):163–70.
Keenan HT, Bratton SL. All-terrain vehicle legislation for children: a comparison of a state with and a state without a helmet law. Pediatrics. 2004;113(4):e330–4.
Keezer MR, Rughani A, Carroll M, Haas B. Head first: bicycle-helmet use and our children's safety. Can Fam Physician. 2007;53(7):1131–2.
Kelleher CM, Metze SL, Dillon PA, Mychaliska GB, Keshen TH, Foglia RP. Unsafe at any speed–kids riding all-terrain vehicles. J Pediatr Surg. 2005;40(6):929–34.
Khambalia A, MacArthur C, Parkin PC. Peer and adult companion helmet use is associated with bicycle helmet use by children. Pediatrics. 2005;116(4):939–42.
Khor D, Inaba K, Aiolfi A, Delapena S, Benjamin E, Matsushima K, Strumwasser AM, Demetriades D. The impact of helmet use on outcomes after a motorcycle crash. Injury. 2017;48(5):1093–7.
Kirkpatrick R, Puffinbarger W, Sullivan JA. All-terrain vehicle injuries in children. J Pediatr Orthop. 2007;27(7):725–8.
Larson AN, McIntosh AL. The epidemiology of injury in ATV and motocross sports. Med Sport Sci. 2012;58:158–72.

Lawrence J, Kerns T, Burch C, Thomas A, Bell E. Motorcycle helmet use and head and facial injuries: crash outcomes in CODES-linked data. NHTSA. Oct 2009 (DOT HS 811 208). Available at: https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811208 Accessed 19 Jan 2024.
Levy BE, Quattrone M, Castle JT, Doud AN, Draus JM, Worhunsky DJ. Injury pattern and outcomes following all-terrain vehicle accidents in Kentucky children: a retrospective study. Am Surg. 2023;89(12):5874–80.
Linnaus ME, Ragar RL, Garvey EM, Fraser JD. Injuries and outcomes associated with recreational vehicle accidents in pediatric trauma. J Pediatr Surg. 2017;52(2):327–33.
Liu BC, Ivers R, Norton R, Boufous S, Blows S, Lo SK. Helmets for preventing injury in motorcycle riders. Cochrane Database Syst Rev. 2008;23(1):CD004333.
Mangano FT, Menendez JA, Smyth MD, Leonard JR, Narayan P, Park TS. Pediatric neurosurgical injuries associated with all-terrain vehicle accidents: a 10-year experience at St Louis Children's Hospital. J Neurosurg. 2006;105(1 Suppl):2–5.
Mcintosh AS, Patton DA, Rechnitzer G, Grzebieta R. Injury mechanisms in fatal Australian quad bike incidents. Traffic Inj Prev. 2016;17(4):386–90.
McIntosh AL, Christophersen CM. Motocross injuries in pediatric and adolescent patients. J Am Acad Orthop Surg. 2018;26(5):162–5.
Merrigan TL, Wall PL, Smith HL, Janus TJ, Sidwell RA. The burden of unhelmeted and uninsured ATV drivers and passengers. Traffic Inj Prev. 2011;12(3):251–5.
Miller PA, Binns HJ, Christofffel KK. Children's bicycle helmet attitudes and use. Association with parental rules. The Pediatric Practice Research Group. Arch Pediatr Adolesc Med. 1996;150(12):1259–64.
Miller B, Baig M, Hayes J, Elton S. Injury outcomes in children following automobile, motorcycle, and all-terrain vehicle accidents: an institutional review. J Neurosurg. 2006;105(3 Suppl):182–6.
Myers ML, Cole HP, Mazur JM. Cost effectiveness of wearing head protection on all-terrain vehicles. J Agromed. 2009;14(3):312–23.
National Highway Traffic Safety Administration. Motorcycle safety 5-year plan. May 2019. (DOT HS 812 488). U.S. Department of Transportation, Washington, DC. Available at: https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/13507-motorcycle_safety_plan_050919_v8-tag.pdf Accessed 2 Feb 2024.
Nabaweesi R, Robbins JM, Goudie A, Onukwube JI, Bowman SM, Aitken ME. A cross-sectional study of emergency department visits by children after all-terrain vehicle crashes, motor vehicle crashes, and sports activities. Pediatr Emerg Care. 2018;34(7):479–83.
National Highway Traffic Safety Administration (NHTSA). Traffic Safety Facts 2009 Data. December 2009. (DOT HS 811 392). U.S. Department of Transportation, Washington, DC. Available at: https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811392#:~:text=In%202009%2C%20there%20were%20an,crashes%20involved%20property%20damage%20only. Accessed 2 Feb 2024.
National Highway Traffic Safety Administration (NHTSA). Motorcycles. Traffic Safety Facts. 2021. (DOT HS 813 112). U.S. Department of Transportation, Washington, DC. Available at: https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813112 Accessed 19 Jan 2024.
Nichols JC, Sorrentino A, Hayslip M, King W, Jones A, Monroe K. Pediatric injury due to wheeled recreational devices: a single-institution retrospective study. Inj Epidemiol. 2022;9(Suppl 1):44.
Nortica DM, Sayrs LW, Krishna N, Davenport KP, Jamshidi R, McMahon L. Impact of helmet laws on motorcycle crash mortality rates. J Trauma Acute Care Surg. 2020;89(5):962–70.
Patel PB, Staley CA, Runner R, Mehta S, Schenker ML. Unhelmeted motorcycle riders have increased injury burden: a need to revisit universal helmet laws. J Surg Res. 2019;242:177–82.
Rodgers GB. The effectiveness of helmets in reducing all-terrain vehicle injuries and deaths. Accid Anal Prev. 1990;22(1):47–58.
Shannon SF, Hernandez NM, Sems SA, Larson AN, Milbrandt TA. Pediatric orthopaedic trauma and associated injuries of snowmobile, ATV, and dirt-bike accidents: a 19-year experience at a level 1 pediatric trauma center. J Pediatr Orthop. 2018;38(8):403–9.
Shults RA, West BA. ATV riding and helmet use among youth aged 12–17 years, USA, 2011: results from the YouthStyles survey. Inj Prev. 2015;21(1):10–4.
Shults RA, Wiles SD, Vajani M, Helmkamp JC. All-terrain vehicle-related nonfatal injuries among young riders: United States, 2001–2003. Pediatrics. 2005;116(5):e608–12.
Shults RA, West BA, Rudd RA, Helmkamp JC. All-terrain vehicle-related nonfatal injuries among young riders in the United States, 2001–2010. Pediatrics. 2013;132(2):282–9.
Testerman GM, Prior DC, Wells TD, Rollins SE, Oesch SL. Helmets matter: Kentucky all-terrain vehicle crashes seen at a Tennessee trauma center. Am Surg. 2018;84:289–93.
Unni P, Morrow SE, Shultz L. Analysis of pediatric all-terrain vehicle trauma data in Middle Tennessee: implications for injury prevention. J Trauma Acute Care Surg. 2012;73(4 Suppl 3):S277–80.
Vittetoe KL, Allen JH, Unni P, McKay KG, Yengo-Kahn AM, Ghani O, Mummidi P, Greeno AL, Bonfield CM, Lovvorn HN. Socioeconomic factors associated with helmet use in pediatric ATV and dirt bike trauma. Trauma Surg Acute Care Open. 2022;7(1):e000876.
Wiener RC, Waters C, Harper M, Trickett AK, Shockey RB. All-terrain vehicle-related emergency department visits: interaction of sex and age, NEISS, 2019. J Emerg Med. 2022;62(6):810–9. https://doi.org/10.1016/j.jemermed.2022.02.005.
Wymore C, Denning G, Hoogerwerf P, Wetjen K, Jennissen C. Parental attitudes and family helmet use for all-terrain vehicles and bicycles. Inj Epidemiol. 2020;7(Suppl 1):23.
Zhang C. Report of deaths and injuries involving off-highway vehicles with more than two vehicles. United States Consumer Product Safety Commission. May 2023. 2022. Available at: https://www.cpsc.gov/s3fs-public/OHV-Annual-Report-2022.pdf Accessed on 17 Jan 2024.

Publisher's Note

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Community partnership approaches to safe sleep (CPASS) program evaluation

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Abstract

Background Sudden unexpected infant death (SUID) continues to be a leading cause of death in infants in the United States (US), with significant disparities by race and socio-economic status. Infant safe sleep behaviors are associated with decreasing SUID risk, but challenges remain for families to practice these routinely. The objective of this program was to implement and evaluate a novel approach for an infant safe sleep pilot program built upon partnerships between hospitals and community-based organizations (CBOs) serving pregnant and parenting families in at-risk communities.

Methods Community Partnership Approaches to Safe Sleep (CPASS) was a prospectively implemented infant safe sleep program. CPASS included children's hospitals partnered with CBOs across five US cities: Portland, OR, Little Rock AR, Chicago, IL, Birmingham, AL, and Rochester, NY. The program consisted of (1) monthly learning community calls; (2) distribution of Safe Sleep Survival Kits; and (3) surveys of sites and families regarding program outcomes. Survey measures included (1) site participation in CPASS activities; (2) recipients' use of Safe Sleep Kits; and (3) recipients' safe sleep knowledge and behaviors.

Results CPASS learning community activities were consistently attended by at least two representatives (1 hospital-based, 1 CBO-based) from each site. Across the five sites, 1002 safe kits were distributed over 9 months, the majority (> 85%) to families with infants ≤ 1 month old. Among participating families, 45% reported no safe sleep location before receipt of the kit. Family adherence to nighttime safe sleep recommendations included: (1) no bedsharing (M 6.0, SD 1.8, range 0–7); (2) sleep on back (M 6.3, SD 1.7, range 0–7); and (3) sleep in a crib with no blankets/toys (M 6.0, SD 2.0, range 0–7). Site interviews described how participation in CPASS influenced safe sleep conversations and incorporated local data into counseling. Hospital-CBO relationships were strengthened with program participation.

Conclusions The CPASS pilot program provides a new, innovative model built on hospital-community partnerships for infant safe sleep promotion in SUID-impacted communities. CPASS reached families before their infant's peak age risk for SUID and empowered families with knowledge and resources to practice infant safe sleep. Important lessons learned included improved ways to center and communicate with families.

Keywords SUID, SIDS, ASSB, Prevention, Safe sleep, Community partnerships

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Introduction

Sudden unexpected infant death (SUID) is the leading cause of death for infants one-month to one-year old, resulting in the death of approximately 3400 infants in the U.S. annually (Moon et al. 2022a). SUID is defined as the sudden and unexpected death of an infant less than one-year-old with no immediately obvious cause. The majority of SUID occur during sleep and are defined as infant deaths from: (1) accidental suffocation and strangulation in bed (ASSB), (2) ill-defined or unknown causes, or (3) sudden infant death syndrome (SIDS). ASSB is assigned when the infant's death is caused by suffocation or asphyxia from obstruction of the nose and mouth, or compression of the neck or chest, by soft bedding, overlaying, wedging/entrapment, and/or strangulation. The latter two causes of death are assigned when there is no explanation, even after a full investigation.

The triple-risk model proposes that SIDS is likely to occur when three factors coincide: (1) the infant's intrinsic vulnerability; (2) during a critical period of development; and 3) with an exogenous stressor (e.g. bed-sharing, soft bedding, prone sleeping) Filiano and Kinney 1994). Data from the Center for Disease Control and Prevention's (CDC) SUID Case Registry showed that from 2011 to 2017, most (75%) SUID occurred among infants less than six-months-old. For SUID with complete case information, 98.5% occurred in an unsafe sleep environment (Parks et al. 2021).

In 1994 the American Academy of Pediatrics (AAP) collaborated with the National Institute of Child Health and Human Development (NICHD) and other stakeholders on the "Back-to-Sleep" public health campaign (Eunice Kennedy Shriver National Institute of Child Health and Human Development 2024) Afterwards infant supine sleep position use increased from ~15% in 1998 to ~72% in 2010 and the rate of SIDS (deaths per 1000 live births) decreased from ~1.4 in 1988 to ~0.5 in 2010 (Coverstone and Kemp 2019). Over the past two decades the combined SUID rate has plateaued and infant death rates attributed to unknown cause or ASSB have increased (Centers for Disease Control and Prevention 2024). Race and ethnic disparities persist with SUID rates over two times higher among non-Hispanic American Indian/Alaska Native (NH AI/AN) infants and approximately two times higher in non-Hispanic Black (NHB) infants, compared to non-Hispanic white (NHW) infants. In large US cities, these disparities are magnified with SUID rates for NHB infants three to 12 times that of NHW infants, and SUID rates for Hispanic infants consistently higher than NHW infants, a disparity not seen in the national data (Boyer et al. 2022). These disparities are rooted in inequitable access to trusted information and resources (Menon et al. 2023), and are further challenged by low awareness of SUID as a leading threat to the lives of infants (Quinlan et al. 2018).

The AAP's most recent guidelines continue to reinforce promoting safe sleep practices anchored in placing infants to sleep on their backs, on a firm, non-inclined sleep surface, without soft bedding or other items in their own sleep space (Moon et al. 2022b) While public health campaigns, newborn nurseries, or primary care offices are common avenues where safe sleep recommendations are delivered, there is evidence that community-driven efforts, such as community agency baby showers or peer counseling, may be more effective (Menon et al. 2023). To this end, the AAP launched the Community Partnership Approaches to Safe Sleep (CPASS) Program. The objective of CPASS was to develop and implement a novel approach by establishing authentic partnerships between injury prevention experts at children's hospitals with community experts at community-based organizations (CBOs) serving communities with disproportionately high SUID rates to deliver infant safe sleep education and resources.

Methods

This was a one-year prospective pilot program from December 2021–December 2022 with a formative evaluation of five children's hospital-CBO partnerships for an infant safe sleep education and product distribution intervention. From a call for applications among Injury Free Coalition for Kids hospital sites, five children's hospitals and their CBO partners were selected to participate in this study. Participants from each hospital included the Injury Free Coalition for Kids site Principal Investigator (PI), CPASS site PI, and injury prevention program staff; CBO participants included center directors, program specialists, parent and peer educators, and/or community health workers. The sites were chosen for their demonstrated need based on local SUID data from their community, and hospital and CBO service to families from SUID-impacted populations. Funding for the program was provided by Amazon to the AAP, who disbursed funds to each of the CPASS sites to participate in the program. Amazon had no role in the product selection. This study was approved by the institutional review board of the AAP.

CPASS program implementation

The CPASS program model included three components: (1) implementation of the CPASS learning community; (2) distribution of the Safe Sleep Survival Kits; and (3) data collection from CPASS site and family participants. (Fig. 1) To implement the CPASS learning community, AAP program staff held monthly calls with the five CPASS sites for 11 months. The goals of the CPASS

learning community were to share knowledge, best practices, and discuss challenges and successes associated with program implementation grounded in providing timely and equitable access to safe sleep education and resources.

Pregnant and postpartum individuals received Safe Sleep Kits and participated in site-specific educational activities between April and August 2022. Families were eligible if the parenting individual was in their third trimester, already had a newborn, or if they had infants two to 12 months old and a need for a Safe Sleep Kit. Each site developed their own outreach and engagement approaches for families, capitalizing on their knowledge of and relationships with their community.

Safe Sleep Survival Kits were obtained through Cribs for Kids (Fig. 2) and were purchased directly by the CBO and/or children's hospital through an online portal for the CPASS program. Each hospital-CBO site received funds to purchase 200 kits for a total of 1000 kits across the entire CPASS program. While Cribs for Kids educational materials were initially translated only into Spanish, CBOs recognized a need for additional

Fig. 1 CPASS learning community, safe sleep survival kit distribution, and data collection timeline

Fig. 2 Cribs for kids safe sleep survival kit

language translations. By CPASS conclusion, Cribs for Kids educational materials were translated into five additional languages (Amharic, French, Russian, Swahili, and Tigrinya). Safe Sleep Kits were either mailed directly to program participants' homes or distributed by the hospital or CBO by another method (e.g. community baby shower). Distribution methods were at the hospital and CBO discretion based on their knowledge of community needs.

CPASS program evaluation

CPASS used a formative evaluation approach to assess program implementation and to examine the early program impacts of site partnerships and Safe Sleep Kit distribution. The evaluation plan was anchored by the expected outcomes of the program activities based on the three aims in the CPASS logic model (Additional file 1): (1) fidelity to the CPASS program model; (2) safer sleep for babies through community partnerships; and (3) enhancing and sustaining the future of CPASS. Questions regarding fidelity to the CPASS model focused on the learning community model implementation and site participation in learning community activities. For babies' safer sleep, the questions focused on the successful distribution of the Safe Sleep Kits, survey responses by participating families, and any changes in the relationships between site partners due to CPASS. To evaluate the future of CPASS, questions focused on lessons learned from participating sites and families to inform revision of the learning model and program and to improve AAP safe sleep-related outreach.

The evaluation included four primary data collection components: (1) project documentation; (2) post-learning community call participant online feedback surveys (Additional file 2); (3) Safe Sleep Kit recipient family surveys, available in English and Spanish (Additional file 3); and (4) in-depth site interviews at CPASS conclusion. Descriptive frequencies were calculated for quantitative data. Project documentation included attendance records at monthly learning community calls and notes from these calls. For the learning community surveys, responses were compiled monthly and shared with program staff and leaders. To allow families time to use the Safe Sleep Kits, recipients were surveyed six to eight weeks after distribution using a survey link disseminated either by email or as a text message to the participant, based on their stated preference. A reminder was sent one week later to optimize survey response. Each hospital-CBO site was responsible for tracking kit distribution, survey dissemination, survey response, and one week follow up. Families who received their Safe Sleep Kit after September 1, 2022 did not complete surveys as that was beyond the pre-determined end date for data collection and analysis. Semi-structured interviews with CPASS hospital and CBO representatives on a voluntary basis, were conducted by the CPASS program evaluator (L.R.). After informed consent was verbally obtained, interviews were recorded and transcribed. These transcripts were analyzed, both individually and in aggregate, for key themes and content.

Results

Five children's hospitals and their CBO partners participated in the CPASS program across five US cities: (1) Portland, OR—Doernbecher Children's Hospital & Healthy Birth Initiatives; (2) Little Rock AR—Arkansas Children's Hospital & Turning Point Youth Center; (3) Chicago, IL—Rush University Children's Hospital & Family Focus; (4) Birmingham, AL—Children's of Alabama & Birmingham Healthy Start Plus; and (5) Rochester, NY—Golisano Children's Hospital & Baby Safe Sleep Coalition. There was strong site participation in the CPASS learning community activities with at least two representatives (one hospital-based, one CBO-based) from each site attending every call. CPASS site participants reported value in their CPASS experience: 96% strongly agreed/agreed that they learned something new from the calls and that the calls provided infant safe sleep-related information applicable to their work with families. In addition, 87% of respondents strongly agreed/agreed that the calls provided actionable strategies to contribute to infant safe sleep work in the community.

CPASS sites reached families at community events, group classes, healthcare settings, baby-themed events, and through individual engagement. (Fig. 3) Across the five sites, 1002 Safe Sleep Kits were distributed. Over 85% of Safe Sleep Kits were distributed to families who were pregnant or postpartum with infants less than one-month-old.

Among participating families, 168 (16.8%) completed the Family Survey. Among respondents, 75 (45%) reported having no safe sleep location before receipt of the Safe Sleep Kit. Respondents reported learning new infant safe sleep knowledge regarding no bedsharing (30%); sleeping on back (27%); and no items in the sleep environment (25%) (Table 1). Family adherence (in nights per week) to nighttime safe sleep recommendations and in daytime naps were similar in terms of mean nights or days (Table 2). There was variable uptake in the use of the Safe Sleep Kit items, and 93% of families reported using their cribette (Fig. 4).

