OHIO EMS INJURY PREVENTION RESEARCH GRANT

2008-2009 RESEARCH PROJECT

FINAL PROJECT REPORT

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PROJECT NAME: The Medical and Economic Impact of Injuries in Ohio

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Introduction

The Ohio Commission on the Prevention of Injury was convened by the Ohio Department of Health from 2001-2003 to evaluate the status of injury in Ohio with particular emphasis on the pediatric and geriatric populations. The Injury Commission's final report, "Injury in Ohio: A Report of the Ohio Commission on the Prevention of Injury", did not include a comprehensive analysis of Ohio-specific injury data, especially injury morbidity data. The Injury Commission recognized the need for expansion and improvements in the use of injury surveillance data in Ohio, and one of its core recommendations was the linkage of existing statewide databases. Linkage of these databases was begun in 2004 with the initiation of the Ohio CODES Program. The current study analyzed linked and unlinked injury-related data from five statewide databases in Ohio to provide the most comprehensive and detailed evaluation of injuries in Ohio ever completed. This study contributes important information not included in the Injury Commission's report, and includes a special focus on motorcycle crash-related injuries in Ohio.

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Executive Summary

Background

Injury is among the most compelling public health problems facing our state and nation. It is the leading cause of death among children and young adults in Ohio and the United States. It is the leading cause of years of potential life lost before age 65 years (NCIPC, CDC). Clearly, research leading to a better scientific understanding of the medical and economic impact of injuries, and the risk and preventive factors associated with these injuries, is a public health priority for Ohio. The long-term goal of this study is to prevent injury-related morbidity and mortality in Ohio, especially related to motorcycle crashes.

Study Objective

This study evaluated the medical and economic impact of injuries in Ohio, and identified key factors that are associated with the outcome of individuals who sustain motorcycle crash-related injuries in Ohio. *Specific Aim 1:* Describe the medical and economic impact of injuries, including motorcycle crash-related injuries, in Ohio. *Specific Aim 2:* Test the hypothesis that there are identifiable risk factors (i.e., motorcycle operator age and alcohol involvement) and protective factors (i.e., use of a helmet) that are associated with the outcome (e.g., injury severity and survival) of individuals who sustain motorcycle crash-related injuries in Ohio.

Methodology

Descriptive data for this report were obtained from unlinked Ohio Crash Reports, Emergency Medical Services Incidence Reporting System, Hospital Discharge Records (emergency department and inpatient admissions), Trauma Registry Records, and Death Certificates for the years 2005 through 2007. Our analyses for motorcycle crash-related injuries in Ohio utilized Ohio Crash Reports that were probabilistically linked to Hospital Discharge Records for the years 2005 through 2007.

Conclusions

The findings of this study demonstrate that injuries are an important cause of morbidity and mortality among Ohioans of all ages. While the cause and/or intent of injury may differ among genders and age groups, injuries have a substantial medical and economic impact for all, resulting in more than $10 billion in hospital charges and 2 million days of hospitalization during 2005-2007. Motorcycle injuries alone accounted for $113 million spent on hospital care, which is on average $37,685,038 annually. Evidence-based and targeted prevention initiatives at the state and local levels must continue to be implemented and evaluated to reduce the burden of injury in Ohio.

Investigators and Project Personnel - Information/Qualifications

Principal Investigator - Gary A. Smith, MD, DrPH. - Dr. Gary Smith is a Professor of Pediatrics of the Ohio State University College of Medicine with joint faculty appointments in the Division of Epidemiology, College of Public Health, and in the Department of Emergency Medicine. He is founder and Director of the Center for Injury Research and Policy (CIRP) and is a pediatric emergency medicine physician at Nationwide Children's Hospital in Columbus, Ohio. Dr. Smith is board certified in the specialties of pediatrics and general preventive medicine and public health, and in the subspecialty of pediatric emergency medicine. In addition to his clinical training, Dr. Smith holds Master of Public Health and Doctor of Public Health degrees from the Johns Hopkins Bloomberg School of Public Health. He is immediate past chairperson of the national Committee on Injury, Violence, and Poison Prevention of the American Academy of Pediatrics (AAP) and was a member of the Initial Review Group of the National Center for Injury Prevention and Control, CDC, from 2003-2006. Dr. Smith is the principal investigator of the Ohio CODES program and several other ongoing injury research projects.

