Fifty Favorites
From the Works of Susan P. Baker
Fifty Favorites
From the works of
Susan P. Baker

The Johns Hopkins Center for
Injury Research and Policy

Baltimore, Maryland
2012
CREDITS

Cover: Sitting on the wing of Margaret Lamb’s Navion as we plotted our route for the next flight (see Page 26). Photo by Margaret W. Lamb.

Cover design by Lynne Heiser

Page 63: Photo by Keith Weller.

Manuscript preparation by Rachel L. Howard
Here in my office in the summer of 2012, I look with a mixture of pleasure and despair at the shelves of books and file cabinets of papers and wonder how I will dispose of everything by the end of the year, as I have promised myself to do.

The task of putting together these papers was more fun than the rest of that job will be, but perhaps some of my readers will come to my rescue and tell me which of these volumes and documents you would like to have.

The favorites that I have included are 50 peer-reviewed papers and two examples of testimony before Congressional committees. In addition is Bill Haddon’s Foreword to The Injury Fact Book because he describes that book so well. Bill played such an important role in my career that I wanted him to be represented here.

The hard part of developing this collection was narrowing the selection to 50 – deciding which fifty. The delightful part was contacting many old friends and former colleagues and reminiscing about the ‘old days’ when many of these papers were written -- my earliest injury papers go back to 1970, 42 years ago!

The disappointing part was not being able to mention colleagues with whom I worked on other papers. I treasure you and our papers just as much as the ones I included, but for a variety of reasons each of these 50 called out to me, “Take me, take me.”

My comments that precede the abstracts are a mixture of recollections, some of which may be inaccurate. But together they capture much of my enjoyable career. Thank goodness it is not over.

Sue Baker
# TABLE OF CONTENTS

CREDITS .............................................................................................................. i

PREFACE ........................................................................................................... ii

FAVORITE WORKS ............................................................................................... 
Anuria Produced by Alpha-Naphthyl Thiourea ................................................. 1
An Evaluation of the Hazard Created by Natural Death at the Wheel ................. 2
Age Effects and Autopsy Evidence of Disease in Fatally Injured Drivers .......... 3
Tattoos, Alcohol, and Violent Death ................................................................. 4
Evaluation of the Management of Vehicular Fatalities Secondary to Abdominal Injury ........................................................................................................... 5
Fatal Unintentional Carbon Monoxide Poisoning in Motor Vehicles ................. 6
The Injury Severity Score: A Method for Describing Patients with Multiple Injuries and Evaluating Emergency Care .............................................................. 7
Drowning: Epidemiology and Prevention .......................................................... 8
How Drivers Prevented from Driving Would Reach Work: Implications for Penalties ............................................................................................................ 9
The Man in the Street: A Tale of Two Cities ..................................................... 10
28,000 Gun Deaths a Year: What is Our Role? ................................................ 11
Fatally Injured Truck Drivers ............................................................................ 12
Children in Motor Vehicles: Never Too Young to Die ..................................... 13
Motor Vehicle Occupant Deaths in Young Children ........................................ 14
Childhood Asphyxiation by Choking or Suffocation .......................................... 15
Freedom and Protection: A Balancing of Interests ........................................... 16
Childhood Injuries: The Community Approach to Prevention .......................... 17
Recent Trends in Fatal Poisoning by Opiates ................................................... 18
Fatal Occupational Injuries ............................................................................. 19
Fatal Housefires in an Urban Population .......................................................... 20
Injuries Among the Hopi Indians: A Population-Based Survey ......................... 21
Smoke Detector Legislation: Its Effect on Owner-Occupied Homes ................. 22
Poisoning Hospitalizations and Deaths from Solids and Liquids Among Children and Teenagers ................................................................. 24
Falls in the Institutionalized Elderly .................................................................. 25
Hazards of Mountain Flying: Crashes in the Colorado Rockies ....................... 26
Pilots Involved in Multiple Crashes: "Accident Proneness" Revisited ................. 27
Prior Crash and Violation Records of Pilots in Commuter and Air Taxi Crashes: A Case-Control Study ............................................................................... 28
Exploring the Male-Female Discrepancy in Death Rates from Bicycling Injury:
The Decomposition Method ................................................................. 29
At Work and Play in a Hazardous Environment: Injuries Aboard a Deployed
U.S. Navy Aircraft Carrier .................................................................. 30
Biomechanical Epidemiology: A New Approach to Injury Control Research .................................................................. 31
Wartime Civilian Injuries: Epidemiology and Intervention Strategies .................................................................. 32
A Modification of the Injury Severity Score that Both Improves Accuracy and
Simplifies Scoring ............................................................................. 33
Back Injury in Municipal Workers: A Case-Control Study ..................... 34
Effects of High School Driver Education on Motor Vehicle Crashes, Violations,
and Licensure .................................................................................. 35
Carrying Passengers as a Risk Factor for Crashes Fatal to 16- and 17-Year Old
Drivers ............................................................................................ 36
Characteristics of General Aviation Crashes Involving Mature Male and Female
Pilots .................................................................................................. 37
Age, Flight Experience, and Risk of Crash Involvement in a Cohort of
Professional Pilots ............................................................................ 38
Inmate-Made Weapons: Assessing the Risk ......................................... 39
Crash Resistant Fuel System Effectiveness in Civil Helicopter Crashes .... 40
EMS Helicopter Crashes: What Influences Fatal Outcome? ................. 41
Graduated Driver Licensing Programs and Fatal Crashes of 16-Year Old
Drivers: A National Evaluation ....................................................... 42
Sharpless Surgery: A Prospective Study of The Feasibility of Performing
Operations Using Non-Sharp Techniques in an Urban, University-Based
Surgical Practice .............................................................................. 43
Crashes of Sightseeing Helicopter Tours in Hawaii .............................. 44
Preventing Injuries by Understanding Energy Damage........................... 45
Injury Statistics, High Risk Groups, and Individuals: Falling Through the Cracks .... 46
Alcohol in Fatal Crashes Involving Mexican and Canadian Drivers in the United
States ............................................................................................... 47
Comparing Road Traffic Mortality Rates from Police-Reported Data and Death
Registration Data in China .................................................................. 48
Trauma in the Russian Federation: Then and Now ................................. 49
Helicopter Crashes Related to Oil and Gas Operations in the Gulf of Mexico .... 50
Testimony: Heavy Truck Safety ............................................................ 51
Testimony: Passive Restraints - Airbags ............................................... 52
Foreword to The Injury Fact Book by William Haddon, Jr. .................... 55