All five sites completed an in-depth interview. Qualitative review of in-depth interviews demonstrated the following accomplishments across sites:

	Event/Activity	Number of Kits Distributed
	**CBO/Community Partner/Community Event** Examples: CBO event; Fire Department	273
	**Group Class/Presentation** Examples: safe infant sleep presentation or workshop	180
	**Healthcare Setting** Examples: health department; pediatric clinic; hospital room	159
	**Baby-Themed Event** Examples: Safety baby shower; virtual baby shower; drive-thru baby shower	158
	**Individual Parent/Family Engagement** Examples: 1:1 peer educator session	64
	**Shipped – no additional information / Unspecified**	15

Fig. 3 Safe sleep kit distribution methods

Table 1 Safe sleep kit recipient knowledge survey

Survey questions	Responses (N = 168)	
Until 1 year, babies should sleep in their own crib/bassinet, and not bed-share with an adult.	Knew prior to Sleep Kit receipt: Learned upon receipt: Did not know:	68% 30% 1%
Until 1 year, babies should sleep on their backs.	Knew prior to Sleep Kit receipt: Learned upon receipt: Did not know:	68% 27% 5%
Until 1 year, babies should sleep on a flat surface, with a firm mattress and fitted sheet, with no blankets or toys.	Knew prior to Sleep Kit receipt: Learned upon receipt: Did not know:	72% 25% 3%

Table 2 Safe Sleep Kit Recipient Safe Sleep Practice Survey (from 168 recipients surveyed)

Sleep behavior/environment	Nighttime sleeping	Daytime napping
Sleeps in crib/bassinet, no bed-sharing	Mean nights = 6.0 SD = 1.8 Range = 0–7	Mean days = 6.0 SD = 1.8 Range = 0–7
Starts out placed on back	Mean nights = 6.3 SD = 1.7 Range = 0–7	Mean days = 6.0 SD = 1.9 Range = 0–7
Sleeps in crib, firm mattress, fitted sheet, no blankets/toys	Mean nights = 6.0 SD = 2.0 Range = 0–7	Mean days = 5.9 SD = 2.0 Range = 0–7

- Deployment of trusted and passionate professionals who are in the community for delivering safe sleep messaging and resources.
- Hiring peer-educators to provide safe sleep education and support.
- Identifying and sharing local SUID data to raise family and community awareness; sites reported that communicating local SUID data was more impactful than conveying national or individual state data.
- Expanding partnerships and building relationships with other CBOs and community service providers.
- Taking an intergenerational approach to infant safe sleep messaging and education by offering community workshops, presentations, and educational ses-

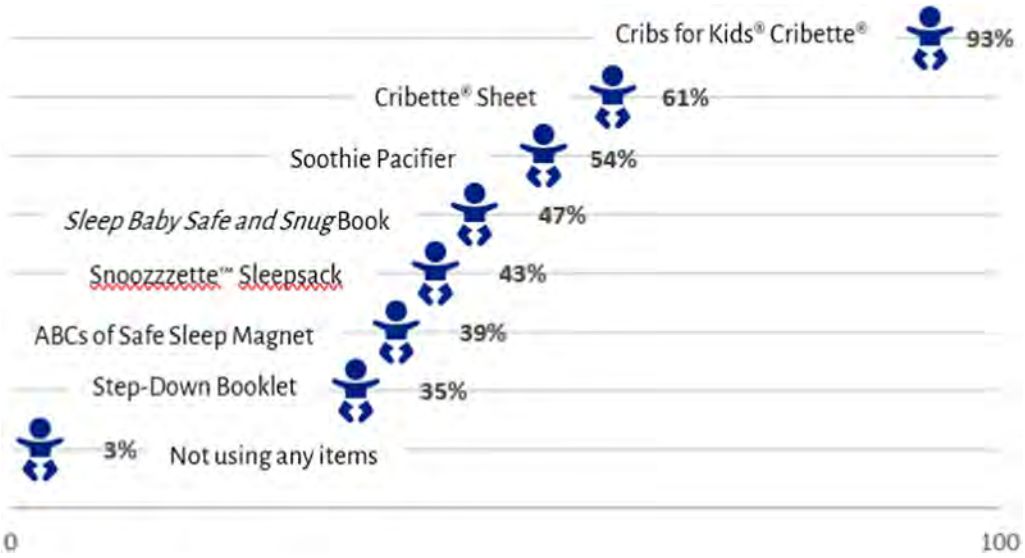

Fig. 4 Use of safe sleep kit components by recipients

sions to caregivers across the age continuum from youth to young families to seniors.

CPASS participation influenced key changes in the ways that partners provide safe sleep education and counseling. As one site participant noted, their commitment to and engagement with community families was about "…so much more than handing off a crib." Sites described moving from building awareness to enabling action and celebrating and building upon family safe sleep knowledge. Approaches including reframing infant safe sleep education as injury prevention with greater incorporation of concepts like 'preventing suffocation' were found to be useful with families.

CPASS participation strengthened hospital-CBO relationships, with sites reporting deeper, more trusting relationships at the program's conclusion. Four of the five sites had established plans to continue collaborating on issues of SUID prevention and infant safe sleep promotion. All partner sites voiced concern regarding the inability of their limited funding to match their community need for safe sleep products. Partner sites perceived that the Safe Sleep Kits were the "key" that opened the door to greater relationship building with families and other organizations: "CPASS helped us to take things to a whole 'nother level… We talk to [families] about sleep education and alternative sleeping methods other than co-sleeping. It was one thing talking about that, but it was another thing providing the equipment for them to be able to do so."

Discussion

The CPASS program successfully supported five hospital-CBO partnerships to reach over 1000 families from SUID-impacted communities with Safe Sleep Kits and education. CPASS sites provided families with these resources before their infant's peak risk for SUID, with over 85% of families receiving Safe Sleep Kits before their infants were one-month-old. Safe Sleep Kit contents were highly utilized and cribette use was reported by 93% of recipients. Broad consensus among CPASS site participants indicated that beyond the availability of sleep kits, the monthly learning community calls were the most positive aspect of the program model. Site representatives affirmed the call environment fostered sharing and openness about safe sleep challenges and successes and inspired new and innovative ideas as a result of learning from other sites and program leaders.

Prevention recommendations to address evidence-based, modifiable risk factors for sleep-related deaths exist, but infant safe sleep guidance does not reach all parents and caregivers equally and in ways that resonate and foster attitudinal and behavioral changes (Moon et al. 2022a; Menon et al. 2023). Familial practices and traditions along with the demands of caring for newborns who wake frequently throughout the night are just two additional factors that contribute to bed-sharing, a risk factor for both suffocation-related and unexplained SUID (Parks et al. 2023). Children's hospitals typically incorporate safe sleep education in postpartum or newborn care settings. However, they may not be knowledgeable of or intentionally partner with community agencies who

serve pregnant and parenting families. The CPASS CBO partners are agencies supporting pregnant and parenting individuals by providing a range of services such as home visiting and doula services; parenting groups; family engagement; parent–child relationship support; community advocacy; safe sleep and resource supports. Such programs typically have funding from federal, state, grant and private funding sources. Their aims are grounded in improving disparities in maternal-child health outcomes through efforts that center and support families' social, economic, educational and resource needs. The experience and wisdom of these community-based and community-trusted agencies expand opportunities for safe sleep promotion at a range of outreach events where safe sleep education can be provided. These events include community resource fairs; community baby showers; faith-based events; parenting or father's group classes; and individual engagement. Such events and activities are geared towards meeting families where they are, both geographically (in neighborhoods where families live and at events families attend) and individually—understanding and considering how the real circumstances of families' lives impact their ability to access and incorporate knowledge and resources to support and protect their health.

The CPASS Learning Community calls allowed for information sharing between the grantor and the sites, as well as for information exchange between sites. A highly useful aspect of the calls was learning how different sites in different cities were approaching outreach and family engagement, as well as hearing about CPASS site challenges and successes. Both hospital and CBO leads participated in every call from all five sites, reflecting the perceived high value of participation in the learning community.

An important focus of discussions was to reframe prevention messaging to emphasize how safe sleep practices 'prevent suffocation', rather than only reviewing that safe sleep practices prevent SIDS. Parents and caregivers may more easily picture how soft bedding, bedsharing and inclined surfaces can lead to suffocation. Understanding how these factors lead to SIDS—both because it is unclear how something with an unknown cause could be caused by certain risk factors, and because SIDS has been felt to be a tragedy that is random and outside of a parent's control, may be difficult (Moon et al. 2010). Parks et al.'s updated case control study using PRAMS and SUID Case Registry data identified strongly overlapping risk factors for both suffocation-related SUID and unexplained SUID, implying that preventing suffocation-related infant deaths will likely also prevent unexplained SUID (Parks et al. 2023). Other shared best practices included approaches that centered families' knowledge, beliefs and practices to start conversations that could build upon these values. Such conversations shift the focus from safe sleep education to safe sleep guidance—allowing for greater input and problem-solving from families in creating a more sustainable safe sleep environment for their infants.

Limitations of the CPASS program evaluation includes limited data capture of the actual number of families reached with safe sleep guidance. While 1002 families received the Safe Sleep Kits, outreach events including community events, group classes and baby showers would have included many more families who received safe sleep education but who did not receive a Safe Sleep Kit. Also, while this variability in the delivery of the intervention could limit a standardized evaluation, it also allowed for evaluation of community-participatory approaches to supporting families in practicing safe sleep. Further limitations include low completion of Family Survey responses, with just 16% of recipients completing the survey. The Family Survey was only offered in English and Spanish, excluding participation of other language recipients. Despite these limitations, CPASS provides an important new model for building strategic partnerships at the community level and empowering families with the education and resources needed to reduce infant mortality due to sleep-related deaths.

Conclusions

This novel partnering of children's hospitals with community-based organizations to provide safe sleep guidance and resources in places where families live and gather helped to increase access to trusted information and resources for families from SUID-impacted communities. CPASS reached families before their infant's peak age risk for SUID and surfaced improved ways to reframe conversations and center families. In addition, this type of collaboration strengthened hospital-community relationships. Commitment to ongoing partnerships may sustain successful community outreach to promote safe sleep, but limited resources remain as a substantial challenge to providing tangible tools to support safer sleep and program sustainability. This model could also be applied to other pediatric injury prevention efforts to address health disparities and improve health outcomes for all children.

Abbreviations

AAP	American academy of pediatrics
ASSB	Accidental suffocation and strangulation in bed
CPASS	Community partnership approaches to safe sleep
SIDS	Sudden infant death syndrome
SUID	Sudden unexpected infant death
NH AI/AN	Non-Hispanic American Indian/Alaska native
NHB	Non-Hispanic black
NHW	Non-Hispanic white

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40621-024-00528-y.

Additional file 1. CPASS Logic Model

Additional file 2. CPASS Learning Community Feedback Survey

Additional file 3. CPASS Infant Safe Sleep Parent Family Survey

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Author contributions
BH, LL, AH and BK generated the study idea and protocol, and participated in study design. LR evaluated the CPASS program and provided critical review and revisions of the manuscript. GL, LL and JS authored the manuscript. All authors had substantial roles in implementing the CPASS program, and all authors read and approved the final manuscript.

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Availability of data and materials
The data that support the findings of this study are available from the American Academy of Pediatrics (AAP) and are available from the authors upon reasonable request and with permission of the AAP.

Declarations

Ethics approval and consent to participate
Approval of the study protocol was obtained by the Institutional Review Board of the American Academy of Pediatrics (AAP IRB# 21 HOFF 01).

Consent for publication
No individual data is presented within our manuscript.

Competing interests
The authors declare that they have no competing interests.

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References

Boyer BT, Lowell GS, Roehler DR, Quinlan KP. Racial and ethnic disparities of sudden unexpected infant death in large US cities: a descriptive epidemiological study. Inj Epidemiol. 2022;9(1):12. https://doi.org/10.1186/s40621-022-00377-7.

Centers for Disease Control and Prevention. Sudden unexpected infant death and sudden infant death syndrome: data and statistics. Trends in sudden unexpected infant death by cause, 1990–2020. https://www.cdc.gov/sids/data.htm#graph. Accessed 19 Mar 2024.

Coverstone A, Kemp J. Chapter 80: sudden infant death syndrome and apparent life-threatening events. In: Wilmott R, editor. Kendig's disorders of the respiratory tract in children. 9th ed. Elsevier; 2019. p. 1125–42.

Eunice Kennedy Shriver National Institute of Child Health and Human Development. Campaign History. https://safetosleep.nichd.nih.gov/campaign/history. Accessed 15 Feb 2024.

Filiano JJ, Kinney HC. A perspective on neuropathologic findings in victims of the sudden infant death syndrome: the triple-risk model. Biol Neonate. 1994;65(3–4):194–7. https://doi.org/10.1159/000244052.

Menon M, Huber R, West DD, Scott S, Russell RB, Berns SD. Community-based approaches to infant safe sleep and breastfeeding promotion: a qualitative study. BMC Public Health. 2023;23(1):437. https://doi.org/10.1186/s12889-023-15227-4.

Moon RY, Oden RP, Joyner BL, Ajao TI. Qualitative analysis of beliefs and perceptions about sudden infant death syndrome in African-American mothers: implications for safe sleep recommendations. J Pediatr. 2010;157(1):92–7. https://doi.org/10.1016/j.jpeds.2010.01.027.

Moon RY, Carlin RF, Hand I, Task Force on Sudden Infant Death Syndrome and the Committee on Fetus and Newborn. Evidence base for 2022 updated recommendations for a safe infant sleeping environment to reduce the risk of sleep-related infant deaths. Pediatrics. 2022a;150(1):e2022057991. https://doi.org/10.1542/peds.2022-057991.

Moon RY, Carlin RF, Hand I, Task Force on Sudden Infant Death Syndrome and the Committee on Fetus and Newborn. Sleep-related infant deaths: updated 2022 recommendations for reducing infant deaths in the sleep environment. Pediatrics. 2022b;150(1):e2022057990. https://doi.org/10.1542/peds.2022-057990.

Parks SE, Erck Lambert AB, Hauck FR, Cottengim CR, Faulkner M, Shapiro-Mendoza CK. Explaining sudden unexpected infant deaths, 2011–2017. Pediatrics. 2021;147(5):e2020035873. https://doi.org/10.1542/peds.2020-035873.

Parks SE, DeSisto CL, Kortsmit K, Bombard JM, Shapiro-Mendoza CK. Risk factors for suffocation and unexplained causes of infant deaths. Pediatrics. 2023;151(1):e2022057771. https://doi.org/10.1542/peds.2022-057771.

Quinlan KP, Roehler DR, Silvestri J. Protecting infants from sleep-related deaths: a wake-up call. JAMA Pediatr. 2018;172(8):714–5. https://doi.org/10.1001/jamapediatrics.2018.0879.

Publisher's Note

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RESEARCH Open Access

A national study of firearm exposure and safety training among rural youth

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Abstract

Background Data regarding rural youths' experience with firearms, including safety training, is highly limited despite their frequent presence in homes. Our objective was to investigate rural adolescents' use of firearms and whether they had received formal firearm training.

Methods A convenience sample of 2021 National FFA (formerly Future Farmers of America) Convention & Expo attendees were given an anonymous survey at the University of Iowa Stead Family Children's Hospital injury prevention booth. The survey explored their use of rifles/shotguns and handguns and whether they had completed a certified firearm safety course. Descriptive and comparative analyses, including multivariable logistic regression analyses, were performed on compiled data.

Results 3206 adolescents ages 13–18 years participated with 45% reporting they lived on a farm or ranch. The vast majority of participants (85%) had fired a rifle/shotgun; 43% reported firing them > 100 times. Of those that had fired rifles/shotguns, 41% had done so before 9 years old. Most had also fired a handgun (69%), with 23% having fired handguns > 100 times. Of those that had fired handguns, 44% had done so before 11 years. Average age for first firing rifles/shotguns was 9.5 (SD 3.1) years, and 11.1 (SD 3.0) years for handguns. Males, non-Hispanic Whites, and those living on farms or in the country had significantly greater percentages who had fired a rifle/shotgun or a handgun. Significant differences were also seen by U.S. census region. Over half (64%) reported having gone hunting. Of those that had used a firearm, 67% had completed a firearm safety training course. Overall, 23% were/had been members of a school or club shooting team and of these, 87% had taken a safety course.

Conclusions Most FFA member participants had fired both rifles/shotguns and handguns, many at very young ages. Significant differences in firearm use were noted by demographic factors including the home setting (i.e., farms and ranches) and their U.S. census region. Nearly one-third of adolescent firearm users had not received formal safety training. Promoting firearm safety should include advising families on when it is developmentally appropriate to introduce youth to firearms and on the importance of firearm safety training.

Keywords Adolescent, Farms, Firearm, Handgun, Hunting, Rifle, Rural, Shooting, Shotgun, Training, Youth

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Background

Firearm injuries in children and adolescents are a rising concern across the U.S. and have become the leading cause of death for those 19 years of age and younger (Goldstick et al. 2022). According to the Centers for Disease Control and Prevention (CDC), there were 18,800 non-fatal injuries and 2601 deaths in youth under 18 years due to firearms in 2021 (Centers for Disease Control and Prevention 2021). This was a 50% increase in firearm mortality as compared to 2019 (Gramlich 2021). In the U.S., more than 40% of households with children have firearms with 15% of those households storing them loaded and unlocked, potentially allowing anyone within the home access (Miller and Azrael 2024). In addition, in households with children and firearms, nearly two-thirds do not store the firearms both locked and unloaded which means approximately 16 million U.S. children live in a household with a firearm unsafely stored (Miller and Azrael 2024; Azrael et al. 2015).

Firearm ownership in the U.S. is higher than any other country (Gun Ownership By Country 2024; Karp 2018), and the proportion of homes with firearms in rural settings is significantly greater than urban communities (Sadowski and Munoz 1996; Senturia et al. 1994; Shaughnessy et al. 1999; Smith 2001; Azrael et al. 2017; Nordstrom et al. 2001; Jennissen et al. 2021). Studies have also found a higher prevalence of handgun carrying among rural teenagers than their urban counterparts (Rowhani-Rahbar et al. 2020; Substance Abuse and Mental Health Services Administration 2023). While the number and rates of homicide deaths due to firearms are much greater in urban settings, rural areas have higher rates of both firearm-related suicides and unintentional deaths (Branas et al. 2004; Fontanella et al. 2015; Nestadt et al. 2017). As for pediatric firearm-related injuries, the hospitalization rate for those under 15 years is higher for rural than urban youth with unintentional injuries being the most common cause (Herrin et al. 2018).

We previously surveyed nearly 1400 rural adolescents who were attendees of a state FFA conference in Iowa (Miller et al. 2024). FFA is a national organization associated with schools that focuses on agricultural education and leadership development. The vast majority (85%) of respondents had fired a rifle/shotgun and over three-fifths (62%) had fired a handgun. Many used firearms frequently and they had started at very young ages. Of those that had used a firearm, only about 60% had completed a firearm safety certification course.

With the recent dramatic rise in pediatric firearm-related injuries and deaths, there has been an increase in firearm-related research (Miller and Azrael 2024; Jennissen et al. 2021), but few studies that have focused on the use of firearms by youth. Given that our previous study was limited to the state of Iowa, we wanted to determine firearm use using a national sampling of rural adolescents. Our study's objectives were to explore rural adolescents' use of firearms and whether they had completed a certified firearm safety course. We also wanted to determine if there were differences by demographic factors including the region of the country where youth lived.

Methods

Study population

A cross-sectional survey study involving a convenience sample of attendees at the 2021 National FFA Convention & Exposition in Indianapolis, Indiana, was performed at the University of Iowa Stead Family Children's Hospital injury prevention booth. As of 2024, there were nearly 950,000 FFA members in over 9000 local chapters across all 50 states, Puerto Rico and the U.S. Virgin Islands (National FFA Organization 2024). FFA members are in grades 5–12 and there are some collegiate chapters as well. Conference attendees were recruited to complete the anonymous survey on paper or by cell phone linking via a QR code to an electronic survey on Qualtrics (Qualtrics International, Inc, Provo, UT). Staff reviewed the written surveys for completeness. Participants received a modest prize (e.g., lip balm, trucker hat) determined via Plinko board as an incentive to complete the survey. Study inclusion was restricted to English speakers 13–18 years old.

Survey

The survey was created by the members of the University of Iowa Stead Family Children's Hospital's Injury Prevention Program, along with staff and students interested in firearm injury prevention at the study institution. The written survey was administered to 20 young persons aged 11–22 years for validation. After completion, these individuals were verbally asked for their input and clarification of their responses for any survey questions not easily understood. All responses provided from the validation were compared for consistency and were utilized in improving the survey's final design. After being used for the state Iowa FFA conference (Jennissen et al. 2021; Miller et al. 2024; Jennissen et al. 2021), the survey was modified slightly for the national conference.