Co-Investigator - Huiyun Xiang, MD, PhD, MPH. - Dr. Xiang is an Associate Professor of Pediatrics in the Ohio State University College of Medicine and a research faculty member in CIRP. Dr. Xiang is an injury epidemiologist with advanced training in biostatistics. He has more than 15 years experience in large data management and statistical analysis. Dr. Xiang is the PI of several ongoing injury research projects, and is Co-PI of the Ohio CODES Program.

Co-Investigator – Jonathan I. Groner, MD. - Dr. Groner is a Clinical Professor of Surgery at the Ohio State University College of Medicine, the Medical Director of the Level 1 Pediatric Trauma Program at Nationwide Children's Hospital, and an affiliate research faculty member in CIRP. He was president of the Central Ohio Trauma System, and is a member of the Ohio Emergency Medical Services Board.

Project Research Manager – Lynne Rochette, PhD. - Dr. Rochette obtained her degree in experimental psychology from Ohio University. She has experience in conducting research, performing data analysis, peer-reviewed publication, and teaching research methods and statistics.

Data Linkage Supervisor – Ashley Swert, MAS. - Ms. Swert has a master degree in applied statistics. She has experience in data analysis and experimental design, as well as with the probabilistic data linkage methodology used in this research project.

Data Analysis Supervisor - Brenda J. Shields, MS. - Ms. Shields has more than 17 years of experience with managing and analyzing large and complex datasets. She is lead or co-author of numerous research studies on injury-related topics published in the peer-reviewed scientific literature.

Literature Review

Injury is among the most compelling public health problems facing our state and nation. It is the leading cause of death among children and young adults in Ohio and the United States. The Ohio Commission on the Prevention of Injury was convened by the Ohio Department of Health from 2001-2003 to evaluate the status of injury in Ohio with particular emphasis on the pediatric and geriatric populations. However, the Injury Commission's final report did not include a comprehensive analysis of Ohio-specific injury data, especially injury morbidity data. This was primarily due to difficulty in accessing some databases. The Injury Commission recognized the need for expansion and improvements in the use of injury surveillance data in Ohio. Members of the Ohio legislature typically request Ohio-specific injury data when considering legislation to prevent injury among Ohioans, and these data have been often unavailable in the past. This study provides these data, and also focuses on motorcycle crash-related injuries.

Motorcycle-related fatalities and fatality rates have been increasing rapidly during the past decade nationally. Excessive speed was involved in 37% of motorcyclist deaths, compared with 23% of deaths to passenger car drivers in 2006 (NHTSA, 2008). Alcohol also plays an important role in motorcycle-related fatalities. In 2006, 27% of motorcyclists who died had a blood alcohol concentration (BAC) of .08 g/dL or greater, which was higher than any other category of motor vehicle driver. The percentage of motorcycle operators with a BAC equal to or greater than .08 was 41% for single-vehicle crash-related fatalities and 59% for fatalities involving single-vehicle collisions on weekend nights. Motorcycle operators with BACs of .08 or greater killed in crashes had lower helmet use rates (45%) compared with those who had no detectable alcohol (66%) (NHTSA, 2008). Brain injury is the leading cause of death in motorcycle crashes (NHTSA, 2008a). Motorcycle helmets are estimated to be 37% effective in preventing motorcycle crash-related fatalities, and 67% effective in preventing brain injuries (NHTSA, 2008a; NHTSA, 1996). In 2006, an estimated 1,650 motorcyclist lives were saved by helmets, and another 750 lives could have been saved if there had been universal helmet use by motorcycle operators (NHTSA, 2008). Despite these statistics, helmet use has been decreasing dramatically.

Historical Perspectives

Motorcyclist deaths increased by more than 110% from 1996 to 2005, and currently account for approximately 11% of motor vehicle crash fatalities. Increases in motorcycle registrations (61%) and vehicle miles of travel (8.6%) played only a minor role in the observed increase; the motorcycle fatality rate increased by 94% during this ten-year period (FHWA, 2007). The number of motorcyclist deaths increased another 5% from 2005 to 2006, totaling 4,810 deaths nationally, and there were another 88,000 non-fatal injuries among motorcyclists in 2006 (NHTSA, 2008). In 2005, motorcycles represented more than 3% of registered vehicles, contributed 0.4% of all vehicle miles of travel, but accounted for 11% of

traffic fatalities, 13% of occupant deaths, and 4% of occupant injuries. In a crash, motorcycles provide almost no protection to their riders. Motorcyclists were approximately 37 times more likely to die and 8 times more likely to be injured than occupants of passenger cars per vehicle mile driven in 2005 (NHTSA, 2008).