ACRONYMS ...................................................................................... 59
INDEX OF AUTHORS ........................................................................ 60
ABOUT THE AUTHOR ........................................................................ 63
ANURIA PRODUCED BY ALPHA-NAPHTHYL THIOUREA

SP Baker

My first paper was written a year after I graduated from Cornell with a BA in Zoology. It had nothing to do with injury, although the rats might have disagreed with that. Working in the psychobiology lab of Curt Richter—famous for his concept of ‘biological clocks’—laid the foundation for my later research habits. A rare preceptor, he declined to be named as an author because I had conceived and executed this project (including designing the equipment) and written up the results while he was out of the country. He encouraged me to submit it first to the journal where I most wanted to see it published; when the American Journal of Physiology accepted, I never forgot that lesson.

Abstract: The mechanisms involved in alpha-naphthyl thiourea (ANTU) poisoning are still not fully understood. The outstanding feature of ANTU poisoning is the loss of large amounts of fluid from the blood stream into the lungs and pleural cavities. When we realize that the volume of this fluid often approaches total blood volume, it is probable that profound changes must occur in fluid regulators. Although histological examination of the kidneys of ANTU-poisoned rats has revealed no pathological changes, we decided to determine whether this great fluid transfer is reflected in the urine output. To investigate this we tested the effects of ANTU on a forced water diuresis. Our study of the urine output of rats forced to ingest large amounts of fluid show that in rats, urine formation returns to normal as pleural effusion and pulmonary edema diminish. It is suggested that since anuria and the other symptoms that characterize ANTU poisoning often accompany certain types of shock, rats poisoned in this manner may be considered to be in a condition of shock.


On the PubMed page where the link leads to, there is a rectangular icon in the top right corner for either the Journal where the article appears, or a database like Ovid or ScienceDirect; click the icon to find and download the full text of the article.
AN EVALUATION OF THE HAZARD CREATED BY
NATURAL DEATH AT THE WHEEL

SP Baker and WU Spitz

Werner Spitz was Deputy Chief Medical Examiner of Maryland when I telephoned him in the spring of 1968, toward the end of my MPH program. I asked about the possibility of reviewing ME cases of drivers who died at the wheel. Instead of telling me about probable difficulties, he said, “Come on over, let’s talk.” “When?” “As soon as you’d like.” I was on my way that afternoon. That began 14 happy and productive years digging in a gold mine of data and collaborating with Werner Spitz and other medical examiners. For the first few years, until we moved to a building near University Hospital, I had no office, but sat at the table in the residents’ room, where they discussed cases, dictated descriptions of the autopsies they had just performed, and changed into or out of their scrubs—simply standing behind me as they did so. To identify the cases I would study, I worked my way through ledgers where cases were entered, one line per case, with codes to identify the cause of death. Then I would pull a stack of cases from the file, each bearing a description of the body, the findings revealed by autopsy, and the investigator’s report of the circumstances of death. Werner says I “brought back to daylight the long-forgotten files which harbored valuable information that no one recognized and no one took time or had the interest to explore.”