Demographic variables included age (years), gender (female, male, other, choose not to respond), race/ethnicity (Asian, Black/African American, Hispanic/Latinx, Native American/Alaska, Native Hawaiian/Pacific Islander, White/Caucasian, Mixed, Other), where they lived (on a farm, in the country/not on a farm, in town), and the US state of residence. Participants could select all that apply for race/ethnicity. In the questionnaire, members were asked how many separate occasions they had

fired rifles/shotguns and handguns. Response choices included: Never, < 10 times, 10–100 times, > 100 times. If they had fired a rifle/shotgun or a handgun, they were asked to specify at what age in years they had first fired one.

Participating individuals were asked if they had ever gone hunting and, if so, at what age they first went hunting with a rifle/shotgun. They were asked whether they had ever been a member of a school or club shooting team. In addition, participants were queried whether they had ever taken a formal/certified hunter or firearm safety training course and, if so, at what age had they first completed it.

Data analysis

Written and electronic surveys were provided to the research team. The Institutional Review Board regarded the study exempt as the analysis was completed on an existing, anonymously gathered dataset. The written surveys were inputted into Qualtrics™ with those of participants who had completed the survey by cell phone. Aggregated data was exported via Excel (Microsoft Corp, Redmond, Washington) and imported into Stata 15.1 (StataCorp, College Station, Texas).

Descriptive (frequencies), bivariate (chi-square, Fisher's exact test) and multivariable logistic regression analyses were performed. Sixteen respondents (0.5%) noted their gender as "other" and were not included in the comparative analysis regarding sex. The race/ethnicity variable was divided into "non-Hispanic (NH) White" and "other races/ethnicities" due to the limited diversity in the participant population. This resulted in significant heterogeneity within the other races/ethnicities group; however, it allowed for use of the variable in the data analysis. The states in which the participants lived were grouped by U.S. census region which are West, South, Midwest and Northeast. All p-values were two-tailed and a value < 0.05 was considered statistically significant. Fisher's exact test was utilized for any comparison in which a cell had a predicted value of < 5. Missing data were not included in analyses.

Results

Subject demographics

Completed surveys were obtained from 3296 adolescents (13–18 years old). See Table 1. The percentage of males and females was similar and about three-quarters of participants were 15–17 years old. Nearly half lived on a farm, one-third lived in the country/not on a farm, and one-fifth lived in town. Ninety-two percent were NH White. Participants were from Puerto Rico and every

Table 1 Demographics, firearm use and safety training among adolescent survey respondents at the 2021 National FFA Convention & Expo

	n (Col %)[a]
Group N	3296
Sex	
Male	1623 (49)
Female	1639 (50)
Other	16 (< 1)
Age	
13 years	60 (2)
14 years	327 (10)
15 years	710 (22)
16 years	890 (27)
17 years	947 (29)
18 years	353 (11)
Residence	
Farm	1495 (45)
Country/not farm	1116 (34)
Town	679 (21)
Race/ethnicity	
Non-Hispanic White	3025 (92)
Other races/ethnicities	261 (8)
US census region	
Midwest	2173 (66)
South	692 (21)
Northeast	111 (3)
West	294 (9)
Fired a rifle/shotgun	
> 100 times	1411 (43)
10–100 times	873 (27)
< 10 times	502 (15)
Never	401 (15)
Fired a Handgun	
> 100 times	736 (23)
10–100 times	845 (26)
< 10 times	659 (20)
Never	1014 (31)
Have been hunting	
Yes	2089 (64)
No	1161 (36)
School/club shooting team member	
Yes	730 (23)
No	2491 (77)
Firearm safety training	
Yes	1945 (60)
No	1321 (40)

[a] The sum of n may not equal the total Group N due to missing values

U.S. state except Maine, New Hampshire, Vermont and Massachusetts. Two-thirds of participants were from the Midwest, just over one-fifth were from the South, and 9% and 3% were from the West and Northeast U.S. census regions, respectively.

Firearm use and safety training

Eighty-five percent of participants reported having fired a rifle/shotgun, with over 40% reporting having fired one > 100 times. See Table 1. Additionally, over two-thirds reported having fired a handgun; approximately one-fifth had done so > 100 times. Nearly two-thirds of respondents reported having gone hunting with firearms, and more than one fifth stated they were or had been a member of a school or club shooting team. Overall, six in ten reported having completed a certified firearm safety training course.

Comparisons of rifle/shotgun use

Among those who had fired a rifle/shotgun, almost half (1244/2657, 47%) had done so before they were 10 years old and over four-fifths (2198/2657, 83%) before 13 years. The average age participants had first fired a rifle/shotgun was 9.4 years (SD 3.1 years).

Males as compared to females, those living on farms or in the country/not on a farm as compared to those from towns, and NH Whites as compared to other races/ethnicities all had greater proportions that had fired a rifle/shotgun. See Table 2. Those from the West, South and Midwest U.S. census regions had similar but higher percentages than those from the Northeast.

With respect to having fired a rifle/shotgun, multivariable logistic regression analysis revealed that males had 4.5 times greater odds than females. Individuals who lived on a farm or in the country/not on a farm had 3.4 and 2.4 times greater odds, respectively, than participants who lived in town. NH Whites had 2.5 times greater odds than other races/ethnicities; and FFA members from the Midwest, South and West had 2.0, 2.4 and 3.2 times higher odds, respectively, than those in the Northeast.

Among those who had fired rifles/shotguns frequently (defined as > 100 times) males, those living on a farm, NH Whites, and individuals from the West had the highest percentages. Males had odds over 5 times higher than females of frequent use. Participants who lived on farms and in the country/not on a farm had 2.8 and 1.9 times greater odds, respectively, than those from town. The odds of NH Whites having fired a rifle/shotgun > 100 times was about twice that of other races/ethnicities. Individuals living in the Midwest, South and West regions had 1.4, 1.8 and 2.6 times greater odds, respectively than those from the Northeast.

As compared to their peers, males, younger teenagers, those living on farms, and respondents from the South and West had significantly higher percentages that had fired a rifle/shotgun for the first time before 10 years of age. Multivariable regression analysis demonstrated males having odds nearly twice that of females for having fired a rifle/shotgun before 10 years of age. The odds of first firing a rifle/shotgun before 10 years of age for those living on a farm or in the country/not a farm were 2.1 and 1.8 times higher, respectively, than those living in town. Participants from the West and the South had 3.1 and 3.3 times greater odds, respectively, as compared to those from the Northeast.

Comparisons of handgun use

Over two-fifths (956/2168, 44%) of participants had fired a handgun before they were 11 years old and more than two thirds (1463/2168, 67%) had done so before the age of 13. The mean age members had first fired a handgun was 11.1 years (SD 3.0 years).

Males, NH Whites, and those living on farms or in the country/not on a farm, all had greater percentages who had fired a handgun relative to their peers. See Table 3. Participants from the West and South had significantly higher proportions that had fired a handgun than those from the Midwest with the lowest proportion having fired a handgun from the Northeast.

Multivariable logistic regression analysis showed males had odds 3.7 times greater than females of having fired a handgun. Individuals living on a farm and those from the country/not a farm had odds 1.8 and 1.6 times higher, respectively, than those living in town, and NH Whites had odds 1.3 times greater than other races/ethnicities. The odds of having fired a handgun were 2.1, 3.1 and 4.0 times greater for those from the Midwest, South and West, respectively, as compared to the Northeast.

Groups with higher percentages of more frequent use of handguns as compared to their peers included males, those who lived on farms or in the country/not on a farm, and those from the South and West. The odds of males reporting firing a handgun > 100 times was nearly 5 times greater than females. Participants living on a farm or in the country/not on a farm had odds of frequent use that were 1.9 and 1.8 times higher, respectively, than those from towns. Members from the South and the West had 2.6 and 3.7 times greater odds, respectively, of frequent use that those from the Northeast.

With regards to having first fired a handgun before 12 years of age, males and younger teenagers had higher proportions as compared to females and older teenagers. Those from the South and West had higher percentages than the Midwest, who subsequently had greater percentages than the Northeast. Multivariable

Table 2 Demographic comparisons of rifle/shotgun use among survey respondents at the 2021 National FFA Convention & Expo

Variables	Cross tab analysis			Logistic regression analysis[a]	
	Yes	No	*p* value	OR	95% CI
	n (Row %)[b]	n (Row %)[b]			
Fired a rifle/shotgun[c]					
Sex					
Male	1513 (94)	99 (6)	< 0.001	4.52	3.55–5.75
Female	1249 (77)	382 (23)		1.0 (ref)	
Age					
16–18 years	1849 (85)	329 (15)	0.695	1.04	0.83–1.30
13–15 years	931 (85)	159 (15)		1.0 (ref)	
Residence					
Farm	1341 (90)	145 (10)	< 0.001	3.44	2.67–4.45
Country/not farm	959 (86)	151 (14)		2.44	1.89–3.16
Town	483 (72)	192 (28)		1.0 (ref)	
Race/ethnicity					
Non-Hispanic White	2597 (86)	412 (14)	< 0.001	2.5	1.82–3.45
Other races/ethnicities	181 (70)	78 (30)		1.0 (ref)	
U.S. census region					
Midwest	1835 (85)	324 (15)	0.003	1.97	1.23–3.15
South	591 (86)	99 (14)		2.37	1.42–3.95
West	258 (88)	34 (12)		3.24	1.78–5.91
Northeast	82 (74)	29 (26)		1.0 (ref)	
Frequent firing of rifles/shotguns (defined as > 100 times)[d]					
Sex					
Male	1011 (63)	601 (37)	< 0.001	5.32	4.54–6.22
Female	396 (24)	1235 (76)		1.0 (ref)	
Age					
16–18 years	962 (44)	1216 (56)	0.085	1.24	1.05–1.47
13–15 years	447 (41)	643 (59)		1.0 (ref)	
Residence					
Farm	768 (52)	718 (48)	< 0.001	2.84	2.29–3.53
Country/not farm	460 (41)	650 (59)		1.90	1.51–2.38
Town	182 (27)	493 (73)		1.0 (ref)	
Race/ethnicity					
Non-Hispanic White	1335 (44)	1674 (56)	< 0.001	1.96	1.43–2.70
Other races/ethnities	72 (28)	187 (72)		1.0 (ref)	
U.S. census region					
Midwest	902 (42)	1257 (58)	< 0.001	1.41	0.89–2.22
South	315 (46)	375 (54)		1.81	1.12–2.92
West	154 (53)	138 (47)		2.56	1.52–4.29
Northeast	33 (30)	78 (70)		1.0 (ref)	
First time firing a rifle/shotgun < 10 years old[e]					
Sex					
Male	788 (54)	680 (46)	< 0.001	1.84	1.57–2.16
Female	448 (38)	721 (62)		1.0 (ref)	
Age					
16–18	801 (45)	967 (55)	0.028	0.83	0.70–0.99
13–15 years	441 (50)	444 (50)		1.0 (ref)	
Residence					
Farm	656 (51)	625 (49)	< 0.001	2.12	1.68–2.67

Table 2 (continued)

Variables	Cross tab analysis			Logistic regression analysis[a]	
	Yes	No	*p* value	OR	95% CI
	n (Row %)[b]	n (Row %)[b]			
Country/not farm	431 (48)	476 (53)		1.75	1.37–2.23
Town	155 (33)	312 (67)		1.0 (ref)	
Race/ethnicity					
Non-Hispanic White	1171 (47)	1310 (53)	0.215	0.72	0.98–1.39
Other races/ethnicities	71 (42)	97 (58)		1.0 (ref)	
U.S. census region					
Midwest	741 (42)	1014 (58)	< 0.001	1.62	0.97–2.69
South	334 (59)	231 (41)		3.32	1.96–5.63
West	139 (57)	103 (43)		3.08	1.75–5.42
Northeast	24 (31)	54 (69)		1.0 (ref)	

[a] The analyses performed controlled for all other listed variables in the models

[b] The sum of n for a variable may not equal the total Group N due to missing values

[c] The total number of cases used in the logistic regression model was 3199

[d] The total number of cases used in the logistic regression model was 3199

[e] The total number of cases used in the logistic regression model was 2607

logistic regression analysis showed males had odds 1.4 times greater than females and younger teens had odds 1.8 times greater than older teens of having first fired a handgun at < 12 years of age. Those from the Midwest, West and South had odds that were 1.9, 3.1 and 3.1 times higher, respectively, than members from the Northeast.

Hunting

A greater proportion of males had hunted as compared to females. See Table 4**.** Those from farms or from the country/not on a farm, NH Whites and participants from the South all had greater proportions that reported hunting relative to their counterparts. Males had odds 2.9 times greater than females of having gone hunting. Those from farms had 3.0 times and those from the country/not a farm had 2.3 times the odds of having gone hunting as compared to participants from towns. The odds of having gone hunting were 1.9 times higher for both NH Whites versus other races/ethnicities and those from the South versus the Northeast.

Nearly one third (667/2066, 32%) of those that went hunting stated they first did so at < 9 years old, 55% (1142/2066) at < 11 years old, and 76% (1575/2066) < 13 years of age. Of those who had gone hunting with a rifle/shotgun, the average age they first participated was 10.2 years (SD 3.0).

Males, younger teenagers, and those from farms and from the country/not a farm had higher percentages as compared to their peers of having first hunted at < 10 years old. The South and Midwest both had higher percentages as compared to the West and Northeast. Males and younger teens had odds 1.3 times greater than females and older teens, respectively, of having first gone hunting at < 10 years of age. Those from farms had 1.8 times and those from the country/not a farm had 1.5 times higher odds of having first gone hunting at < 10 years than participants from towns. The odds of having first gone hunting at < 10 years was 3.4 and 9.1 times greater for those from the Midwest and South, respectively, as compared to those from the Northeast.

School or club shooting teams

Those with higher proportions reporting having been a shooting team member included males as compared to females, and those living on farms or in the country/not a farm as compared to those from towns. See Table 5. The Midwest, South and West had higher percentages as compared to the Northeast. The odds of being or having been a shooting team member was 2.5 times greater for males as compared to females, 1.9 times greater for those from farms as compared to towns, and 1.4 times greater for those from the county/not a farm as compared to towns. The South, West and Midwest all had odds greater than twice that of those from the Northeast of being or having been a member of a shooting team.

Firearm safety education

Of adolescents that had taken a certified hunter or firearm safety course, 12% (228/1920) took the course at < 10 years, 33% (640/1920) at 11 or 12 years, 27% (520/1920) at 13 or 14 years, and 28% (532/1920)

Table 3 Demographic comparisons of handgun use among survey respondents at the 2021 National FFA Convention & Expo

Variables	Cross tab analysis			Logistic regression analysis[a]	
	Yes	No	*p* value	OR	95% CI
	n (Row %)[b]	n (Row %)[b]			
Fired a handgun[c]					
Sex					
Male	1320 (82)	281 (18)	< 0.001	3.72	3.15–4.39
Female	903 (56)	717 (44)		1.0 (ref)	
Age					
16–18 years	1498 (69)	667 (31)	0.477	1.11	0.94–1.32
13–15 years	734 (68)	346 (32)		1.0 (ref)	
Residence					
Farm	1080 (73)	395 (27)	< 0.001	1.80	1.46–2.21
Country/not farm	765 (69)	337 (31)		1.55	1.25–1.92
Town	393 (59)	278 (41)		1.0 (ref)	
Race/ethnicity					
Non-Hispanic White	2077 (70)	911 (30)	0.008	1.39	1.03–1.85
Other races/ethnicities	158 (61)	99 (39)		1.0 (ref)	
U.S. census region					
Midwest	1435 (67)	709 (33)	< 0.001	2.06	1.36–3.11
South	509 (74)	176 (26)		3.13	2.01–4.87
West	229 (78)	63 (22)		3.97	2.41–6.55
Northeast	52 (48)	57 (52)		1.0 (ref)	
Frequent firing of handguns (defined as > 100 times)[d]					
Sex					
Male	566 (35)	1035 (65)	< 0.001	4.78	3.94–5.81
Female	165 (10)	1455 (90)		1.0 (ref)	
Age					
16–18 years	503 (23)	1662 (77)	0.288	1.15	0.96–1.39
13–15 years	233 (22)	847 (78)		1.0 (ref)	
Residence					
Farm	380 (26)	1095 (74)	< 0.001	1.91	1.47–2.48
Country/not farm	260 (24)	842 (76)		1.79	1.36–2.35
Town	95 (14)	576 (86)		1.0 (ref)	
Race/ethnicity					
Non-Hispanic White	685 (23)	2303 (77)	0.118	1.28	0.90–1.85
Other races/ethnicities	48 (19)	209 (81)		1.0 (ref)	
U.S. census region					
Midwest	442 (21)	1702 (79)	< 0.001	1.80	0.95–3.38
South	181 (26)	504 (74)		2.62	1.37–5.02
West	98 (34)	194 (66)		3.65	1.86–7.18
Northeast	12 (11)	97 (89)		1.0 (ref)	
First time firing a handgun < 12 years old[e]					
Sex					
Male	701 (54)	601 (46)	< 0.001	1.37	1.15–1.64
Female	385 (45)	468 (55)		1.0 (ref)	
Age					
16–18	669 (46)	782 (54)	< 0.001	0.57	0.47–0.69
13–15 years	423 (59)	289 (41)		1.0 (ref)	
Residence					
Farm	537 (51)	508 (49)	0.426	1.14	0.90–1.45

Table 3 (continued)

Variables	Cross tab analysis			Logistic regression analysis[a]	
	Yes	No	*p* value	OR	95% CI
	n (Row %)[b]	n (Row %)[b]			
Country	375 (51)	364 (49)		1.07	0.83–1.38
Town	182 (48)	201 (52)		1.0 (ref)	
Race/ethnicity					
Non-Hispanic White	78 (52)	73 (48)	0.766	1.10	0.78–1.56
Other races/ethnicities	1014 (50)	998 (50)		1.0 (ref)	
U.S. census region					
Midwest	662 (48)	730 (52)	< 0.001	1.92	1.03–3.57
South	285 (58)	206 (42)		3.08	1.63–5.82
West	128 (58)	94 (42)		3.06	1.57–5.98
Northeast	16 (31)	35 (69)		1.0 (ref)	

[a] The analyses performed controlled for all other listed variables in the models

[b] The sum of n for a variable may not equal the total Group N due to missing values

[c] The total number of cases used in the logistic regression model was 3178

[d] The total number of cases used in the logistic regression model was 3178

[e] The total number of cases used in the logistic regression model was 2132

when ≥ 15 years of age. The average age they completed safety training was 11.9 years (SD 2.4).

Demographic groups with higher proportions that reported taking a firearm safety course included males, those living on farms or in the country/not on a farm, NH Whites, and those living in the West. See Table 6. The odds of having taken a firearm safety course was 1.6 times greater for males as compared to females, 1.3 times greater for older teens as compared to younger teens, and 1.6 and 1.3 times greater for those from farms and from the country/not a farm, respectively, as compared to those from towns.

A higher percentage of participants who had belonged to a school or club shooting team had completed a firearm safety course as compared to respondents who had not, and shooting team members had a 4.2 times greater odds of having taken a course than their peers. Only half of those that had fired a rifle/shotgun or a handgun (but not both) had taken a formal firearm safety course, while nearly three-quarters that had fired both rifles/shotguns and handguns had completed a course. Those who had used both a rifle/shotgun and a handgun had 1.8 times higher odds of having completed a firearm safety course as compared to those who had used a rifle/shotgun or a handgun only.

Discussion

Investigations regarding the use of firearms by adolescents are generally lacking, making this study a valuable addition to the current literature. Our study of a national sampling of adolescent FFA members found that a marked majority had fired both rifles/shotguns and handguns, and that many used them frequently. We also found that rural children are using firearms at very young ages. When comparing the U.S. census regions, study participants who resided in the Northeast had the least experience with firearms, whereas, respondents from the West and the South had used rifle/shotguns and handguns more frequently and at younger ages. Of the FFA members who had used a firearm, only around two-thirds had taken a certified firearm safety course.