Current Status in Ohio

There are more than 6,000 deaths in Ohio due to injury each year. Two-thirds of these deaths are due to unintentional injury, and one-third is caused by intentional injury. However, a comprehensive understanding of the breadth and magnitude of the injury problem in Ohio currently does not exist. Motor vehicle crashes, including motorcycle crashes, are one of the leading causes of death, accounting for about 45% of unintentional trauma-related fatalities in Ohio. They are also a leading cause of trauma-related morbidity. Ohio has the 10th largest roadway system in the United States. It also maintains the 5th largest traffic volume, and 4th largest truck traffic volume in the nation. Each year, thousands of people are killed or injured in crashes on Ohio's roadways. These crashes adversely affect the victims and their families, as well as the State of Ohio as a whole. Millions of dollars are lost each year in productivity, property damage, increased insurance costs, and municipal expenses, while the number of licensed drivers and registered vehicles, especially motorcycles, continues to grow.

Regional and National Trends

According to the National Occupant Protection Use Survey (NOPUS) by NHTSA, motorcycle helmet use declined from 71% in 2000 to 51% in 2006. This represents a 70% increase in nonuse (NHTSA, 2008). As of January 2008, 20 states, Washington DC, and Puerto Rico had universal helmet laws requiring all motorcycle operators and passengers to wear helmets; 28 states required helmet use only for persons under a certain age (usually 18 years old); and 2 states had no motorcycle helmet use laws (NHTSA, 2008a). Universal motorcycle helmet use laws have been shown to significantly increase helmet use and are easily enforced because of the high visibility of motorcycle riders. Helmet laws applying only to minors or novice operators, such as the current law in Ohio, are difficult to enforce. Indeed, in states with laws restricted to minors, less than 40% of fatally injured youth were wearing helmets despite the law (NHTSA, 2008a). Following the first year of enactment of a universal helmet law, there were documented decreases in motorcycle crash-related fatalities of 15%-37% in the six states where this was studied (NHTSA, 2008a). Fatalities have increased in states following the repeal or weakening of motorcycle helmet laws, including in Arkansas (21%), Texas (31%), Kentucky (50%), and Louisiana (100%) (NHTSA, 2008a; NHTSA, 2000). Hospital costs of motorcycle crash-related injuries are higher among unhelmeted operators, and these costs are less likely to be covered by insurance. An estimated $1.3 billion was saved in 2002 alone due to motorcycle helmet use (NHTSA, 2008a; NHTSA, 1998).

Financial Considerations

Not applicable to this research project.

Education and Training Considerations

Not applicable to this research project.

Legislative and Regulatory Considerations

Not applicable to this research project

Data Considerations

Descriptive data for this report were obtained from unlinked Ohio Crash Reports, Emergency Medical Services Incidence Reporting System, Hospital Discharge Records (emergency department and inpatient admissions), Trauma Registry Records, and Death Certificates for the years 2005 through 2007. Our analyses for motorcycle crash-related injuries in Ohio utilized Ohio Crash Reports that were probabilistically linked to Hospital Discharge Records for the years 2005 through 2007. Please see the accompanying report titled "The Burden Of Injury In Ohio, 2005-2007" and report titled "Motorcycle Injuries in Ohio, 2005-2007" for a description of the methodology used in this study.

Researcher Findings

Please see the accompanying report titled "The Burden Of Injury In Ohio, 2005-2007" and report titled "Motorcycle Injuries in Ohio, 2005-2007" for a description of findings presented in this study.

Conclusions

The findings of this study demonstrate that injuries are an important cause of morbidity and mortality among Ohioans of all ages. While the cause and/or intent of injury may differ among genders and age groups, injuries have a substantial medical and economic impact for all, resulting in more than $10 billion in hospital charges and 2 million days of hospitalization during 2005-2007. Motorcycle injuries alone accounted for $113 million spent on hospital care, which is on average $37,685,038 annually. Roughly, 12 thousand individuals were injured while riding a motorcycle in Ohio during 2005-2007.

Recommendations

Evidence-based and targeted prevention initiatives at the state and local levels must continue to be implemented and evaluated to reduce the burden of injury in Ohio.

References

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