Abstract: Assessment of the hazard associated with sudden natural death of drivers suggests that the magnitude of the problem does not warrant costly and restrictive control efforts. Investigation of 591 collisions that caused fatal injuries to drivers or pedestrians revealed that none of them resulted from natural death at the wheel. Natural death of a sober driver apparently does not entail measurable risk of death or severe injury to his passengers or other persons. Collisions caused by these deaths are relatively infrequent, representing less than 6 per 10,000 motor-vehicle collisions. Nonfatal medical impairments still need to be explored more precisely before driver examinations and restrictions can be considered justified and effective.

Citation: Baker SP, Spitz WU. An Evaluation of the Hazard Created by Natural Death at the Wheel. New Eng J Med 283:405-409, August 20, 1970.

AGE EFFECTS AND AUTOPSY EVIDENCE OF DISEASE IN FATALLY INJURED DRIVERS

SP Baker and WU Spitz

In 1968, I became the first faculty member at the School of Public Health to specialize in “accident prevention,” soon to be known as “injury control,” which was the title of my first textbook chapter. At the beginning of my academic career, my research focused on highway safety and alcohol, which was associated with the majority of the 55,000 road deaths annually in those years. Yet when I described my research to a faculty member who asked what I was working on, she said, “But is that Public Health?” Her attitude was not unusual at the time, but today no public health professional would be likely to ask that about any injury problem. I think that is a real mark of our success. JAMA had rejected my first paper (on the prior page) but quickly accepted this paper after NEJM published the first. When a medical news journal described this paper, it repeatedly referred to the authors as “Spitz and Baker,” apparently in recognition of Dr. Spitz’s status as a physician. I wrote the editor that when a junior, non-MD was first author, one could be sure she had done most of the work, and should be mentioned first. When the same news journal subsequently featured the paper on Page 4, it described us as, “Mrs. Baker and a team of three (unnamed) physicians.”

Abstract: A total of 328 drivers who died as the result of highway crashes were investigated, using autopsy records and police reports. There was no correlation between driver responsibility for the crash and autopsy evidence of disease or physical disability. Arteriosclerotic heart disease was found with similar frequency in drivers at fault and drivers not at fault. Several findings indicated that a decreased ability to survive crashes caused older persons to be greatly overrepresented among fatally injured drivers. The proportion of drivers who were 60 years of age or older was five times as high among those killed as among drivers who survived multivehicle crashes. Delayed death was more common among older drivers and was associated with less-serious injuries than in younger drivers.

Citation: Baker SP, Spitz WU. Age Effects and Autopsy Evidence of Disease in Fatally Injured Drivers. JAMA 214:1079-1088, 1970.

TATTOOS, ALCOHOL, AND VIOLENT DEATH

SP Baker, LS Robertson, and WU Spitz

Tattoos were scarcely on my list of proposed research topics. But I was sitting at my 24-inch-wide designated space in the residents’ room of the Office of the Chief Medical Examiner, coding cases of fatally injured drivers, when I realized that the last four were decorated with tattoos. So I went back to the first case and added tattoos as a variable. Their over-representation among “at fault” drivers caught the attention of Bill Haddon, then head of NHTSA, when I wrote him asking for $10,000 to expand the study. His deputy, Bob Brenner, phoned me two days later: “Dr. Haddon wants to fund this. Just send us a budget.” Thus began more than two decades of funding and collaboration with Bill and his colleagues at the Insurance Institute for Highway Safety, where Bill became president.