More than one-fifth of participants had been a member of a school or club shooting team. According to the Scholastic Shooting Sports Foundation, youth participation in shooting events in 2015 had increased by 146% in 6 years (National Shooting Sports Foundation 2016). Additionally, the USA High School Clay Target League grew in membership from 1700 to over 43,000 adolescents from 2012 to 2022 (Karp 2018). The League reports that it is the "fastest growing high-school extracurricular activity in the country" (USA High School Clay Target League 2024).

Hunting was also common among our study population across all regions and the majority had done so before 11 years of age. The U.S. Fish and Wildlife Service estimated 14.4 million people hunted in 2022 with 500,000 being 16 and 17 years old—an increase of 66% since 2016 (U.S. Department of the Interior et al. 2016; U.S. Department of the Interior and U.S. Fish and Wildlife Service 2022). There are 29 states that allow children at any age to hunt if supervised by an adult and 6 states that have no age limit specified to hunt unsupervised (Outdoor

Table 4 Demographic comparisons of hunting behaviors among survey respondents at the 2021 National FFA Convention & Expo

Variables	Cross tab analysis			Logistic regression analysis[a]	
	Yes	No	*p* value	OR	95% CI
	n (Row %)[b]	n (Row %)[b]			
Had gone hunting[c]					
Sex					
Male	1229 (77)	377 (23)	< 0.001	2.90	2.47–3.39
Female	848 (53)	765 (47)		1.0 (ref)	
Age					
16–18 years	1391 (64)	770 (36)	0.966	1.06	0.90–1.25
13–15 years	695 (64)	386 (36)		1.0 (ref)	
Residence					
Farm	1066 (72)	408 (28)	< 0.001	3.01	2.46–3.68
Country/not farm	722 (66)	379 (34)		2.24	1.82–2.76
Town	300 (45)	369 (55)		1.0 (ref)	
Race/ethnicity					
Non-Hispanic White	1954 (65)	1030 (35)	< 0.001	1.89	1.41–2.50
Other races/ethnicites	128 (50)	129 (50)		1.0 (ref)	
U.S. census region					
Midwest	1335 (62)	808 (38)	< 0.001	1.08	0.71–1.63
South	488 (71)	195 (29)		1.85	1.19–2.87
West	191 (66)	99 (34)		1.40	0.87–2.27
Northwest	64 (58)	46 (42)		1.0 (ref)	
Went hunting the first time when < 10 years old[d]					
Sex					
Male	498 (41)	721 (59)	< 0.001	1.34	1.11–1.62
Female	275 (33)	561 (67)		1.0 (ref)	
Age					
16–18 years	493 (36)	885 (64)	0.022	0.79	0.65–0.96
13–15 years	281 (41)	405 (59)		1.0 (ref)	
Residence					
Farm	419 (40)	632 (60)	0.002	1.75	1.31–2.34
Country/not farm	272 (38)	444 (62)		1.48	1.09–2.01
Town	85 (29)	213 (71)		1.0 (ref)	
Race/ethnicity					
Non-Hispanic White	728 (38)	1203 (62)	0.690	1.16	0.78–1.75
Other races/ethnicities	46 (36)	82 (64)		1.0 (ref)	
U.S. census region					
Midwest	449 (34)	872 (66)	< 0.001	3.38	1.59–7.19
South	273 (57)	206 (43)		9.07	4.21–19.55
West	43 (23)	148 (77)		1.90	0.84–4.32
Northeast	9 (14)	55 (86)		1.0 (ref)	

[a] The analyses performed controlled for all other listed variables in the models

[b] The sum of n for a variable may not equal the total Group N due to missing values

[c] The total number of cases used in the logistic regression model was 3175

[d] Includes only those that had gone hunting. The total number of cases used in the logistic regression model was 2034

Empire 2023). A national study of unintentional firearm deaths in children 0–14 years found 11% were hunting-related (Hemenway and Solnick 2015).

Firearm use varied significantly by where participants lived being more common in rural areas, and safety training was more common among rural youth. This is similar

Table 5 Demographic comparisons related to membership in a school or club shooting team among survey respondents at the 2021 National FFA Convention & Expo

Variables	Cross tab analysis			Logistic regression analysis[a]	
	Yes	No	*p* value	OR	CI
	n (Row %)[b]	n (Row %)[b]			
Member of a school or club shooting team					
Sex					
Male	489 (31)	1094 (69)	< 0.001	2.52	2.11–3.01
Female	234 (15)	1370 (85)		1.0 (ref)	
Age					
16–18 years	484 (23)	1656 (77)	0.927	1.03	0.86–1.23
13–15 years	244 (23)	828 (77)		1.0 (ref)	
Residence					
Farm	404 (28)	1062 (72)	< 0.001	1.94	1.52–2.50
Country/not farm	224 (21)	863 (79)		1.37	1.05–1.78
Town	100 (15)	562 (85)		1.0 (ref)	
Race/ethnicity					
Non-Hispanic White	680 (23)	2280 (77)	1.250	1.05	0.87–1.80
Other races/ethnicities	48 (19)	203 (81)		1.0 (ref)	
U.S. census region					
Midwest	501 (24)	1617 (76)	0.010	2.39	1.26–4.53
South	149 (22)	529 (78)		2.27	1.17–4.38
West	63 (22)	227 (78)		2.17	1.08–4.34
Northeast	11 (10)	98 (90)		1.0 (ref)	

[a] The analysis performed controlled for all other listed variables in the model. The n = 3142 for the analysis

[b] The sum of n for a variable may not equal the total Group N due to missing values

to our study of Iowa FFA members (Jennissen et al. 2021), and is consistent with other studies investigating urban and rural differences (Branas et al. 2004; Herrin et al. 2018). Study adolescents that lived outside of towns also had higher percentages that had gone hunting which may help explain their higher proportions that received training as it is often required to obtain a hunting license (Huntin' Fool 2024).

Our study showed regional patterns of more frequent and earlier firearm use by youth that had some similarities to regional patterns seen for firearm-related injuries. For example, the risk of self-inflicted firearm hospitalization in those < 21 years of age has been highest in the South, followed by the West and then the Midwest, with all three having significantly greater risk odds than the Northeast (McLoughlin et al. 2019). Another study found that for those 0–17 years, Southern states and parts of the Midwest had higher rates for firearm homicides and some of the highest firearm suicide rates were in Western states (Fowler et al. 2017).

Participants in our study reported very young ages at which they first used firearms (means of < 9 ½ years for rifles/shotguns and ~ 11 years for handguns). Given the extremely young ages many rural children in the study were allowed to use firearms, it is likely that their cognitive and physical development were inadequate to assure safe firearm use.

Limitations

Our study consisted primarily of a rural NH White population. Thus, our findings may not be generalizable to urban areas and populations with more racial and ethnic diversity. Another limitation was that the specific type of firearm safety training participants had received (e.g., in-person vs. online) was not asked in the survey. Additionally, all collected information was self-reported and may be subject to recall bias and social desirability. Surveys were performed independently and anonymously which should have decreased the social desirability effect.

Conclusions

A large majority of participating FFA members had fired both handguns and rifles/shotguns, many at very young ages. Significant differences in firearm use were noted by demographic factors including the youth's home setting and their U.S. census region. Nearly a third that had used a firearm had not received formal training. Legislation that requires firearm safety training certification prior

Table 6 Demographic comparisons related to firearm safety training among survey respondents at the 2021 National FFA Convention & Expo

Variables	Cross tab analysis			Logistic regression analysis[a]	
	Yes	No	*p* value	OR	CI
	n (Row %)[b]	n (Row %)[b]			
Completed firearm safety course					
Sex					
Male	1154 (72)	455 (28)	< 0.001	1.61	1.35–1.92
Female	777 (48)	848 (52)		1.0 (ref)	
Age					
16–18 years	1313 (60)	861 (40)	0.168	1.28	1.06–1.53
13–15 years	628 (58)	457 (42)		1.0 (ref)	
Residence					
Farm	1001 (67)	483 (33)	< 0.001	1.64	1.29–2.08
Country/not farm	651 (59)	455 (41)		1.28	1.00–1.63
Town	292 (44)	379 (56)		1.0 (ref)	
Race/ethnicity					
Non-Hispanic White	1821 (61)	1185 (39)	< 0.001	1.10	0.78–1.56
Other races/ethnicities	119 (47)	134 (53)		1.0 (ref)	
U.S. census region					
Midwest	1265 (59)	884 (41)	0.025	0.78	0.48–1.28
South	418 (60)	274 (40)		0.84	0.50–1.41
West	196 (67)	96 (33)		1.15	0.66–2.03
Northeast	58 (53)	51 (47)		1.0 ref)	
School/club shooting team member					
Yes	630 (87)	95 (13)	< 0.001	4.20	3.25–5.43
No	1279 (52)	1199 (48)		1.0 (ref)	
Firearm usage					
Never Used a Firearm	35 (8)	401 (92)	< 0.001	0.14	0.09–0.21
Both rifle and handgun	1583 (72)	604 (28)		1.80	1.43–2.25
Rifle or handgun only	309 (50)	305 (50)		1.0 (ref)	

[a] The analysis performed controlled for all other listed variables in the model

[b] The sum of n for a variable may not equal the total Group N due to missing values

to firearm use by youth would help decrease this proportion. Parents and caregivers should receive targeted education regarding firearm safety including advisement when it is developmentally appropriate to introduce youth to firearms and on the importance of safe storage, professional training and the direct supervision of youth when using firearms.

Abbreviations

CDC Centers for Disease Control and Prevention
e.g. Exempli gratia (for example)
FFA Formerly stood for Future Farmers of America
TM Trademark
U.S. United States

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Author contributions

All authors have read and approved the final manuscript. Each author significantly contributed to and takes public responsibility for one or more aspects of the study. Specifically: JLK was involved with interpretation and analysis of the results, literature review, and writing and preparation of the manuscript. BML participated in survey development, validation processes, data collection and revision of the manuscript. MRS performed survey development,

validation processes, data collection and revision of the manuscript. KMW was involved with survey development, validation processes, data collection and revision of the manuscript. PJH was involved with survey development, validation processes, data collection and electronic entry, and revision of the manuscript. JL helped develop the analysis plan, completed analysis and interpretation of the results, and helped revise the manuscript. CAJ was the primary investigator of the study and had overall responsibility for interpretation and analysis of the results, and final writing and preparation of the manuscript for submission.

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Availability of data and materials
Data and materials are available to other parties for research purposes after a data sharing agreement plan is agreed to and signed. Those interested should contact the corresponding author.

Declarations

Ethics approval and consent to participate
The University of Iowa Institutional Review Board considered this study exempt as the analysis was performed on an existing dataset that had been collected anonymously.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests or financial relationships relevant to this article to disclose.

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References

Azrael D, Cohen J, Salhi C, Miller M. Firearm storage in gun-owning households with children: results of a 2015 national survey. J Urban Health. 2018;95(3):295–304.
Azrael D, Hepburn L, Hemenway D, Miller M. The stock and flow of US firearms: results from the 2015 national firearms survey. RSF. 2017;3(5):38–57.
Branas CC, Nance ML, Elliott MR, et al. Urban-rural shifts in intentional firearm death: different causes, same results. Am J Public Health. 2004;94(10):1750–5.
Centers for Disease Control and Prevention. Injury Counts and Rates. WISQARS (web-based injury statistics query and reporting system)Fatal and Nonfatal Injury Reports . 2021. Available at: https://www.cdc.gov/injury/wisqars/ Accessed January 22, 2024.
Fontanella CA, Hiance-Steelesmith DL, Phillips GS, et al. Widening rural-urban disparities in youth suicides, United States, 1996–2010. JAMA Pediatr. 2015;169(5):466–73.
Fowler KA, Dahlberg LL, Haileyesus T, Gutierrez C, Bacon S. Childhood firearm injuries in the United States. Pediatrics. 2017;140(1): e20163486.
Goldstick JE, Cunningham RM, Carter PM. Current causes of death in children and adolescents in the United States. N Engl J Med. 2022;386(20):1955–6.
Gramlich J. Gun deaths among U.S. children and teens rose 50% in two years. Pew Research Center, Washington, D.C. (April, 6 2021). Available at https://www.pewresearch.org/fact-tank/2023/04/06/gun-deaths-among-us-kids-rose-50-percent-in-two-years/. Accessed on December 10, 2023.
Gun Ownership By Country. 2024. Available at https://wisevoter.com/country-rankings/gun-ownership-by-country/. Accessed January 29, 2024.
Hemenway D, Solnick SJ. Children and unintentional firearm death. Inj Epidemiol. 2015;2(1):26.
Herrin BR, Gaither JR, Leventhal JM, Dodington J. Rural versus urban hospitalizations for firearm injuries in children and adolescents. Pediatrics. 2018;142(2): e20173318.
Huntin' Fool. Youth hunting guide. 2024. https://www.huntinfool.com/resources/youth Accessed January 29, 2024.
Jennissen CA, King RP, Wetjen KM, Denning GM, Wymore CC, Stange NR, Hoogerwerf PJ, Liao J, Wood KE. Rural youth's exposure to firearm violence and their attitudes regarding firearm safety measures. Inj Epidemiol. 2021;8(Suppl 1):29.
Jennissen CA, Wetjen KM, Wymore CC, et al. Firearm exposure and storage practices in the homes of rural adolescent. West J Emerg Med. 2021;22(3):498–509.
Karp A. Estimating global civilian-held firearms numbers. Small arms survey. June 2018. Available at https://www.smallarmssurvey.org/sites/default/files/resources/SAS-BP-Civilian-Firearms-Numbers.pdf. Accessed January 29, 2024.
McLoughlin RJ, Hazeltine M, Dacier BM, Hirsh MP, Cleary MA, Aidlen JT. Young lives cut short: the relationship between firearms and pediatric suicide. J Trauma Acute Care Surg. 2019;87(1):161–7.
Miller M, Azrael D. Firearm storage in US households with children. JAMA Netw Open. 2022;5(2):e2148823.
Miller JL. Linden B, Sinik M, et al. Firearm exposure and safety training among rural youth across the United States. Journal of Rural Health. 2024:1–11.
National FFA Organization. Our membership: who we are. 2024. Available at: https://www.ffa.org/our-membership/. Accessed January 23, 2024.
National Shooting Sports Foundation. Scholastic Shooting Sports Foundation. Industry Intelligence Reports: Helping Our Members Make Informed Decisions. 2016 Edition. Available at: https://sssfonline.org/wp-content/uploads/2016/10/SCTP_IIR_2016_lo-res.pdf Accessed January 22, 2024
Nestadt PS, Triplett P, Fowler DR, Mojtabai R. Urban-rural differences in suicide in the state of Maryland: the role of firearms. Am J Public Health. 2017;107(10):1548–53.
Nordstrom DL, Zwerling C, Stromquist AM, et al. Rural population survey of behavioral and demographic risk factors for loaded firearms. Inj Prev. 2001;7(2):112–6.
Outdoor Empire. Most youth friendly hunting states: hunting age limits by state. 5 August 2023. Available at: https://outdoorempire.com/youth-hunting-age-limits/ Accessed January 22, 2024
Rowhani-Rahbar A, Oesterle S, Skinner ML. Initiation age, cumulative prevalence, and longitudinal patterns of handgun carrying among rural adolescents: A multistate study. J Adolesc Health. 2020;66(4):416–22.
Sadowski LS, Munoz SR. Nonfatal and fatal firearm injuries in a rural country. JAMA. 1996;275:1762–4.
Senturia YD, Christoffel KK, Donovan M. Children's household exposure to guns: a pediatric practice-based survey. Pediatrics. 1994;93:469–75.
Shaughnessy AF, Cincotta JA, Adelman A. Family practice patients' attitudes toward firearm safety as a preventive medicine issue: a HARNET study. J Am Board Fam Pract. 1999;12:354–9.
Smith TW. 2001 National gun policy survey of the national opinion research center: research findings: National Opinion Research Center. Chicago: University of Chicago; 2001.
Substance Abuse and Mental Health Services Administration. Results from the 2017 national survey on drug use and health: detailed tables. September

14, 2018. Available at: https://www.samhsa.gov/data/report/2017-nsduh-detailed-tables. Accessed January, 22 2023.
U.S. Department of the Interior, U.S. Fish and Wildlife Service. 2022 National survey of fishing, hunting, and wildlife-associated recreation. September 2023. Available at: https://www.fws.gov/sites/default/files/documents/Final_2022-National-Survey_101223-accessible-single-page.pdf. Accessed January 22, 2024.
U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2016 National survey of fishing, hunting, and wildlife-associated recreation. April 2018. Available at: https://www.fws.gov/sites/default/files/documents/news-attached-files/nat_survey2016.pdf Accessed January 22, 2024.
USA High School Clay Target League. History. 2024. Available at: http://txclaytarget.com/about-us/history/ Accessed January 22, 2024.

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Using syndromic surveillance for unintentional and undetermined intent drowning surveillance in a large metropolitan area

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Abstract

Introduction A drowning definition is available for use with National Syndromic Surveillance Program (NSSP) data. However, its accuracy in capturing drowning emergency department and urgent care visits at the regional level is unknown. We tested the ability of the syndromic surveillance (SS) definition in capturing unintentional and undetermined intent drowning (UUID) and describe UUID SS visit trends in a large metropolitan area.

Methods We applied the drowning definition to NSSP data from 2016 to 2022 for the 8-county metropolitan Houston region. We queried the dataset for UUID ICD-10-CM codes and manually reviewed the chief complaint (CC) and discharge diagnosis (DD) for SS visits. True-positives were calculated by dividing the number of UUID cases identified by UUID ICD-10-CM codes and CC/DD review by the total visits captured by the SS definition. Demographics and trends of UUID visits were calculated from 2018 to 2022 due to limited data from 2016 to 2017 in NSSP.

Results 2,759 visits were captured by the SS definition. After case review, 2,019 (73.2%) had ICD-10-CM drowning codes of any intent; and 2,015 of those (99.8%) were classified as UUID. Of the remaining 740 cases with no ICD-10-CM codes that were pulled by the SS definition, 690 (93.2%) had a CC/DD diagnosis of drowning/submersion/underwater related to aquatic exposure. Taken together, 2,705 (98.0%) were true-positive UUID visits based on the SS drowning definition.. Children (aged < 18 years) constituted 79% of UUID visits. Black, White and Asian/Pacific Islander persons comprised 17%, 60% and 4% of UUID visits respectively. Rates of UUID visits were lowest in 2020.

Conclusion Syndromic surveillance is a novel and accurate method to conduct real-time drowning surveillance in a large metropolitan region.

Keywords Syndromic surveillance, Drowning burden, Drowning trends, Accuracy

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Introduction

Drowning is the leading cause of death among children aged 1–4 years in the United States and the second leading cause of unintentional injury death for children aged 5–14 years of age (Centers for Disease Control and Prevention 2023). There are approximately 800 fatal unintentional drownings involving US children aged 0–17 years each year in the United States (Centers for Disease Control and Prevention 2023). Drowning is preventable. Real time surveillance of drowning at the local and regional level can inform drowning prevention strategies. The National Syndromic Surveillance Program (NSSP) is a collaboration between the Centers for Disease Control and Prevention (CDC), local and state health departments, and health care facilities to collect, analyze, and share electronic patient encounter data received from EDs, urgent and ambulatory care centers, inpatient health care settings, and laboratories (The National Syndromic Surveillance Program (NSSP) 2024). The CDC's National Center for Injury Prevention and Control adapted a drowning syndromic surveillance definition from Austin Public Health to use in NSSP data to provide timely information about drowning ED visits (The National Syndromic Surveillance Program (NSSP) 2024; Yoon et al. 2017; Update 2019). However, the ability of the "CDC unintentional drowning v1" syndrome definition in capturing both drowning emergency department (ED) and urgent care (UC) visits (collectively termed Syndromic Surveillance (SS) visits) in NSSP, and its use in drowning surveillance at the regional level, has not been described.

The aim of this study was to determine the percentages of true-positive unintentional and undetermined intent drowning (UUID) cases for all ages in a large metropolitan area based on all cases captured by the "CDC unintentional drowning v1" definition. Secondary aims were to use syndromic surveillance (SS) data to describe the burden and injury trends of UUID rates overall in the metropolitan Houston region and to compare demographic trends of SS data with National Vital Statistics System (NVSS) mortality data between 2018 and 2022.