Abstract: Tattoos are often viewed by clinicians as possible indicators of sociopathic personality, delinquency, or venereal disease. Among veterans, tattoos often adorn men whose life histories include truancy, parental separations, and courts-martial. Similar findings were obtained among enlisted men at a submarine school and inductees into the army who were tattooed before their recruitment for service. Studies of a mental institution and a prison show that tattoos are likely to be acquired during the first months in the institutions in order to gain acceptance, rather than later to relieve boredom. Tattooed inmates of an English special prison were judged less stable and more intelligent than their non-tattooed counterparts; “Tattooing was a peripheral indicator of a primary ‘psychopathic’ syndrome.” The present study was undertaken to examine the relationship between tattoos and violent death and to determine whether, in the groups studied, tattoos are independent of age, blood alcohol concentration, occupation, and other variables. Driver fatalities and homicides were both studied, since parallel relationships may be indicative of similarities in the pathogenesis of these two forms of violent death. Tattooed drivers fatally injured in crashes and tattooed homicide victims were more likely than their non-tattooed counterparts to have contributed to the events leading to their deaths. Alcohol was correlated with presence of tattoos among drivers, and was a major factor in both forms of violent death.


“The patient’s blood pressure dropped. I’ve phoned the doctor on call.” As the ME opened the blood-filled abdomen, I was reading the notes that had been written by a desperate nurse while her patient was dying for lack of a surgeon. This was not the first such case from a rural ER. I needed surgeons to help me interpret the data that I now wanted to collect for my next paper. Rudy Gertner, a surgical resident, and his chief, Robert Rutherford, joined Werner Spitz and me on a study that, according to R Adams Cowley, founder of the Shock-Trauma unit at University of Maryland, provided crucial evidence to support the first statewide trauma system that would direct trauma victims to hospitals that were staffed and equipped to care for them. This paper was my first presentation at a scientific meeting (AAAM); when I finished, still quaking from nervousness, a past-president stood and stated, “You have opened Pandora’s box!” Later, when I’d caught my balance, I asked him, “Do you want to just close the lid and sit on it?” (Later I learned the questioner was mad because a non-physician had exposed deficiencies in trauma care.)

Abstract: Each year almost 60,000 Americans die as the result of motor vehicle collisions. It has been emphasized that over half of these persons die before they reach a hospital, thereby calling attention to the importance of proper extrication, rapid transportation, and resuscitative measures applied at the scene of the accident or in transit to the hospital. We believe it is equally appropriate to evaluate and improve the medical care received by those who survive long enough to reach medical facilities. This report concerns 33 drivers, passengers, and pedestrians who died following isolated abdominal injury, and considers the adequacy of the hospital care that they received. Hospital records and postmortem findings were reviewed for 33 highway deaths in which the main injuries were intra-abdominal. It was estimated that half of these lives might possibly have been salvaged by prompt and proper diagnosis and treatment. Over one-third of the cases showed a need for more aggressive treatment of patients in shock. Nearly half involved either failure to operate or excessive delay in operation, despite symptoms of abdominal injury. The results suggest that greater attention should be given to transporting injured patients to facilities that are best equipped and staffed to handle major trauma.


FATAL UNINTENTIONAL CARBON MONOXIDE POISONING IN MOTOR VEHICLES

SP Baker, RS Fisher, WC Masemore, and IM Sopher

During my first years in the ME office, I often started my day in the autopsy room, reading the investigators’ reports on the cases and listening to discussions among the MEs. After watching a number of autopsies of people who died unexpectedly of carbon monoxide poisoning while trying to stay warm in their car, I talked with Bill Masemore, Chief Investigator for the ME office, and Irv Sopher, then an assistant ME and later the chief medical examiner for West Virginia. They convinced me that those deaths were preventable. After this paper was published in AJPH, I wrote a layman’s version that was published in Parade, Status Report, Autosafe, and Catholic Digest. Eventually, changes in car design and durability greatly reduced these deaths. My choice of Parade was based not on the fact that it would pay me something, but on the number of people likely to read it, far greater than would read any journal. For dissemination of information based on research published in journals, we had to depend upon reporters picking up the information from Hopkins’ press releases, which have always been terrific in their outreach.

Abstract: The potential health hazard created by sublethal concentrations of carbon monoxide from automotive exhaust in the atmosphere has evoked increasing concern. At the same time, the large number of deaths that occur in vehicles when lethal concentrations of carbon monoxide enter the passenger compartment has escaped widespread attention. This paper presents data suggesting that over 500 Americans die each year from carbon monoxide poisoning because their vehicles are defective due to deterioration, damage, or poor automotive design. Most of these deaths occur in non-moving vehicles; therefore they are not classified as “motor vehicle accidents” and rarely are thought of in connection with vehicular deaths. Yet probably no other group of deaths is more closely related to defective motor vehicles. In 1967, 819 deaths in the U.S. were classified as “accidental poisoning by motor vehicle exhaust gas.” As with many types of adult poisoning, information on these deaths is scanty because they rarely reach the hospital alive and therefore are not reported through the poison control information system. Sopher and Masemore’s report on 6 recent carbon monoxide deaths described methods of investigation and disclosed the role played by defective vehicles. Their findings led to this review of all Maryland deaths during the past six years caused by unintentional carbon monoxide poisoning in motor vehicles. The objectives were to document the size of the problem, describe the age and condition of the vehicles and the circumstances under which these deaths occurred, and consider the possible solutions suggested by the data.


The Injury Severity Score: A Method for Describing Patients with Multiple Injuries and Evaluating Emergency Care

SP Baker, B O'Neill, W Haddon Jr., and WB Long

In 1970, Bill Haddon, president of IIHS, suggested that I tear up a grant proposal I was preparing in hopes of NIH funding and accept IIHS support for to-be-determined research. The next six frustrating months saw a series of my suggested research proposals rebuffed. Finally Haddon and Brian O’Neill, who was then the Senior Statistician in the IIHS research department (and later the president of IIHS after Bill died), liked my idea of studying a series of traffic deaths in Baltimore city. We had no inkling that what would evolve would be the ability to measure the effect on trauma outcome of having more than one injury. At that time the Abbreviated Injury Scale (AIS) was the best thing for describing injury severity, but it applied only to single injuries. When I came up with what is Figure 2 in the following paper, I was excited to realize I had measured the influence of additional injuries on fatality rates – but everyone I showed it to said, “well, of course it is worse to have more than one injury” – until I shared it with Bill Long at a breakfast meeting of ER docs. Bill, a young surgeon at Shock Trauma who had been trying to measure the effects of single organ failure and multiple organ failure, looked at the graph for about two minutes and said, “this is fascinating – if you square and add the scores for the two worst injuries, the sum correlates with the case-fatality rate.” (Subsequently Brian’s calculations showed that it was important to use the 3 worst injuries.) Twenty-five years later, the ISS is still valued as a very simple way to assess the likelihood of a fatality given various combinations of injuries. (The NISS, page 33, is even simpler and better, but regrettably is less widely used).

Abstract: It is essential to take into account differences in severity of injury when comparing the morbidity and mortality of various groups for purposes of evaluating their emergency and subsequent care. A method for comparing death rates of groups of injured persons was developed, using hospital and medical examiner data for more than two thousand persons. Controlling for severity of the primary injury made it possible to measure the effect on mortality of additional injuries. Injuries that in themselves would not normally be life-threatening were shown to have a marked effect on mortality when they occurred in combination with other injuries. An Injury Severity Score was developed that correlates well with survival and provides a numerical description of the overall severity of injury for patients with multiple trauma. Use of the Injury Severity Score facilitates comparison of the mortality experience of varied groups of trauma patients, thereby improving ability to evaluate care of the injured.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/4814394
Park Dietz was a third-year med student when he dropped into my 3rd floor cubbyhole at the new ME office to which we had moved. “I have some free time to work on a project and someone told me you had lots of ideas.” That was probably the last time Park had to ask anyone to suggest an idea. The project ended his supposition that data were dull, not worth time collecting and analyzing. I had just begun this drowning study and was happy to turn it over to him. We made a good team. He did a great job with the Haddon Matrix, which categorizes injury prevention measures by whether they apply before, during, or after the crash or other injury event; the other dimension of the Matrix is divided into factors related to the host (e.g., driver or injured person), the inanimate vector or vehicle that conveys harmful energy to the host, and the physical or social environment in which the injury occurs. Each of the twelve cells of the Matrix contains factors that contribute to the likelihood or severity of the injury, or factors that would prevent or reduce the injury. Park later applied the Matrix to the problem of rape, showing its value in formulating approaches to intentional injury. I suspect his time at the ME office contributed to his eventual career as a world-famous forensic psychiatrist, and the Haddon Matrix probably played a role in his development of an entire industry addressed to workplace violence prevention.