Methods

This cross-sectional study used NSSP data for the 8-county metropolitan Houston region from January 1, 2016, to December 31, 2022, from the City of Houston Health Department (HHD) Electronic Surveillance System Early Notification of Community-based Epidemics (ESSENCE) platform. The HHD-ESSENCE platform includes data from 128 of 143 (90%) healthcare facilities across the Public Health Region 6/5 South in Texas who agree to provide data to the City of Houston Health Department. Cases were pulled from the HHD-ESSENCE platform based on the patient's county of residence being one of the following eight Texas counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller. These counties constitute Texas Public Health Region 6/5S. The population of the region was 7,092,073 in 2020. Children aged 0–17 years comprised 26.2% of the population and non-Hispanic White persons-33.9%, Black persons-18.5%, Asian persons 8.3% and American Indian/Alaska Native/Pacific Islander persons 1.1% of the population. Persons of Hispanic ethnicity comprised 38.8% of the population (US 2023).

National syndromic surveillance program

The NSSP collects data from over 78% of EDs across the country. Electronic health data are transmitted to a shared platform called BioSense, and public health agencies, including the CDC and local and state health departments, can use analytic tools on the platform to analyze data received as early as 24 h after a patient's visit for detection, characterization, monitoring, and response to events of public health concern (The National Syndromic Surveillance Program (NSSP) 2024). Visit information captured by the NSSP can include free-text chief complaint, discharge diagnosis codes, and some patient demographic information, such as age and sex. Diagnostic information is collected using the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM), International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM), and Systematized Nomenclature of Medicine codes (The National Syndromic Surveillance Program (NSSP) 2024; Yoon et al. 2017).

In collaboration with several health departments, CDC adapted a drowning definition from Austin Public Health which is available in the ESSENCE platform (Moreland et al. 2024). The "CDC unintentional drowning v1" definition queries patient discharge diagnosis and chief complaint information to identify initial unintentional drowning encounters. The syndrome definition includes relevant ICD-10-CM codes (T75.1, V90, V92, W16 (with 6th character = 1 except 16.4 and 16.9 where 5th character = 1), W22.041, W65-W74, codes only included when 7th character = A or missing) (Moreland et al. 2024). Additionally, undetermined drowning encounters (Y21) were added to the definition for this analysis (Additional File 1). In addition to discharge diagnosis codes, the definition relies on the chief complaint inclusion (e.g., "drown", "underwater", "submerge" and respiratory symptoms related to contact with a body of water) and exclusion terms (e.g., "drown self", "attempt to drown", and "feel or sound like drowning") to further identify drowning–related ED and urgent care visits and decrease false

positives (Moreland et al. 2024). The HHD utilized the CDC unintentional drowning v1 definition (Moreland et al. 2024) to query the ESSENCE platform and obtain an output of all cases of UUID for the geographic area of interest. This was shared with the researchers through a data use agreement.

Validation of the syndrome definition in the Houston Metropolitan area

Visits captured by the "CDC unintentional drowning v1" definition from 2016 to 2022 were queried using ICD-10-CM codes for UUID cases using SAS version 9.4 and manually reviewing the text describing the chief complaint and discharge diagnosis for ED and UC visits. We selected cases with a chief complaint or discharge diagnosis text indicating "drowning" or "submersion" or "underwater" or "inhaled water" or "swallowed water" in relation to contact with a body of water and/or specific misspellings. We excluded cases where the chief complaint/discharge diagnosis did not indicate drowning (Moreland et al. 2024).

Analysis

To calculate the percentage of true-positives, we divided the number of UUID cases based on ICD-10-CM codes and manual review of chief complaint/discharge diagnosis by the total visits captured by the syndromic definition for drowning from 2016 to 2022. The City of Houston instituted syndromic surveillance in 2016 but it was not fully operational until 2018 leading to a likely underestimation of UUID visits in 2016 and 2017. Due to the incomplete syndromic surveillance data available in 2016 and 2017, we limited the UUID trend analysis to 2018 onward. We calculated the percentage of all SS visits that were related to drowning from 2018 to 2022 overall and by age (all ages, 0–17 years), Hispanic ethnicity and race (Black, White, Asian/Pacific Islander, and other race). "Other race" was defined as American Indian or Alaska Native and other race not previously specified due to small counts.

Annual drowning rates per 100,000 SS visits were calculated as the number of SS visits for UUID divided by the total number of SS visits and multiplied by 100,000 for the period 2018–2022. SS visits consist of non-fatal and some fatal data and are useful for real-time surveillance. However, deaths occurring outside of the ED are not captured. NVSS data can be used to analyze all deaths. We do not know if demographic trends in fatal drowning are the same as demographic trends in nonfatal drowning. Therefore, we also compared demographics between UUID SS visits and NVSS data between 2018 and 2021 (2021 was the most recent full year of data available for NVSS at the time of analysis) for the 8-county Houston Metropolitan area (Centers for Disease Control and Prevention 2023). Fatal drowning cases in NVSS were those with ICD-10 codes: V90, V92, W65-W74. Statistical demographic comparisons were made for SS visits over time and SS visits vs. UUID cases. Since accuracy of capturing all unintentional drowning cases is a consideration for this study, unknown values were included in the analysis. Categorical data were analyzed using the Pearson Chi-Square test. A p-value < 0.05 was considered statistically significant. This study received institutional review board approval from the Baylor College of Medicine (protocol H-51536).

Patient and public involvement

The study did not include patient and public input since the data were retrospectively collected. Research questions were developed based on existing gaps in drowning surveillance. Patients and the public were not involved in study design or recruitment. The study results (injury burden and trends) will be disseminated to the community after publication.

Results

During 2016–2022, there were 2,759 visits for UUID identified through SS. There were 2,019 cases (73.2%) with ICD-10-CM codes for drowning; of these 2,015 (99.8%) were classified as UUID (n = 4 intentional drowning cases). Of the remaining 740 cases with no ICD-10-CM codes, 690 (93.2%) were classified as UUID cases given chief complaint or discharge diagnosis text indicating "drowning" or "submersion" or "underwater" or "inhaled water" or "swallowed water" in relation to contact with a body of water and/or specific misspellings (Fig. 1). Taken together, among all 2,759 visits classified as drowning based on the SS definition, there were 2,705 (98.0%) cases classified as Yes (true-positive) UUID and 54 (2.0%) classified as No (exclusions) (Table 1).

There were 24,742,818 (ED: 23,870,676; UCC: 872,142) SS visits captured by the Syndromic Surveillance Program for metropolitan Houston between January 1, 2018, to December 31, 2022. The number of UUID visits to the ED and UCC were 2,537 and 155 respectively for the same time period. Of the total 2,692 SS UUID visits for 2018–2022, there were 2,116 (78.6%) visits by children aged 0–17 years, 1,524 (56.6%) visits by males, 964 (35.8%) visits by persons of Hispanic ethnicity. The SS visits by race were as follows: Black persons: 447 (16.6%); White persons: 1,621 (60.2%); Asian/Pacific Islander persons: 112 (4.2%) and persons of other races: 421 (15.6%) during 2018–2022 (Table 2).

SS visits for UUID had a higher proportion of males, children aged 0–17 years and White persons compared to overall emergency department and urgent care visits

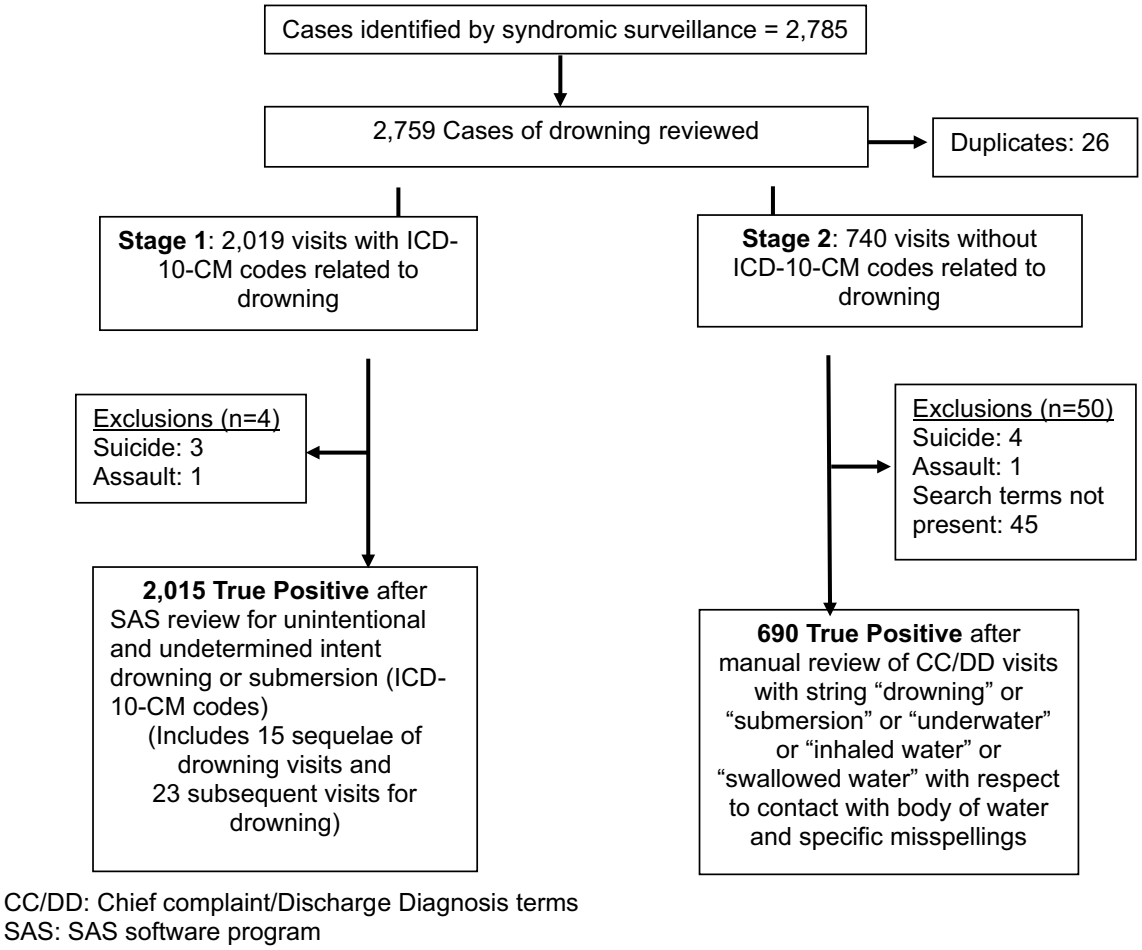

Fig. 1 Analysis of drowning visits based on syndromic surveillance definition for unintentional/undetermined intent drowning for Houston metropolitan area (2016–2022)

Table 1 Results of visit reviews by coding stage for unintentional/undetermined intent drowning for Houston metropolitan area (2016–2022)

	Stage 1[a]	Stage 2[b]	Totals
Visits for Unintentional or Undetermined Drowning (UUID)	Visits with ICD-10-CM codes for UUID n = 2,019 (100%)	Visits with "submersion" or "drowning" or "underwater" or "swallowing water" or "inhaling water" with respect to contact with body of water and without ICD-10-CM codes for UUID n = 740 (100%)	All Visits 2,759 (100%)
Yes (True Positive)	2,015 (99.8%)	690 (93.2%)	2,705 (98.0%)
No (Exclusions)	4 (0.2%)	50 (6.8%)	54 (2.0%)

Houston Health Department, National Syndromic Surveillance Program

ICD-10-CM codes for UUID: T75.1XXA, W65-W74, V90, V92, W16 (with 6th character = 1 except 16.4 and 16.9 where 5th character = 1), W22.041, Y21 and excluding X71 and X92

[a] Cases captured by the drowning syndromic definition ide tified as UUID f om ICD-10-CM codes

[b] Cases captured by the drowning syndromic definition th t did not have UUID related ICD-10-CM codes

(Table 3). From 2018 to 2022, the UUID drowning rate per 100,000 SS visits was lowest during 2020 (Table 4).

Comparison of SS visits based on male sex, age group 0–17 years, race, and Hispanic ethnicity with NVSS mortality data for UUID in the metropolitan Houston region for the years 2018–2021 revealed that there was a higher percentage of children aged 0–17 years (79.0%) ($p < 0.05$) and persons of Hispanic ethnicity (36.1%)

Table 2 Demographic characteristics of Syndromic Surveillance Unintentional or Undetermined Intent Drowning visits in Houston metropolitan area (2018–2022)

	Year					Total n (%) N = 2,692 (100)
	2018 n (%) n = 393(14.6)	2019 n (%) n = 624(23.2)	2020 n (%) n = 412(15.3)	2021 n (%) n = 626(23.2)	2022 n (%) n = 637(23.7)	
Male	208 (52.9)	359 (57.5)	245 (59.5)	365 (58.3)	347 (54.5)	1,524 (56.6)
Female	185 (47.1)	265 (42.5)	167 (40.5)	259 (41.4)	286 (44.9)	1,162 (43.2)
Unknown	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.3)	4 (0.6)	6 (0.2)
Children 0–17 years	357 (90.8)	517 (82.9)	293 (71.1)	456 (72.8)	493 (77.4)	2,116 (78.6)
Adults	33 (8.4)	106 (16.9)	119 (28.9)	163 (26.1)	140 (22.0)	561 (20.8)
Unknown	3 (0.8)	1 (0.2)	0 (0.0)	7 (1.1)	4 (0.6)	15(0.6)
Race						
Black	47 (12.0)	89 (14.3)	56 (13.6)	115 (18.4)	140 (22.0)	447 (16.6)
White	227 (57.8)	396 (63.5)	279 (67.7)	378 (60.4)	341 (53.5)	1,621 (60.2)
Asian/Pacific Islander	10 (2.5)	24 (3.8)	14 (3.4)	30 (4.8)	34 (5.3)	112 (4.2)
Other Race[a]	64 (16.3)	95 (15.2)	61(14.8)	92 (14.7)	109 (17.1)	421 (15.6)
Unknown	45 (11.5)	20 (3.2)	2 (0.5)	11 (1.8)	13 (2.0)	91 (3.4)
Hispanic Ethnicity	130 (33.1)	244 (39.1)	150 (36.4)	218 (34.8)	222 (34.8)	964 (35.8)
Non-Hispanic	169 (43.0)	325 (52.1)	245 (59.5)	382 (61.0)	400 (62.8)	1,521 (56.5)
Unknown	94 (23.9)	55 (8.8)	17 (4.1)	26 (4.2)	15 (2.4)	207 (7.7)

Percentages may not total 100% due to rounding

Houston Health Department, National Syndromic Surveillance Program

[a] Other Race includes American Indian or Alaska Native and other race not mentioned

Table 3 Demographic characteristics of Unintentional or Undetermined Intent Drowning (UUID) visits and overall emergency department and urgent care visits in Houston metropolitan area (2018–2022)

	SS UUID visits n (%) 2,692 (100.0)	Overall visits n (%) 24,742,818 (100.0)
Male Sex	1,524 (56.6)	11,091,432 (44.8)
Unknown/Unreported	6 (0.2)	6,682 (0.03)
Children 0–17 years	2,116 (78.6)	14,656,990 (59.2)
Unknown/Unreported	14 (0.5)	–
Race		
Black	447 (16.6)	4,179,237 (16.9)
White	1,621 (60.2)	13,616,812 (55.0)
Asian/Pacific Islander	112 (4.2)	1,088,759 (4.4)
Other Race[a]	421 (15.6)	3,162,453(12.8)
Unknown/Unreported	91 (3.9)	2,695,557(10.9)
Hispanic Ethnicity	964 (35.8)	9,296,591 (37.6)
Unknown/Unreported	207 (7.7)	3,082,494 (12.5)

Percentages may not add up to 100 due to rounding

Houston Health Department, National Syndromic Surveillance Program

UUID: Unintentional or Undetermined Intent Drowning; SS: Syndromic Surveillance

[a] Other Race includes American Indian or Alaska Native and other race not mentioned

($p < 0.05$) and fewer males (57.3%) ($p < 0.05$), Black persons (14.9%) and White persons (62.3%) ($p < 0.05$) compared to NVSS data (children aged 0–17: 23.6%; Hispanic persons: 24.0%; males: 74.3%; Black persons: 23.4%; White Persons: 68.8%) (Table 5).

During 2018–2022, the UUID drowning rate for males (6.16/100,000 SS visits) was higher than for females (4.70/100,000 SS visits). The UUID drowning rate for non-Hispanics (6.15/100,000 SS visits) was higher than for Hispanics (3.90/100,000 SS visits). Similarly, the UUID drowning rate for persons with White or Asian race (7.00/100,000 SS visits) was two times higher than for persons who were not White or Asian (3.51/100,000 SS visits) (data not shown).

Discussion

In our study we observed that SS is a novel and accurate method of conducting real-time drowning surveillance in a large metropolitan region. Overall, 98% of the cases identified through SS were true-positive UUID visits. SS can be utilized to track the burden and trends of unintentional and undetermined drowning injuries at the state and regional level. Our results indicate that drowning rates between 2018 and 2022 as a percentage of SS visits

Table 4 Annual syndromic surveillance and UUID visits in Houston metropolitan area (2018–2022)

	Year				
	2018	**2019**	**2020**	**2021**	**2022**
UUID visits	393	624	412	626	637
Syndromic Surveillance* Visits	3,419,708	5,444,854	4,415,226	5,628,169	5,834,861
UUID visits/100,000 visits	11.49**	11.46**	9.33	11.12**	10.92**

Houston Health Department, National Syndromic Surveillance Program

UUID: Unintentional or Undetermined Intent Drowning

* Syndromic Surveillance visits = Emergency Department and Urgent Care visits

** Significa t at p = 0.01 compared to 2020 as reference

Table 5 Comparison of demographic characteristics of Syndromic Surveillance Unintentional or Undetermined Intent Drowning visits with NVSS drowning fatality data for the Houston metropolitan area (2018–2021)

	UUID SS[1] n (%) 2,055 (100.0)	**NVSS[2] n (%) 475 (100.0)**	**p-value**
Male Sex	1,177 (57.3)	353 (74.3)	$p < 0.05$
Children 0–17 years	1,623 (79.0)	112 (23.6)	$p < 0.05$
Race*			
Black	307 (14.9)	111 (23.4)	$p < 0.05$
White	1,280 (62.3)	327 (68.8)	
Hispanic Ethnicity	742 (36.1)	114 (24.0)	$p < 0.05$

Houston Health Department, National Syndromic Surveillance Program

[1] SS: UUID Syndromic Surveillance visits 2018–2021 Houston Health Department, National Syndromic Surveillance Program

[2] Centers for Disease Control and Prevention, National Center for Health Statistics. National Vital Statistics System (NVSS), Mortality 2018–2021 on CDC WONDER Online Database

Note: NVSS includes ICD-10 codes: V90, V92, W65-W74

* Values for Native Hawaiian or Pacific Islande , American Indian or Alaska Native and other race are suppressed in NVSS due to low case counts

in the metropolitan Houston region have been relatively stable except for the year 2020. This lower rate for 2020 coincided with the onset of the COVID-19 pandemic when stay at home orders and social distancing were in place during March and April, 2020 in Texas (Orders and to Mitigate Spread of COVID-19 In Texas 2023). Overall, ED visits declined in the United States during this time in NSSP data, especially among children (Hartnett et al. 2020). In the Great Lakes region, while drownings were lower than the historical average early in the pandemic, they began to increase as stay-at-home orders were lifted (Houser and Vlodarchyk 2021). The lower number of drowning and SS visits in 2018 could relate to the beginning of the roll out of the SS system in metropolitan Houston when participation by member entities was not complete as indicated by notably lower overall, all cause SS visits for that year.

We also observed that the distribution of SS visits based on pediatric age group, race and Hispanic ethnicity are different from those due to fatal drowning. This has implications in drowning injury surveillance and prevention. The SS data are unable to differentiate fatal and non-fatal drowning. Analysis of medical examiner data is a more accurate method to establish fatal drowning burden. However, SS can fill an important gap in drowning epidemiology, especially if syndromic surveillance data are linked with fatality data. Currently, there is no method which can study overall non-fatal drowning at a regional or state level. Syndromic surveillance for drowning can be used to monitor regional burden and regional and national trends in UUID in real time to facilitate drowning prevention efforts. Drowning prevention requires a multilayered approach and includes close, attentive, and constant adult supervision, functioning safety barriers, the presence of lifeguards, CPR training, basic swimming and water safety skills training, and the use of life jackets (Denny et al. 2021).

When comparing NVSS data with SS data, adults, males, Black persons, and non-Hispanic persons were more commonly represented in fatal drowning data. Fatal drownings are not always transported to the ED. This may be related to a number of factors. For example, drowning among adults more commonly occurs in natural water (Ryan et al. 2023; Xu 2014; Clemens et al. 2021) which may result in longer extrication times and death being declared at the scene. Disparities in drowning rates among different racial and ethnic groups may reflect variations in cultural practices, exposure to aquatic bodies, socio-economic factors, access to prevention strategies such as swimming lessons, and water competency among different population groups (Irwin et al. 2009; Pharr et al. 2018). This is a complex issue which would benefit from further study.

Syndromic surveillance has several limitations. First, the syndrome definition used might underestimate

or overestimate UUID SS visits because of variation in coding, reporting, and the availability of visit-level data between facilities or over time. Second, the World Health Organization and International Liaison Committee on Resuscitation defines drowning as "the process of experiencing respiratory impairment from submersion or immersion in a liquid" (Morgan et al. 2022; Beeck et al. 2005) which is what was used in the SS UUID definition. While this drowning syndromic surveillance definition is sufficient to define drowning from the public health preventative perspective, these data may not be helpful when assessing the efficacy of drowning resuscitation and treatment. For instance, we included visits where there were respiratory symptoms like coughing, choking, or gasping for air that were associated with a body of water. In some cases, it is unclear whether the airway was actually submerged. Third, it is difficult to determine the intent of drowning in SS data. ICD-10-CM codes are not included in all SS visits and even when ICD-10-CM codes are included in the discharge diagnosis field, not all codes are associated with a specific intent. For instance, the ICD-10-CM code T75.1 can be used to describe unintentional or intentional drowning. Fourth, SS data lacks consistent information on patient disposition and it is difficult to determine if drowning visits are fatal or nonfatal. In these cases, medical examiner data would be more helpful for analyzing fatal drowning. Also, details on the body of water where the drowning occurred are not complete. Fifth, duplicate cases may arise when patients are transferred between facilities. Finally, syndromic surveillance data only cover approximately 78% of EDs in the country and are not nationally representative (The National Syndromic Surveillance Program (NSSP) 2024). However, in our region 90% of health care facilities participate on ESSENCE.

There are also several limitations specific to this study. First, the completeness of data may have varied during the study period because of varying participation in the NSSP by health facilities. We accounted for these possible fluctuations by assessing monthly trends in UUID SS visits as a percentage of the total number of monthly SS visits. However, this indicator could be influenced by changes in the denominator or by differences in the characteristics and exposure to water of the patients visiting the participating facilities. Currently 90% of health care facilities in the region submit data to ESSENCE. We did not correct for the population. Second, the percentage of UUID may vary based on the prevalence of other causes of SS visits and this may not reflect true increases in UUID. Third, the results are for one region in the US and may not be generalizable to other areas with different aquatic bodies of water or in regions which do not use NSSP. Fourth, all drowning deaths in the Houston Metropolitan area were included in the NVSS data, but only health care facilities that provide information to the City of Houston Health department were included in the SS data which could partially contribute to the differences in demographic characteristics between NVSS and SS data. Finally, while we were able to determine the percentage of true-positives identified by the syndrome, we were unable to describe the number of cases that the syndrome may have missed. A review of hospital records would address this issue but would be logistically difficult to conduct at a regional level.

Conclusion

Syndromic surveillance data are a novel source for drowning injury surveillance. Nearly all cases of UUID captured by SS in a large metropolitan area appeared to be accurately classified, indicating a very high degree of accuracy for the SS definition. Syndromic surveillance can be used by local injury prevention professionals to monitor drowning injuries and to inform preventative measures.

Abbreviations

ED	Emergency Department
ESSENCE	Electronic Surveillance System Early Notification of Community-based Epidemics
HHD	Houston Health Department
NSSP	National Syndromic Surveillance Program
NVSS	National Vital Statistics System
SS	Syndromic Surveillance
UC	Urgent Care
UUID	Undetermined and Unintentional and undetermined intent drowning

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40621-024-00529-x.

Additional file 1. ICD -10 CM codes for Unintentional and Undetermined Intent Drowning.

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Author contributions

RS conceptualized and designed the study, undertook acquisition and management of data, drafted the initial manuscript, and contributed substantially to its review and revision for important intellectual content; BM conceptualized and designed the study, drafted the initial manuscript, and contributed substantially to its review and revision for important intellectual content; JJ coordinated and supervised data collection and transfer from other sites,

contributed substantially to the review of the manuscript and its revision for important intellectual content; NP conceptualized and designed the study, drafted the initial manuscript, and contributed substantially to its review and revision for important intellectual content; EC provided statistical expertise on study design and analyzed the data, drafted the initial manuscript and contributed substantially to the review of the manuscript and its revision for important intellectual content; NL analyzed the data, contributed substantially to the review of the manuscript and its revision for important intellectual content. All authors have read and approved the final manuscript.

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References

Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS) (2023). https://www.cdc.gov/injury/wisqars/index.html. Accessed on 24 July 2023
Centers for Disease Control and Prevention, National Center for Health Statistics (2023) Multiple Cause of Death 2018–2021on CDC WONDER Online Database 2021 http://wonder.cdc.gov/ucd-icd10-expanded.html. Accessed on 24 Jul 2023
Clemens T, Moreland B, Lee R. Persistent racial/ethnic disparities in fatal unintentional drowning rates among persons Aged ≤ 29 Years-United States, 1999–2019. MMWR Morb Mortal Wkly Rep. 2021;70(24):869–74. https://doi.org/10.15585/mmwr.mm7024a1.
Denny SA, Quan L, Gilchrist J, et al. Prevention of drowning. Pediatrics. 2021;148(2):e2021052227. https://doi.org/10.1542/peds.2021-052227.
Governor Abbott Issues Executive Orders to Mitigate Spread of COVID-19 In Texas (2023). https://gov.texas.gov/news/post/governor-abbott-issues-executive-orders-to-mitigate-spread-of-covid-19-in-texas. Accessed on 30 Sep 2023
Hartnett KP, Kite-Powell A, DeVies J, et al. Impact of the COVID-19 Pandemic on emergency department visits-United States, January 1, 2019-May 30, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(23):699–704. https://doi.org/10.15585/mmwr.mm6923e1.
Houser C, Vlodarchyk B. Impact of COVID-19 on drowning patterns in the Great Lakes region of North America. Ocean Coast Manag. 2021;1(205):105570.
Idris AH, Bierens JJLM, Perkins GD, et al. 2015 revised Utstein-style recommended guidelines for uniform reporting of data from drowning-related resuscitation: an ILCOR advisory statement. Circ Cardiovasc Qual Outcomes. 2017;10(7):e000024. https://doi.org/10.1161/HCQ.0000000000000024.
Irwin CC, Irwin RL, Ryan TD, Drayer J. Urban minority youth swimming (in) ability in the United States and associated demographic characteristics: toward a drowning prevention plan. Inj Prev. 2009;15(4):234–9.
Moreland B, Clemens T, Idaikkadar N. Syndromic surveillance of emergency department visits related to unintentional drowning, United States, 2019–2022. Public Health Rep. 2024. https://doi.org/10.1177/00333549241249675.
Morgan ER, Hitchcock W, Sakamoto I, Stempski S, Rivara F, Vavilala M, Quan L. Disparities in adolescent reported drowning prevention strategies. J Adolesc Health. 2022;71(6):757–60.
NSSP Update (2019) https://www.cdc.gov/nssp/news/2019/12-december/index.html
Pharr J, Irwin C, Layne T, Irwin R. Predictors of swimming ability among children and adolescents in the United States. Sports (Basel). 2018;6(1):17.
Ryan K, Bui MD, Johnson B, et al. Drowning in the United States: patient and scene characteristics using the novel CARES drowning variables. Resuscitation. 2023;187:109788. https://doi.org/10.1016/j.resuscitation.2023.109788.
The National Syndromic Surveillance Program (NSSP) (2024) https://www.cdc.gov/nssp/php/about/index.html. Accessed on 12 June 2024
US census (2023). https://www.census.gov/data.html. Accessed on 18 June 2023
van Beeck EF, Branche CM, Szpilman D, et al. A new definition of drowning: towards documentation and prevention of a global public health problem. Bull World Health Organ. 2005;83(11):853–6.
Xu J (2014) Unintentional drowning deaths in the United States, 1999–2010. NCHS data brief, no 149. Hyattsville, MD: National Center for Health Statistics. https://www.cdc.gov/nchs/products/databriefs/db149.htm
Yoon PW, Ising AI, Gunn JE. Using syndromic surveillance for all-hazards public health surveillance: successes, challenges, and the future. Public Health Rep. 2017;132(1 Suppl):3S-6S. https://doi.org/10.1177/0033354917708995.

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Injury Epidemiology

RESEARCH Open Access

The effects of the COVID-19 pandemic on pediatric dog bite injuries

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Abstract

Background/objective Shortly after the onset of the COVID Pandemic, when many schools and outside activities were suspended, dog adoption rates increased. It is unknown if increased dog adoption rates along with stay-at-home orders resulted in changes to pediatric dog bite injuries. The objective of this study was to examine the incidence and characteristics of dog bites in children seen in a pediatric emergency department (PED) during the pandemic compared to before.

Methods A retrospective review of children evaluated in the PED of a level 1 pediatric trauma center and its satellite PED from March 2018 through February 2022 who had a discharge diagnosis of dog bite (ICD-10 W54.0XXA) was conducted. Pre-pandemic cases, March 2018 through February 2020, were compared to those that occurred during the pandemic, March 2020 through February 2022.

Results There were 2,222 patients included in the study. Compared to pre-pandemic cases, the incidence for the first 12 months of the pandemic was 1.5 times higher than the pre-pandemic 12-month periods but returned closer to the pre-pandemic rates during the second 12 months of the pandemic. More patients were admitted during the pandemic (6.1% vs. 3.7%, $p < 0.05$). Facial and multiple injuries occurred more frequently during the pandemic (face 35.9% vs. 33.5%: multiple 18.5% vs. 15.6% $p < 0.05$).

Conclusions There was a higher incidence of PED visits, higher admission rates, and an increase in multiple body part and facial injuries in children with dog bite injuries during the COVID pandemic compared to pre-pandemic. Pediatric providers should emphasize safe dog interactions with anticipatory guidance.

Keywords Dog bites, Pediatric Injury, COVID-19 Pandemic

Introduction

The COVID-19 pandemic brought significant turmoil to the United States and its healthcare system. Many adult hospitals were forced to board patients in their emergency departments (EDs) as their intensive care units became critically full. Outside of the hospital, school closures and stay-at-home orders altered people's daily routines and their home dynamics. Initially during this disruption, many people and families became more interested in dog ownership. Based on Google trends, dog adoption-related searches during April 2020 were significantly higher compared to the previous 5-year average

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(Ho et al. 2021). Shelters reported a 9% annual increase in dog adoptions during 2020 as compared to 2019 (Shelter Animals Count 2020). While dog ownership can provide mental health benefits (Hui Gan et al. 2020; Oliva and Johnston 2021), it is not without risk. In the United States, animal bites/stings consistently rank among the top six causes of unintentional injuries in the pediatric population (Borse and Sleet 2008). There are approximately 140,000 annual ED visits for pediatric dog bites (Loder 2019). The potential increase in child-dog interactions during the COVID-19 pandemic due to stay-at-home orders and increased adoption rates only amplified this risk.

Data from the United States and globally shows that dog bite injuries in the pediatric population increased significantly during the COVID-19 pandemic (Plana et al. 2022; Parente et al. 2021; Tulloch et al. 2021; Dixon and Mistry 2020). However, current studies on pediatric dog bites during the COVID-19 pandemic focus mainly on the initial 6 to 10 months. Studies have shown that dog adoption related searches returned to their pre-pandemic levels by December of 2020 (Ho et al. 2021). While still lower than before the pandemic, the number of dogs returned by owner increased by 6.7% in 2021 compared to 2020 (Shelter Animals Count 2022). With these changes, it is unclear if the initial spike in dog bite injuries remained constant throughout the pandemic. This study examines the first 24 months of the pandemic to help understand the full effects it had on dog bite injuries in children. Specifically, the study objective was to examine the incidence and characteristics of dog bites in 0-18-year-old children seen in a pediatric emergency department (PED) during the COVID-19 pandemic compared to before the pandemic.

Methods

A retrospective study was conducted using data from the trauma registry of a level 1 pediatric trauma center PED and its satellite PED that were in a midwestern tertiary care children's hospital. Data was extracted on patients < 18 years old who were seen March 1, 2018 through February 28, 2022 who received the diagnosis of a dog bite (ICD W54.0XXA) during their PED visit. Patients were excluded if they: were >18 years old, left without being seen, or had subsequent visits for the same injury. The following information was abstracted from PED records of eligible patients: demographic information (e.g., age, sex, race, ethnicity, insurance); injury characteristics - anatomic location; patient disposition - discharged home or admitted to the hospital, intensive care unit (ICU), or operating room (OR). The pre-pandemic and during pandemic groups were defined as patients seen from March 1, 2018, through February 29, 2020, and March 1, 2020, through February 28, 2022, respectively. For further delineation, March 2018 through February 2019 is referred to as the first 12 months of the pre-pandemic and March 2019 through February 2020 is the second 12 months. Similarly, March 2020 through February 2021 is referred to as the first 12 months of the pandemic and March 2021 through February 2022 is referred to as the second 12 months of the pandemic. Student's t-test was used to compare continuous variables. Pearson chi-squared test was used to compare categorical variables. Significance was set at $\alpha < 0.05$. All analysis was completed using IBM® SPSS® Statistics (Version 26). This study was deemed exempt by the institutional review board as the dataset contained only de-identified data.

Results

Of the 65,204 injury-related patients seen in the PED during the study period, 2,362 were due to dog bites (3.6%). Of these, 140 patients were excluded due to either age > 18 years ($n=37$), left without being seen ($n=16$), or subsequent visit for the same injury ($n=87$); thus, 2,222 patients with dog bite injuries were eligible for analysis. Overall, there were 114 more cases during the COVID-19 pandemic (1,168) than prior to the pandemic (1,054). As noted in Fig. 1, the incidence rate of dog bite injuries was significantly higher during the first 12 months of the pandemic compared to (1) both years before the pandemic and (2) the second 12 months of the pandemic (for all comparisons, $p<0.001$). However, the incidence rate during the second 12 months of the pandemic was only significantly higher than the first 12 months pre-pandemic ($p<0.01$).

The mean (SD) age for the entire study sample was 7.64 (4.6) years; males sustained more dog bites than females (55.8% vs. 44.2%, Table 1). Although children aged 5 to 9 years old were the most affected group both before the pandemic and during (33.6% and 35.2% respectively), there were no statistically significant differences between age groups during the pre-pandemic years compared to the during pandemic years. Further, there were no differences based on child sex, race, or ethnicity. However, there was a higher number of patients who had private insurance during the pandemic compared to before the pandemic (60.2% vs. 49.8%, $p<0.001$).

More patients required admission for their injuries during the pandemic compared to prior (3.8% vs. 2.1%, $p=0.02$). Additionally, more patients required operative management during the pandemic than prior to the pandemic (4.9% vs. 3%, $p=0.03$). During the pandemic, there was a significantly higher proportion of patients that sustained facial injuries and injuries to multiple body parts compared to before the pandemic (face: 35.9% vs. 33.5%, respectively; multiple body parts: 18.5% vs. 15.6%, respectively; all $p<0.001$; see Fig. 2).

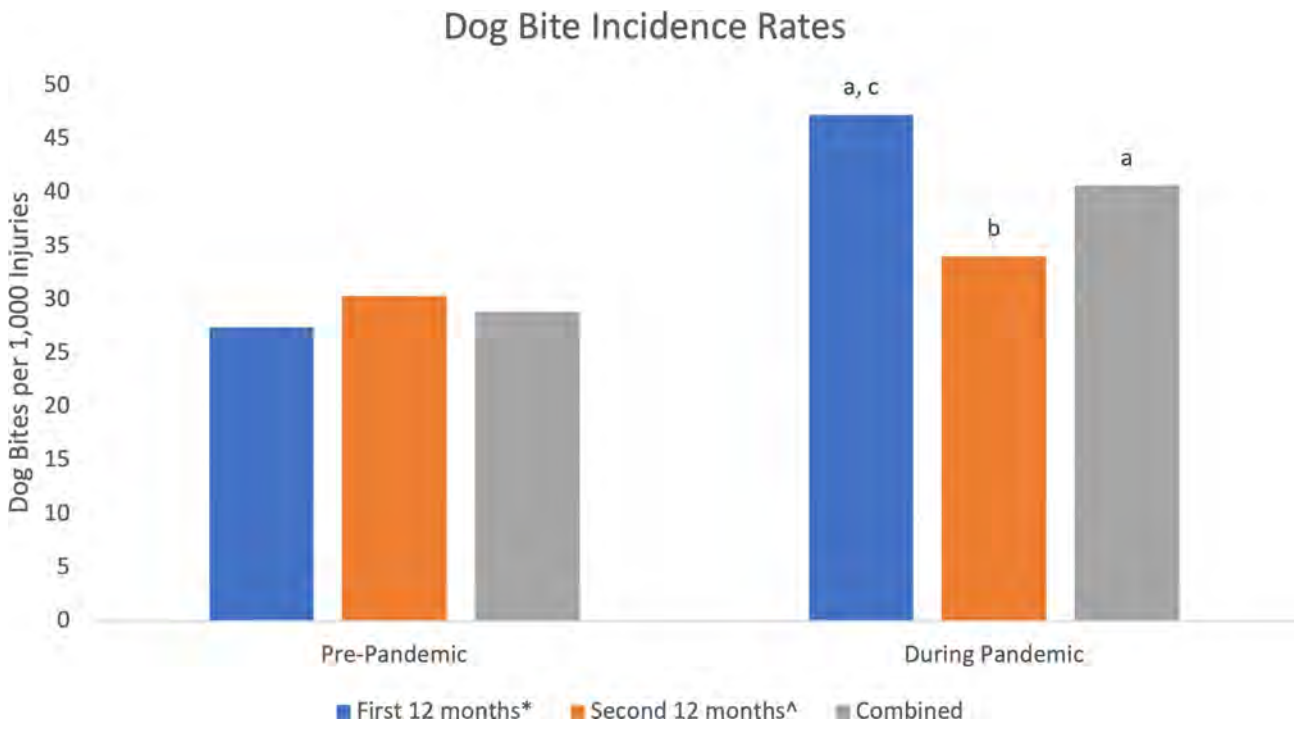

Fig. 1 Dog bite incidence rates by year [a] Significantly higher than all pre-pandemic rates, $p < 0.01$ [b] Significantly higher than pre-pandemic first 12 months incidence rate, $p < 0.01$ [c] Significantly higher than the post-pandemic second 12 months, $p < 0.01$ [*] The first 12 months covered March 2018 through February 2019 for the pre-pandemic group and March 2020 through February 2021 for the post pandemic group [^] The second 12 months covered March 2019 through February 2020 for the pre-pandemic group and March 2021 through February 2022 for the post pandemic group

Discussion

This study provides further evidence that there was a higher incidence rate as well as an absolute increase in dog bite injuries during the COVID-19 pandemic. The increase in dog adoption rates coupled with children spending more time at home due to school closures, activity cancellations, and stay-at-home orders likely contributed to this. These increased child-dog interactions may continue to persist as more people are continuing to work from home, even though the United States has relaxed COVID-19-related restrictions (Parker et al. 2022).

When examined by year, the incidence rate of dog bites for the first 12 months of the pandemic was significantly higher than the second 12 months. While a direct correlation cannot be identified, this does coincide with the gradual return to normalcy. In Ohio, the resident state for the hospital in this study, as state health orders for mandated masking and capacity limits ended on June 2nd, 2021 (Planalp 2021). The percent of Ohio public schools delivering 5-day in person learning rose from 41% at the start of the 2020–2021 school year to 78% at the end of the school year (Burbio 2023).