Abstract: From an epidemiological perspective, drowning may be viewed as an interaction between host (person) and agent (water), occurring with or without the intervention of a vector or vehicle (most often a boat, in the present case) in a variety of environmental settings. This view of drowning emphasizes the similarity not only between drowning and disease but also between drowning and other types of injury-producing interactions between man and his environment. Drowning and highway death, for example, share certain etiological factors such as alcohol intoxication and suggest common preventive measures such as better emergency systems. The two phenomena are also similar in regard to some of the circumstances surrounding the events: for instance, fatal crashes are not usually associated with high density rush hour traffic, and drowning (at least in Maryland) is rare at crowded beaches.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/4818067
HOW DRIVERS PREVENTED FROM DRIVING
WOULD REACH WORK: IMPLICATIONS FOR PENALTIES

SP Baker and LS Robertson

Sometimes we hear something so often that we begin to accept it as fact. I was tired of hearing that judges had allowed convicted drunk drivers to continue driving because they said their jobs depended upon it. Leon Robertson at IIHS shared my skepticism. Always innovative, Leon was willing to add a revealing question to a survey he was planning: The question was, “How would you get to work if you broke your right leg and could not drive because the leg was in a cast?” The great majority of those surveyed would still be able to get to work; usually they expected a friend or relative would drive them, although one driver claimed he would simply use his left foot to brake or accelerate. Did this research have any effect? I don’t know. We should have made sure that it reached a publication that judges were likely to read. Today the communication experts at the Center for Injury Research and Policy, working with the School’s Public Affairs Department, do a superb job of making sure our work reaches a wide audience.

Abstract: The validity of the assumption that loss of a driving license would result in economic hardship for most drivers was examined. Persons who drive to work were asked how they would reach work if a broken leg prevented them from driving. Only 21 per cent said they would not be able to make other travel arrangements. Of those who thought they could find other transportation, two-thirds said the alternative would cost no more than driving themselves. Less than one-fifth said the time required would be more than an additional half hour per day. The results indicate that policies and practices related to license suspension and revocation should not be based on an assumption that job loss or economic hardship would be experienced by most drivers if they were to lose their driving privileges.

Citation: Baker SP, Robertson LS, How drivers prevented from driving would reach work: Implications for penalties. Accident Analysis & Prevention. 7(1):45-48; May 1975.

Link to Full-text: http://www.sciencedirect.com/science/article/pii/0001457575900184
A summer in Rio de Janeiro offered the chance to study pedestrian deaths there and compare them to Baltimore’s. In Rio even a sober adult could easily be killed, as I learned first-hand when a car narrowly missed me as I tried to navigate a wide boulevard with no traffic lights. Rio’s Instituto Medical Legal, which corresponded to Maryland’s ME office, gave me permission to access their files. Fighting my way through ledgers led me to relevant case histories in Portuguese. I learned the words for ‘pedestrian’ and other essential clues and abstracted data from hundreds of cases of MV-related death. The Rio health department had tried in vain to obtain that very data. But they were mistakenly relying on the Instituto to do what I had done; that was one of many examples of ‘if you want it done, do it yourself.’ It was here in Rio where I recognized that, in order to lure people to the safest way to accomplish any task, whether it be crossing a street or removing the cornstalks from a jammed cornpicker, it must be the easiest way. I think it really hit me when I studied a divided highway near Rio where 200 pedestrians had been killed in a single year. The pedestrian bridges that facilitated safe crossing were one-quarter mile apart and required one to climb many stairs, oftentimes carrying groceries, bicycles, or children. Until they make the pedestrian crossings level with the cars going above or below, pedestrians will continue to dart across, lifting their bicycles over the concrete median. First published in Accident Analysis and Prevention in 1977, this was my first foray into injury prevention in other countries. More recently, Guoqing Hu (Page 48) and I have found similar undercounts of deaths as reported by police in China.

Abstract: We compared pedestrians killed in Baltimore with those killed in Rio de Janeiro. Three-fourths of all pedestrians killed in Baltimore are very young, elderly, or intoxicated -- the kinds of people least likely to perceive adequately and respond appropriately to the signals and hazards of the traffic environment. In Rio de Janeiro, on the other hand, most fatally injured pedestrians are sober, working-age adults. In other words, in Rio one need not be very young, very old, or intoxicated to be killed. A substantial proportion of able-bodied people among pedestrian fatalities should call attention to a difficult task or unusual environmental hazards. Death may occur when pedestrians brave the hazards in preference to unacceptable alternatives. If the ‘safe’ way is slow or onerous, some will choose a quicker or easier way, no matter how dangerous. Two ideas: First, we should design our transport system to protect the most vulnerable people. Second, to ensure that pedestrians choose the safest way to their destination, the safest routes must also be the easiest and most appealing.


28,000 GUN DEATHS A YEAR: WHAT IS OUR ROLE?