The COVID-19 pandemic did not change the injury trends for age groups, sex, race, or ethnicity, in our population. However, significantly more visits were made by children with private insurance during the pandemic than before. This finding contradicts a previous report that showed more dog bites occurring in households with government funded insurance (Plana et al. 2022). A possible reason for this is that those who were able to afford private insurance also had the fiscal ability to cover the costs of adopting and caring for a dog during the pandemic. As private insurance is often a marker of higher socioeconomic status, another reason may be that these families had fewer barriers, such as transportation, to obtaining medical care for dog bites.

Compared to pre-pandemic, during the pandemic, there was a statistically higher number of patients who: were admitted (3.7% vs. 6.1%, respectively), needed surgical intervention (3% vs. 4.9%, respectively), sustained facial injuries (33.5% vs. 35.9%, respectively), and sustained multiple injuries 15.6% vs. 18.5%, respectively). Interestingly, this increase in admissions for dog bites occurred at a time when hospital admissions fell from 2.24% of all hospital encounters to 1.89% at the study hospital (Cincinnati Children's Hospital Medical Center 2023). This finding along with more patients needing surgical intervention during the pandemic seems to suggest that more significant injuries occurred after the onset of the COVID-19 pandemic. This is further supported by the increase in facial and injuries to multiple body parts seen during the COVID-19 pandemic. However, it is unclear if these admissions and surgeries were due

Table 1 Characteristics of dog bite injury patients before and during the COVID pandemic

	Pre-Pandemic Dog Bites *n* = 1054	**During Pandemic Dog Bites *n* = 1168**	***p*-value**
Age, years (SD)	7.58 (4.6)	7.68 (4.6)	0.62
Male sex, n (%)	594 (56.4)	647 (55.4)	0.65
Age, years, n (%)			0.91
<1	23 (2.2)	27 (2.3)	
1–4	348 (33)	366 (31.3)	
5–9	354 (33.6)	411 (35.2)	
10–14	243 (23.1)	272 (23.3)	
15–18	86 (8.1)	92 (7.9)	
Race, n (%)			0.25
Black	242 (23.3)	228 (19.7)	
White	750 (72)	869 (75.4)	
Other[1]	49 (4.7)	56 (4.9)	
Hispanic ethnicity, n (%)	52 (5)	63 (5.4)	0.62
Insurance, n (%)			**< 0.001**
Private	518 (49.8)	612 (60.2)	
Government	448 (43.1)	343 (33.8)	
Self-pay	74 (7.1)	11 (6)	
Admissions[2], n (%)	22 (2.1)	71 (3.8)	**0.02**
Required Operative Management[3], n (%)	32 (3)	57 (4.9)	**0.03**

p-values in bold are statistically significant

[1] Defined as American Indian, Asian, Middle Eastern, or Other

[2] Defined as admitted to the intensive care unit or general wards

[3] Includes patients directly admitted from the PED to operating room and patients admitted to other units that subsequently required operative management

to the injury itself or due to complications. It is possible that due to the fear of contracting COVID-19, families delayed seeking treatment until wounds became infected, potentially increasing the need for surgical debridement or admission for intravenous antibiotics. Additionally, patients with minor injuries may have utilized telehealth instead of presenting to the PED. Further research is warranted to examine indicators that suggest that admission or surgical intervention is needed for dog bite related visits; these indicators may include time between presentation to the PED and when the dog bite occurred.

The observational aspect of this study presents limitations that should be considered. The reliance on diagnosis codes for inclusions potentially excludes patients that were miscoded. While the use of the trauma registry provided a standardized data set, it limited the ability of this study to examine variables that were not included in the registry such as antibiotic use, suture use, or dog breed; all of which should be studied in future work. As this study was a single center study, its generalizability to the rest of the U.S. is limited. Nonetheless, this study utilized a large sample size and equal time-period comparisons between groups to help understand the full effects the COVID pandemic had on dog bite injuries in the pediatric population.

Conclusion

In conclusion, there was a higher absolute number and incidence rate of PED visits, higher admission rates, more privately insured patients, and an increase in facial and multiple body part injuries during the COVID pandemic compared to prior. These results highlight the need for improved dog bite prevention education. Providers who care for children should include anticipatory guidance related to ways in which children can safely interact with their dogs (e.g., no rough games) and circumstances under which children should avoid such interactions (e.g., when the dog is eating) (American Academy of Pediatrics 2018; American Veterinary Medical Association 2023). Further, parents should be advised that they should supervise all child-dog interactions, especially when their children are young.

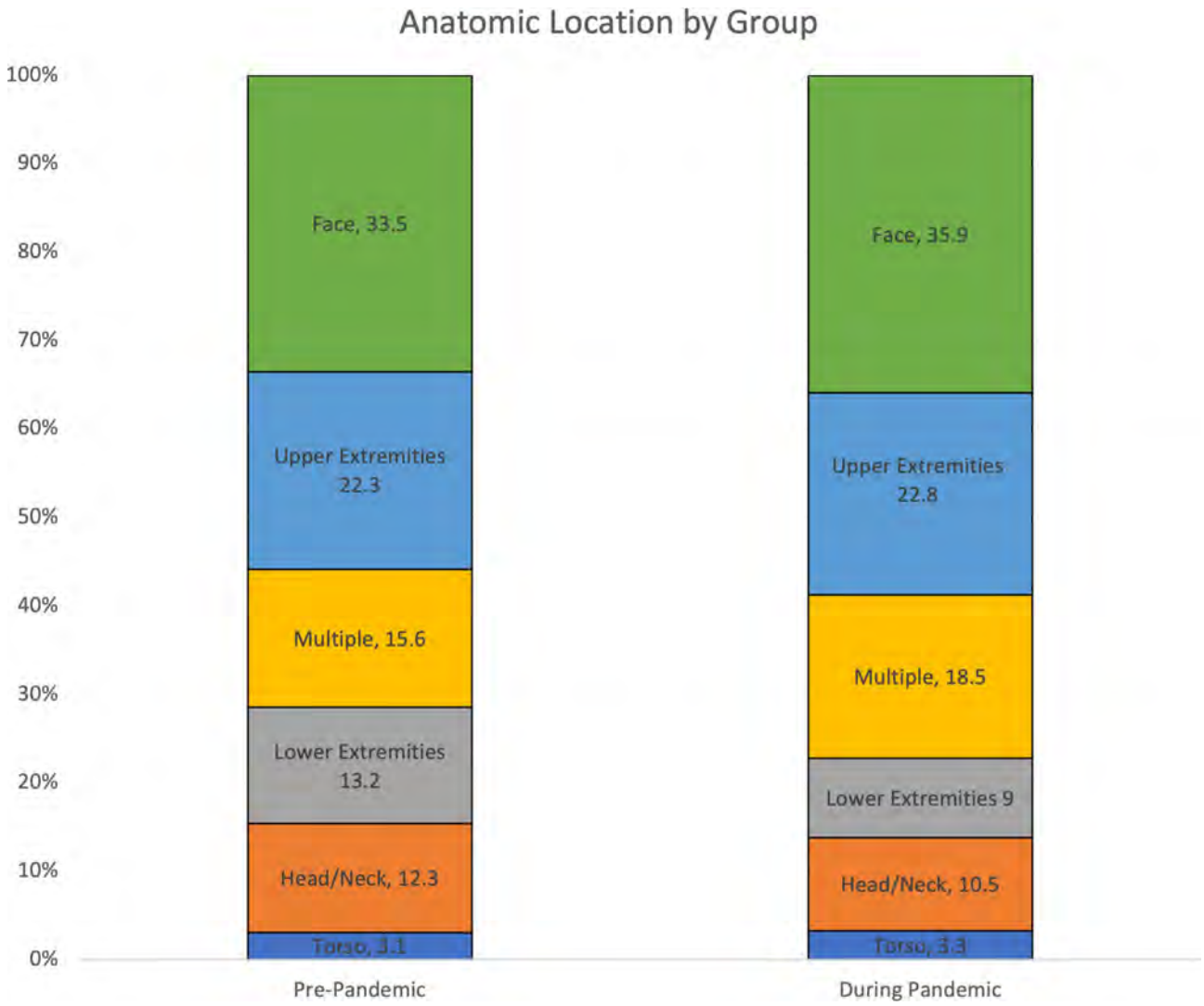

Fig. 2 Anatomic location of dog bite by pandemic group

Abbreviations
PED Pediatric emergency department
ED Emergency department

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None.

Authors' contributions
PTM - conceptualized and designed the study, collected data, carried out initial data analyses, drafted the initial manuscript, and critically reviewed and revised the manuscript. MMG and WJP conceptualized and designed the study, supervised data collection and data analyses, and critically reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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De-identified individual participant data will not be made available.

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Not applicable.

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References

American Veterinary Medical Association. *Dog. bite prevention*. [AVMA.org] [cited 2023 05 February]; https://www.avma.org/resources-tools/pet-owners/dog-bite-prevention

American Academy of Pediatrics. *Dog Bite. Prevention Tips*. 08 June 2018 [cited 2023 05 February]; https://www.healthychildren.org/English/safety-prevention/all-around/Pages/Dog-Bite-Prevention-Tips.aspx

Borse N, Sleet DA. CDC Childhood Injury Report: patterns of Unintentional injuries among 0–19 Year Olds in the United States, 2000–2006. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control: Atlanta, GA; 2008.

Burbio, Inc. *School. opening tracker*. [cited 2023 08 January]; https://about.burbio.com/school-opening-tracker

Cincinnati Children's Hospital Medical Center. *About Cincinnati Children's… Facts and Figures*. [cited 2023 08 January]; https://www.cincinnatichildrens.org/about/corporate/facts-figures

Dixon CA, Mistry RD. Dog bites in Children Surge during Coronavirus Disease-2019: a case for enhanced Prevention. J Pediatr. 2020;225:231–2.

Ho J, Hussain S, Sparagano O. Did the COVID-19 pandemic spark a public interest in Pet Adoption? Front Vet Sci. 2021;8:647308.

Hui Gan GZ, Hill AM, Yeung P, Keesing S, Netto JA. Pet ownership and its influence on mental health in older adults. Aging Ment Health. 2020;24(10):1605–12.

Loder RT. The demographics of dog bites in the United States. Heliyon. 2019;5(3):e01360.

Oliva JL, Johnston KL. Puppy love in the time of Corona: dog ownership protects against loneliness for those living alone during the COVID-19 lockdown. Int J Soc Psychiatry. 2021;67(3):232–42.

Parker K, Menasce Horowitz J, Minkin R. COVID-19 pandemic continues to reshape work in America, Pew Research Center's Social & Demographic Trends Project. Pew Research Center. 2022.

Parente G, Gargano T, Di Mitri M, Cravano S, Thomas E, Vastano M, Maffi M, Libri M, Lima M. Consequences of COVID-19 lockdown on children and their pets: dangerous increase of dog bites among the paediatric population. Child (Basel). 2021;8(8):620.

Plana NM, Kalmar CL, Cheung L, Swanson JW, Taylor JA. Pediatric Dog bite injuries: a 5-Year Nationwide Study and implications of the COVID-19 pandemic. J Craniofac Surg. 2022;33(5):1436–40.

Planalp B. *Gov. DeWine announces Ohio health orders will end June 2*. 2021 [cited 2023 08 January]; https://www.fox19.com/2021/05/12/live-gov-dewine-delivers-rare-evening-address-vaccine-rollout-health-orders/

Shelter Animals Count. *COVID-19 Impact Report: November 2020*. [Online Report] 2020 [cited 2024 11 January]; https://shelteranimalscount.s3.us-east-2.amazonaws.com/Shelter_Animals_Count_COVID_Impact_Report_November_2f48ae33f4.pdf

Shelter Animals Count. *Q1-Q3 Analysis: 2019-2020-2021*. [Online Report] 2022 [cited 2023 30 January]; https://www.shelteranimalscount.org/wp-content/uploads/2022/02/SACAnalysis_Q1-Q3_020322-1.pdf

Tulloch JSP, Minford S, Pimblett V, Rotheram M, Christley RM, Westgarth C. Paediatric emergency department dog bite attendance during the COVID-19 pandemic: an audit at a tertiary children's hospital. BMJ Paediatr Open. 2021;5(1):e001040.

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Impact of cable lock distribution on fi earm securement after emergent mental health evaluation: a randomized controlled trial

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Abstract

Background Suicide-related presentations to pediatric emergency departments (PED) have increased in recent years. PED providers have the opportunity to reduce suicide risk by counseling on restricting access to lethal means. Supplementing lethal means counseling (LMC) with safety device distribution is effective in improving home safety practices. Data on PED-based LMC in high-risk patient populations is limited. The objective of this study was to determine if caregivers of children presenting to PED for mental health evaluation were more likely to secure all household firearms if given cable-style gun locks in addition to LMC.

Methods In this randomized controlled trial, caregivers completed a survey regarding storage practices of firearms and medication in the home. Participants were randomized to receive LMC (control) or LMC plus 2 cable-style gun locks (intervention). Follow-up survey was distributed 1 month after encounter. Primary outcome was proportion of households reporting all household firearms secured at follow-up. Secondary outcomes included: removal of lethal means from the home, purchase of additional safety devices, use of PED-provided locks (intervention only), and acceptability of PED-based LMC.

Results Two hundred participants were enrolled and randomized. Comparable portions of study groups completed follow-up surveys. Control and intervention arms had similar proportions of households reporting all firearms secured at baseline (89.9% vs. 82.2%, $p=0.209$) and follow-up (97.1% vs. 98.5%, $p=0.96$), respectively. Other safety behaviors such as removal of firearms (17.6% vs. 11.8%, $p=0.732$), removal of medication (19.1% vs. 13.2%, $p=0.361$), and purchase of additional safety devices (66.2% vs. 61.8%, $p=0.721$) were also alike between the two groups. Both groups held favorable views of PED-based counseling. Within the intervention group, 70% reported use of provided locks. Preference for a different style of securement device was the most cited reason among those not using PED-provided locks.

Conclusions PED-based LMC is a favorably-viewed, effective tool for improving home safety practices in families of high-risk children. Provision of cable-style gun locks did not improve rate of firearm securement compared LMC alone—likely due to high baseline rates of firearm securement and preference for different style of lock among non-utilizers.

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Keywords Firearm, Lethal means, Suicide prevention, Mental health, Emergency

Introduction

Firearms are now the leading cause of death among youth in the United States (US)((National Center for Health Statistics (NCHS) 2022). In 2020 alone, 3,135 children and teens died from firearm-related injuries (National Center for Health Statistics (NCHS) 2022). Over the last decade, pediatric suicides have increased by 50%, with firearm-related suicides specifically, increasing nearly 75% (National Center for Health Statistics (NCHS) 2022). In part due to their 90% mortality rate (Miller et al. 2004), firearms make up 45% of all pediatric suicide deaths, making them the new leading means of suicide death in those under 18 years of age (National Center for Health Statistics (NCHS) 2022).

Securement of firearms and ammunition is associated with an almost 80% decrease in the odds of death from firearm-related suicide as well as 85% decrease for unintentional injury (Grossman 2005). The American Academy of Pediatrics (AAP) recommends that all firearms in the home should be kept locked and unloaded with ammunition secured separately (Beidas et al. 2020). Unfortunately, less than 40% of American firearm-owning families follow this guidance leaving approximately 4.6 million children living in households with loaded and unlocked firearms (Azrael et al. 2018). Given the impulsive nature of children and the accessibility of firearms, it is clear why 82% of firearms used in pediatric suicides belonged to a family member (Johnson et al. 2010). However, Monuteaux et al. estimated that if just 20% of households with even 1 unlocked firearm moved to locking all firearms within a year, up to 323 youth shootings, including 135 fatalities, could be prevented (Monuteaux et al. 2019).

Emergency providers are at the forefront of the pediatric suicide epidemic. Since 2007, pediatric emergency departments (PEDs) have seen a 2.5 fold increase in the number of suicide-related encounters (Kalb et al. 2019). PED providers have a unique opportunity to improve home safety for families of children at high risk for suicide or self-harm. Lethal Means Counseling (LMC) is a type of safety education that advises securement or removal of potentially hazardous household items such as medications, caustic cleaners, firearms, and other weapons. Several studies have demonstrated that counseling in health care settings can motivate families to improve home safety behaviors (Barkin et al. 2008; Albright and Burge 2003; Gittelman et al. 2006; Runyan et al. 2016; Uspal et al. 2021; Carbone et al. 2005). Moreover, when families receive tangible products, such as booster seats or home safety kits (Posner et al. 2004), they are more likely to make positive changes in home safety practices when compared to receiving education alone (Barkin et al. 2008; Gittelman et al. 2006; Uspal et al. 2021; Carbone et al. 2005). Similarly, firearm safety counseling without the provision of safety devices frequently results in subpar storage practices (Rowhani-Rahbar et al. 2016). While several studies have occurred in the primary care setting, there has been only one prior clinical trial (Uspal et al. 2021) directly comparing the impact of LMC with versus without the provision of firearm safety devices in a population that is high-risk for suicide or self-injury, such as those presenting to a PED for emergent mental health (MH) evaluation. However, examining the efficacy of LMC interventions in distinct geopolitical environments—Pacific Northwest (Uspal) vs. Midwest (our study)—could provide valuable insight for national initiatives. The objective of this study was to determine if provision of cable-style gun locks, in addition to LMC, improved self-reported securement of all firearms compared to LMC alone among caregivers of patients presenting to a PED for emergent MH evaluation.

Materials & methods

Study design and population

We conducted a single-center, prospective, randomized controlled trial within the PED of a free-standing tertiary care level-1 pediatric trauma center. Due to the nature of the study, investigators were not blinded to the interventions received by participants. This study was approved by the Cincinnati Children's Hospital Medical Center (CCHMC) Institutional Review Board. Study protocol, counseling handout, and surveys are available upon request to study team.

The study population consisted of firearm-owning caregivers of children presenting to the PED for emergent MH evaluation. As only patients under the age of 18 can receive psychiatric care at our facility, all children of enrolled caregivers were less than 18 years of age. Caregivers were eligible for enrollment if they endorsed any firearms within the home and the patient resided in their home full- or part-time. Those who did not endorse firearms within the home, were unable to complete the English-based survey, and those within patient rooms deemed unsafe by study staff or behavioral safety team, were excluded. The patient's disposition (admission vs. discharge) did not affect caregivers' eligibility for enrollment.

Survey development

Survey content was based on prior emergency department LMC for caregivers of pediatric patients (Runyan et al. 2016) and specific questions were created via expert opinion of PED physicians, injury prevention researchers, and psychiatric social workers. Pre-counseling surveys contained questions regarding caregiver demographics as well as firearm and medication storage practices. Follow-up surveys repeated questions about storage behaviors with additional questions regarding how participants viewed PED-based counseling, use of the provided locks, removal of lethal means from the home, and the purchase of additional safety devices after PED encounter.

Counseling handouts and surveys were piloted for readability and content among 12 firearm-owning caregivers (Sheatsley 1983). Inclusion criteria was revised to include all firearm-owning caregivers rather than only those with unsafely stored weapons. Potential participants preferred discussing storage practices of "all firearms" (versus answering questions around number of firearms and details about how each were stored) as well as relaying information anonymously via electronic survey as opposed to face-to-face encounter. Content regarding another lethal mean, medication, was added to reduce perceived judgement surrounding firearm ownership.

Study procedure

All enrollment occurred within the primary PED of CCHMC between June 28, 2021 and February 10, 2022. Potential participants were identified by documented chief complaint of "Psychiatric Evaluation", which includes, but is not limited to, those presenting for: suicidal ideation/attempt, homicidal ideation/attempt, aggression, behavior change, and hallucinations. The Psychiatric Intake and Response Center (PIRC) team is made up of social workers and attending psychiatrists that consult on all patients presenting to the PED for psychiatric evaluation. Caregivers who met inclusion criteria and received consultation by PIRC team were considered for enrollment. A convenience sample of caregivers were screened for enrollment by the study principal investigator (PI) or Clinical Research Coordinators (CRCs) specifically trained in study recruitment and lethal means counseling. CRCs were present in the PED 8am to 12am on weekdays and 11am to 9pm on weekends. The PI aided in recruitment, as needed, during times of high patient volumes.