SP Baker

It is hard to believe today, but prior to this paper, public health attention to gun deaths was limited to “accidents.” When I gave the paper at a meeting of the California branch of the American Trauma Society, some members seemed ready to run me out of town. The notion that homicides and suicides were attributable to the weapons involved was new and far from acceptable. Sadly, the “gun lobby” has made this an issue of personal freedom and successfully pushed measures that increase not only the availability of guns and ammunition but also their pervasiveness. The notion that “guns don’t kill people, people kill people” was widely accepted. Slowly, that would change, especially after Steve Teret (Page 16) helped to shift the emphasis to the weapons – from their design and manufacture to distribution and sale.

Abstract: Second only to motor vehicles as instruments of death, firearms will kill more than 28,000 Americans this year. Gun deaths exceed the total number of deaths from fires, explosions, drowning, and poisoning each year. In addition, firearms cause many serious non-fatal injuries, often resulting in prolonged disability. Firearm deaths classified as “accidental” number 2,400 a year. Suicide by firearms—by far the most common means of suicide—takes 12,000 lives a year in the U.S. Firearm homicides in 1974 numbered about 14,000. Because of their firsthand knowledge of the problem, physicians, other health professionals, and their professional associations are in a unique position to help prevent these injuries, especially by facing up to the handgun question. In the case of drugs, a physician who knows that a drug does more harm than good will not prescribe it for his own patients and will also, if he wants to protect other people, support proposals to prevent the manufacture, importation, sale, or use of the drug except in special cases where its demonstrated life-saving benefits outweigh the hazards. Is there any logical reason not to do as much against the second leading cause of fatal trauma?

Citation: Baker SP. 28,000 Gun Deaths a Year: What is Our Role? J Trauma 16:510-511, 1976.

Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/933221
FATALLY INJURED TRUCK DRIVERS

TA Karlson, SP Baker, and BF Morton

Trudy Karlson had planned to be a cancer epidemiologist until she took the injury epidemiology course that Bill Haddon and I were teaching in Minnesota. Like many students here at Hopkins who have taken injury courses with Steve Teret and Jon Vernick and me, she underwent a major conversion. Years before getting her PhD with a dissertation on facial injuries, she came to Baltimore for post-grad work with me at the ME office, reading the autopsy reports that resulted in this paper. Our findings resulted in my testimony (Page 51) on the need for better crash protection for truck drivers. By relating the mechanism of injury—striking the horizontal rim of the steering wheel in big trucks—to the abdominal injury, we were able to emphasize the need for airbags to protect these drivers, something Volvo took the lead in. Some years later, when I drove an 18-wheeler with 12 forward gears at the General Motors proving ground in Phoenix, I recognized the apparent advantage of the horizontal orientation of the steering wheel.

Abstract: Autopsy findings on 68 fatally injured truck drivers were reviewed to ascertain severe injuries sustained upon impact with the occupant compartments. Injuries of the head, neck, chest, and abdomen in drivers of vans, pickups, and heavy trucks are discussed with some suggestions as to possible mechanisms. Findings suggest that particular attention is needed to prevent steering assembly injuries of the chest and abdomen in drivers of heavy trucks and pickups, and head injuries of the drivers of vans. It is urged that existing knowledge of crash dynamics and occupant protection be applied to the prevention of injuries to truck occupants.


Link to Full-text: http://trid.trb.org/view.aspx?id=73307 (Full-text available on request)
CHILDREN IN MOTOR VEHICLES: NEVER TOO YOUNG TO DIE

JJ Karwacki Jr and SP Baker

Jerry Karwacki, a medical student, and I read ME reports of children killed in crashes — heart-rending tales of babies sitting on the mother’s lap while dad drove. Mothers no doubt thought they were protecting their children, not recognizing that the reverse was true — i.e., that in a forward collision, the child would cushion the crash forces on the mother, in effect serving as a human airbag. Perhaps this JAMA paper helped to bring us to the day when that sight is rare. (When is the last time you saw that once-common scene?) The following paper and this one, written at about the same time, helped lay the groundwork for child passenger protection laws. This use of ME records is an example of the treasure to be found in these case histories.

Abstract: In a series of 89 children less than 15 years old who were killed as motor vehicle occupants, children under 1 year of age were greatly overrepresented. Only three children were using child restraint systems or seat belts. Eight were traveling on their parents' laps. Head injuries predominated and were most common in the youngest children. Children under age 1 were the most likely to have reached the hospital alive. The high death rate for very young children was not explained by the circumstances of the crashes or by the age distribution of children involved in all crashes.