Caregivers were approached for enrollment after patient had been evaluated by both emergency medicine and PIRC teams. If more than one caregiver was present, one caregiver was chosen by the family for participation. Participants provided electronic informed consent prior to completing survey questions. Neither consent nor assent was required from patients as no protected health information was collected. Eligibility screening and safety counseling with caregiver occurred outside of patient room, physically distant from patient, in order to avoid raising awareness of firearms in the home.

Enrollment occurred in parallel with a 1:1 allocation ratio. Enrolled caregivers were randomized into one of two study arms based on date of enrollment. Participants enrolled on odd-numbered dates were allocated to the control group (LMC alone), while participants enrolled on even-numbered dates were allocated to the intervention group (LMC+2 cable-style gun locks). Participants completed the tablet-based survey with study team member present to clarify questions. The REDCap® application was used for data collection and survey distribution.

The control arm of the study received standardized LMC from the study PI or CRC as well as a 1-page handout summarizing the counseling recommendations. The intervention arm received the same counseling and handout with the additional provision of 2 cable-style gun locks at no cost to caregivers. Counseling provided by study team was derived from the Suicide Prevention Resource Center's "Counseling on Access to Lethal Means" training module (Suicide Prevention Resource Center 2019) and the "Store It Safe" campaign (Store It Safe 2015) from the Ohio Chapter of the AAP. Guidance focused on securement of dangerous items in the household, such as medications and firearms, with locking devices—or more preferably removing these items from the home, even if temporarily. Particular attention was given to the AAP's recommendations on safe storage of firearms, which state that all firearms in the home should be kept locked, unloaded, with ammunition secured separately (Store It Safe 2015). The cable locks were SnapSafe Cable Padlock (Item No. 75281). Cable locks were chosen as they have several advantages over other types of gun locks, including: (1) they are near-universally applicable to both handguns and long guns (2) cable locks are the least expensive type of gun locks, often costing 5-10x less than even the most basic safes/lockboxes (3) the possibility of unintentional discharge during securement process is much lower than that of devices such as a trigger locks and (4) even if a firearm is kept loaded, a cable lock will prevent the firing pin from striking a bullet/shell. Caregivers were provided with instructions included within the package of the provided gun locks and advised to store keys away from the firearm in a location inaccessible to their children. All patients and caregivers received usual care from PIRC team, including a standardized safety checklist and instructions on increased supervision of child. Counseling provided by study team members was supplementary to usual care.

A link to a follow-up survey was sent to participants 4 weeks after completion of baseline survey. This

survey was distributed via text message using functionality within the REDCap® application and sent to the mobile phone of the participant completing the initial survey. If a participant did not complete the follow-up survey, reminders were sent at 3-day intervals, up to 3 additional times. Participants received $10 gift cards upon completion of each survey.

Outcome measures

The primary comparison groups were the "LMC Alone" control arm and the "LMC+Gun Locks" intervention arm. Pre-post analysis also occurred within each group. The primary outcome was self-reported securement of all firearms in the household with a locking device at 4 weeks post index PED encounter. Securement of all firearms with locking device was chosen as the primary safe storage outcome as it is the most protective factor against suicide and unintentional injury (Grossman 2005). For the purposes of this study, "secured" or "securement" is defined as firearms locked with/within a locking device (including but not limited to: cable lock, trigger lock, lockbox, gun safe, locked cabinet). Secondary outcomes included: caregiver acceptability ratings of PED-based counseling, change in proportion of households reporting all firearms & medications locked, removal of firearms & medications from the home, purchase of additional safety devices, and use of provided gun locks (intervention arm only).

Statistical analysis

A sample size of 200 patients was determined based on a 95% confidence interval with an 80% power to detect a 30% difference in primary outcome—based on described outcome differences in previous clinic-based trials (Carbone et al. 2005). Sample size calculations accounted for an estimated 30% loss to follow-up, based on prior survey-based projects within CCHMC PED (Gittelman et al. 2006). Wilcoxon rank sum and Fisher's exact tests were used to analyze differences between primary comparison groups at both baseline and follow-up, for continuous and categorical variables, respectively. Odds ratios and McNemar's test were used to compare baseline vs. follow-up securement rates within and between study groups. Logistic regression—with adjustments for patient and caregiver age, gender and race—was used to compare change in proportions of caregivers reporting firearm securement between study arms.

Results

During the study period, 3534 patients presented to CCHMC PED for emergent MH evaluations. A total of 816 caregivers were screened for eligibility, with 588 (72.1%) reporting firearms were not present in the home and 28 (3.4%) declining to participate. A total of 200 (24.5%) caregivers were enrolled and randomized into control and intervention groups (Fig. 1). Patients and caregiver demographics are shown in Table 1. Age and gender of patients are representative of overall population presenting to the CCHMC PED for MH evaluation; however there is a slight predominance of female patients in the intervention arm (49.5% vs. 59.4%).

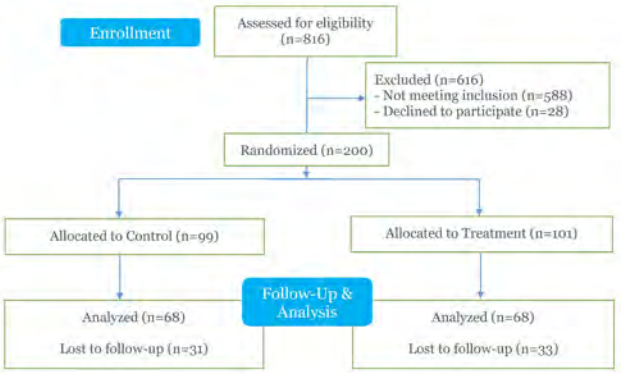

Fig. 1 CONSORT flow diagram of study enrollment. Pre- vs. Post-Counseling firearm securement

Table 1 Patient and caregiver demographics

Patient characteristic	LMC alone (*n* = 99)	LMC + Gun Locks (*n* = 101)
Patient age in years [IQR]	14 [12, 15]	14 [11, 15]
Patient gender n (%)		
Female	49 (49.5%)	60 (59.4%)
Caregiver age n (%)		
30 or younger	5 (5.1%)	4 (4.0%)
31–40	41 (41.4%)	43 (42.6%)
41–50	38 (38.4%)	32 (31.7%)
51–60	11 (11.1%)	16 (15.8%)
61 or older	(4) 4.0%	6 (5.9%)
Caregiver gender n (%)		
Male	69 (69.7%)	80 (79.2%)
Caregiver race n (%)		
Black	10 (10.1%)	10 (9.9%)
White	83 (83.8%)	87 (86.1%)
Other/No Response	6 (6.1%)	4 (4.0%)

Participants in both groups reported similar rates of securement of all firearms with locking devices at baseline (89.9% vs. 82.2%, $p=0.209$). Comparable portions of participants within each study arm completed follow-up surveys; 68 (68.7%) in LMC Alone group and 68 (67.3%) in LMC+Gun Locks group. The post-encounter rates of firearm securement were nearly equivalent between the control (97.1%) and intervention (98.5%) arms (OR 2.03, 95% CI 0.19—44.27, $p=0.96$) as shown in Table 2. The lock-receiving intervention arm had significantly higher odds of firearm securement at follow-up compared to pre-encounter baseline (OR 14.5, 95% CI: 2.9—264, $p=0.001$); this was not true for the control arm (OR 3.7,

Table 2 Securement of Lethal Means. Caregiver-reported securement of firearms and medications, pre-counseling (Baseline) and 4 weeks post-counseling (Four-week Follow-up)

Securement	LMC alone *n* (%)	LMC + Gun Locks *n* (%)	*P*-value	OR (95% CI)
Baseline n (%)	*n* = 99	*n* = 101		
All firearms secured	89 (89.9%)	83 (82.2%)	0.209	
All medication secured	44 (44.4%)	43 (42.6%)	0.957	
Four-week follow-up n (%)	*n* = 68	*n* = 68		
All firearms secured	66 (97.1%)	67 (98.5%)	0.960	2.03 (0.19–44.27)
All medication secured	59 (86.8%)	59 (86.8%)	1.000	1.00 (0.37–2.73)

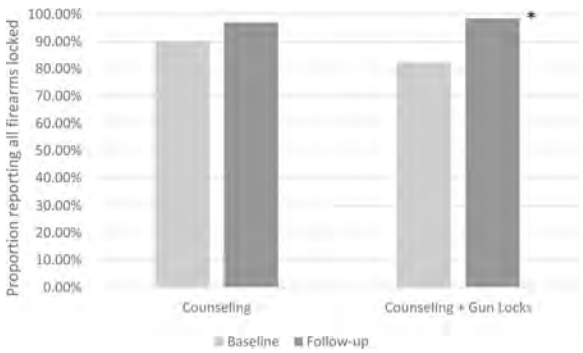

Fig. 2 Change in proportion of caregivers reporting all firearms secured with locking device. *Indicates a significant difference from baseline. (Uspal et al. 2021)

Table 3 Other Safety Behaviors. Other caregiver-reported safety behaviors described on 4 week follow-up survey

Additional safety behaviors	LMC alone *n* (%)	LMC + Gun Locks *n* (%)	*P*-value
Firearms removed	12 (17.6%)	8 (11.8%)	0.732
Medications removed	13 (19.1%)	9 (13.2%)	0.361
Additional safety devices purchased	45 (66.2%)	42 (61.8%)	0.721

95% CI: 0.9—24.6, $p=0.103$) (Fig. 2). The overall degree of change within each group (pre- vs. post-encounter) was not statistically different between the two study arms ($p=0.296$).

Comparable outcomes were seen when examining medication storage practices. Rates of caregivers reporting medication securement at follow-up were identical between control (86.8%) and intervention (86.8%) arms (OR 1.0, 95% CI 0.37—2.73, $p=1.000$). Additionally, both control (OR 8.8, 95% CI 3.1—20.9, $p<0.0001$) and intervention (OR 8.2, 95% CI 3.8—19.4, $p<0.0001$) arms had increased odds of medication securement, compared to their respective groups at baseline. Study groups displayed similarity in other safety behaviors at follow-up (Table 3). In the control group, 66.2% reported purchase of additional safety devices, compared to 61.8% in the intervention ($p=0.721$). Comparable portions of each group removed firearms (17.6% vs. 11.8%, $p=0.732$) and medications (19.1% vs. 13.2%, $p=0.361$) from their homes.

Within the intervention group, nearly 70% reported use of PED-provided locks to secure firearms in their home. Among the proportion not using the provided locks, the most common reasons were: (1) all firearms were already secured with locking device and (2) preferred a different style of safety device, such as safe or lockbox. The majority of participants from both groups had "very favorable" or "somewhat favorable" views of the counseling experience with 92.6% and 94.1% of the control and intervention arms ($p=0.738$), respectively.

Discussion

This randomized controlled trial of a high-risk pediatric patient population demonstrates the efficacy of LMC, but ultimately found that supplementing LMC with cable-style gun locks did not result in improved securement rates of all household firearms.

There are several possible reasons as to why our intervention did not impact storage practices. Both groups reported over 80% of households locking all firearms within the home. In the seminal case-control study by Grossman et al. examining storage practices among households of children who died by firearm-related suicide or unintentional injury, only 32% of case households reported storing firearms locked (Grossman 2005). There are a few possible reasons as to why our findings differed from that of Grossman. First, this low rate of securement only describes the storage practices of those who died, not those with suicidal ideation or other MH concerns. Second, nearly 80% of children who die by suicide were not receiving treatment for MH concerns (Ruch 2021)–differing from our population where many are well-connected to MH services and have received safety counseling on prior occasions. Our findings also corroborate a recent similar study examining firearm safety practices among caregivers of children with MH concerns at a PED or psychiatric hospital. These authors found that 74 −85% of caregivers reported locking their firearms at all times (Uspal et al. 2021). Unlike our data, this prospective, pre-post study found that families who received no-or low-cost firearm safety devices had higher proportion of households reporting improved safety behaviors compared to those families that did not. The disparate findings are likely attributable to several reasons including but not limited to: different devices offered (cable locks vs. lockboxes), outcomes measured (securement

of all firearms vs. triple safe storage), and/or the differing geopolitical environments (Pacific Northwest vs. Midwest) (Uspal et al. 2021).

One of the key findings of our study is that both groups' rates of secure storage increased, each nearly reaching 100%. Another important outcome of our study is that over 92% of caregivers in both groups viewed the counseling in a positive manner. This is of particular significance given that fear of negative reaction by family is one of the top reasons pediatricians do not regularly counsel about firearm safety (Ketabchi et al. 2021). Our results should empower and encourage providers to discuss firearm safety, especially those treating patients at high risk for self-harm.

There are several limitations to our study. As with other prospective firearm studies, our results could be influenced by participation, recall, and/or social desirability biases. Those who agreed to participate may have been more likely to disclose firearm ownership, had better baseline safety behaviors, and/or a stronger predilection for behavior change than those who chose not to participate. Participants may be more likely to report positive safety behaviors due to recall bias or social desirability bias, especially during pre-counseling survey when study team was present. This is one possible explanation as to why a majority of the intervention arm reported use of PED-provided locks, despite nearly 80% previously reporting securement of all firearms at baseline.

While the within-group analysis found that only the intervention arm had an increased odds of households securing all firearms, the higher-than-expected baseline securement rates likely affected the ability to detect significant differences between groups. It is also possible that LMC alone may be enough to produce improved safety behaviors among this highly-motivated population, underscoring the importance of this timely counseling.

To best determine if access to affordable resources was the limiting factor in storage practices, we chose to focus our analysis on the issue addressed by cable locks: firearm securement. While this is the most protective storage factor, other components of safe storage, such as ammunition were not analyzed. Additionally, despite the benefits of cable locks described within the Methods section, firearm owners often prefer gun safes or lockboxes. This was also demonstrated within our study as preferring a different safety device was second most common reasons caregivers cited for not using the PED-provided cable locks. Unfortunately, the price of these items was cost-prohibitive for our study.

And lastly, as our study occurred at a single center, it is possible that perception of counseling and subsequent behavior change may differ in other regions of the country, limiting its generalizability.

Conclusions

Our study demonstrates that the provision of cable gun locks did not result in a greater proportion of caregivers securing all firearms, compared to LMC alone. However, our findings illustrate the ability of PED-based LMC to produce numerous positive safety behaviors in households of children at elevated risk of self-harm. As firearms are now the leading cause of death in U.S. children—millions of whom live in homes with unsecured firearms—LMC should be considered standard of care for this high-risk patient population. Future studies will be needed to understand the needs of firearm-owning families and determine the efficacy of other devices and/or resources in producing improved home safety practices.

Abbreviations

AAP	American academy of pediatrics
CCHMC	Cincinnati children's hospital medical center
CRC	Clinical research coordinators
LMC	Lethal means counseling
MH	Mental health
OR	Odds ratio
PED	Pediatric emergency departments
PI	Principal investigator
PIRC	Psychiatric intake and response center

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Authors' contributions

BK, MG, and WP conceptualized and designed the study, supervised data collection, drafted the initial manuscript, and critically reviewed and revised the manuscript. YZ conducted the analysis and critically reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Availability of data and material

Study data that support these findings are available on request from the corresponding author, BK. The data are not publicly available due to containing participant contact information that could compromise the privacy of research participants.

Declarations

Consent for publication

Neither identifiable information nor protected health data of caregivers or patients are included in the manuscript.

Competing interests

No conflicts of interest or corporate sponsors to disclose.

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References

Albright TL, Burge SK. Improving Firearm Storage habits: impact of brief Office Counseling by Family Physicians. J Am Board Family Med. 2003;16(1):40–6. https://doi.org/10.3122/jabfm.16.1.40.
Azrael D, Cohen J, Salhi C, Miller M. Firearm Storage in Gun-owning households with children: results of a 2015 National Survey. J Urb Health. 2018;95(3):295–304. https://doi.org/10.1007/s11524-018-0261-7.
Barkin SL, Finch SA, Ip EH, et al. Is Office-based counseling about Media Use, Timeouts, and Firearm Storage Effective? Results from a Cluster-Randomized, controlled trial. Pediatrics. 2008;122(1):e15–25. https://doi.org/10.1542/peds.2007-2611.
Beidas RS, Rivara F, Rowhani-Rahbar A. Safe firearm storage: a call for Research informed by Firearm stakeholders. Pediatrics. 2020;146(5):e20200716. https://doi.org/10.1542/peds.2020-0716.
Carbone PS, Clemens CJ, Ball TM, Article. Arch Pediatr Adolesc Med. 2005;159(11):1049. https://doi.org/10.1001/archpedi.159.11.1049.
Suicide Prevention Resource Center. Counseling on Access to Lethal Means. 2019. https://zerosuicidetraining.edc.org/enrol/index.php?id=20. Accessed 1 June 2021.
Gittelman MA, Pomerantz WJ, Laurence S. An Emergency Department Intervention to increase Booster Seat use for lower socioeconomic families. Acad Emerg Med. 2006;13(4):396–400. https://doi.org/10.1197/j.aem.2005.11.002.
Grossman DC. Gun Storage practices and risk of youth suicide and unintentional firearm injuries. JAMA. 2005;293(6):707. https://doi.org/10.1001/jama.293.6.707.
Johnson RM, Barber C, Azrael D, Clark DE, Hemenway D. Who are the owners of firearms used in adolescent suicides? Suicide Life-Threatening Behav. 2010;40(6):609–11. https://doi.org/10.1521/suli.2010.40.6.609.
Kalb LG, Stapp EK, Ballard ED, Holingue C, Keefer A, Riley A. Trends in Psychiatric Emergency Department visits among youth and young adults in the US. Pediatrics. 2019;143(4):e20182192. https://doi.org/10.1542/peds.2018-2192.
Ketabchi B, Gittelman MA, Southworth H, Arnold MW, Denny SA, Pomerantz WJ. Attitudes and perceived barriers to firearm safety anticipatory guidance by pediatricians: a statewide perspective. Inj Epidemiol Sep. 2021;13(Suppl 1):21. https://doi.org/10.1186/s40621-021-00319-9.
Miller M, Azrael D, Hemenway D. The epidemiology of case fatality rates for suicide in the northeast. Ann Emerg Med. 2004;43(6):723–30. https://doi.org/10.1016/j.annemergmed.2004.01.018.
Monuteaux MC, Azrael D, Miller M. *JAMA Pediatrics*. 2019-07-01 2019;173(7):657. https://doi.org/10.1001/jamapediatrics.2019.1078
Posner JC, Hawkins LA, Garcia-Espana F, Durbin DR. A Randomized, Clinical trial of a home safety intervention based in an Emergency Department setting. Pediatrics. 2004;113(6):1603–8. https://doi.org/10.1542/peds.113.6.1603.
Rowhani-Rahbar A, Simonetti JA, Rivara FP. Effectiveness of interventions to Promote Safe Firearm Storage. Epidemiol Rev. 2016;mxv006. https://doi.org/10.1093/epirev/mxv006.
Ruch DA, Steelesmith DL, Warner LA, Bridge JA, Campo JV, Fontanella CA. Health services Use by children in the Welfare System who died by suicide. Pediatrics. 2021-04-01 2021;147(4):e2020011585. https://doi.org/10.1542/peds.2020-011585
Runyan C, Becker A, Brandspigel S, Barber C, Trudeau A, Novins D. Lethal Means Counseling for parents of Youth seeking Emergency Care for Suicidality. Western J Emerg Med. 2016;17(1):8–14. https://doi.org/10.5811/westjem.2015.11.28590.
Sheatsley PB. Questionnaire construction and item writing. In: Rossi PH, et al. editors. Handbook of survey research. Academic; 1983. pp. 195–230
Ohio Chapter of the American Academy of Pediatrics. "Store It Safe Campaign." 2015. https://ohioaap.org/storeitsafe. Accessed 1 June 2021.
Uspal NG, Strelitz B, Cappetto K, et al. Impact of a Firearm Safety device distribution intervention on Storage practices after an Emergent Mental Health visit. Acad Pediatr. 2021;21(7):1209–17. https://doi.org/10.1016/j.acap.2021.04.024.
National Center for Health Statistics (NCHS). Web-based Injury Statistics Query and Reporting System (WISQARS). 2022. www.cdc.gov/injury/wisqars Accessed 1 July 2023.

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