Based on the cases I was seeing in the autopsy room, I had a hunch that babies had higher death rates in crashes than older children. But I could not find data that distinguished the occupants from pedestrians, or that described the fatally injured children by month and year of age. The National Center for Health Statistics granted my request for a special tape that allowed me to tease out the needed detail. Once I had the tape, it took me about 10 minutes to discover that my hunch had been correct. I remember my excitement, and it turned out that my simple analysis had far-reaching results. It still amazes me that the especially high risks of infants were not recognized until this paper was published. In the following decade, the information would be used in many states by proponents fighting to require that children be protected in cars.

Abstract: Motor vehicle occupant deaths of US children aged 0 to 12 years were analyzed. Surprisingly, the death rate is highest for children less than 6 months old: 9.0/100,000, dropping to 4.5/100,000 for 1-year-olds and about 3/100,000 for children aged 6 to 12. The second and third months of age are a period of especially high risk. More attention should therefore be focused on protecting infants from injury and death resulting from motor vehicle crashes.


CHILDHOOD ASPHYXIATION BY CHOKING OR SUFFOCATION

SP Baker and RS Fisher

I had been struck by a statement in a newspaper that “balloons kill more children than any other toy.” Figuring it must be from aspirating balloons or pieces of them, I reviewed all of the medical examiner cases of childhood choking in recent years – and, to my surprise, found three times as many hot dogs as balloons. I mentioned the finding to a newspaper reporter and found myself quoted on the front page of the Baltimore SUN – and maligned by some for attacking the American symbol. I might have turned to problems other than the size and shape of things children put in their mouths, had it not been for a mother who wrote to me about her daughter who had been in a vegetative state for 5 years since choking on a hot dog. Other people told me about members of their families who had choked (not fatally) on hot dogs. One said that as a child, he had choked on a hot dog and was saved when a doctor at the picnic pulled out a penknife. The child was so scared that he coughed out the plug of hot dog. (I often say that a bite of hot dog is the perfect plug for a child’s airway, and that if one wanted to design a food that was likely to kill a child, a hot dog would win the prize.) I asked Russell Fisher, Chief Medical Examiner of Maryland, to co-author this paper in recognition of the contributions of his office to my research and to the health and safety of Marylanders. A later paper in JAMA expanded the study nationwide, assisted by pediatrician Gary Smith and led by Carole Harris, a mother who used the Heimlich maneuver to save her child when he was choking on a Gerber meatstick.

Abstract: Medical examiner records were reviewed for 42 Maryland children younger than 10 years who died of asphyxiation from 1970 through 1978. Twelve children choked on food; six of these deaths involved hot dogs. Eight choked on nonfood objects. Size, shape, and consistency were important, with small, round, pliable products predominating. Twenty-two deaths resulted from suffocation, including four infants who died when plastic bags in their cribs or playpens pressed against their faces. Twelve of the 42 deaths resulted from problems that are now the subject of Consumer Product Safety Commission activity or regulations. Important problems not currently addressed include plastic bags, balloons, and foods that because of their shape or consistency are especially likely to cause asphyxiation.

Citation: Baker SP, Fisher RS. Childhood Asphyxiation by Choking or Suffocation. JAMA 244:1343-1346, 1980.

FREEDOM AND PROTECTION: A BALANCING OF INTERESTS

SP Baker and SP Teret

Steve Teret, a former plaintiff’s attorney, came into my life as an MPH candidate, passionate about the need for society to protect its members against preventable injury and death. He resorted to litigation only sparingly, and as a last resort – but used it very effectively to speed regulations requiring airbags in all cars after decades of delay. As director of our Center for Injury Research and Policy for an important eight years, he helped to shift the focus of policy research to address the man-made hazards in our environment and to capitalize on the potential of the law for reducing those hazards.

Abstract: “Perspective on the Public Good” deserves careful attention because it brings together, in one article, several often-heard arguments that are just as dangerous as the helmetless motorcycling they would promote. The argument that rock climbers and rodeo contestants are not required by law to wear crash helmets implies that if a policy is not applied at the outer limits of a continuum of circumstances, it would be unreasonable to apply that policy at any point along the continuum. But consider the spectrum of regulations pertinent to motorcyclists. At one end would be such measures as banning the use of motorcycles; at the opposite extreme would be the complete absence of restrictions on motorcycle operation and the exemption of motorcycles from traffic laws. If both ends of this continuum are unacceptable, does that mean that a reasonable course of action cannot be found somewhere in between? Hardly. Dr. Perkins is disturbed by what he refers to as Baker’s “unqualified call for public health officials to put a stop to injury and disease losses resulting from the practice of individual freedoms.” In point of fact, my editorial called for putting a stop to the “losses of other people’s freedoms” (emphasis added) resulting from special-interest lobbying in the name of “individual freedom.” If we considered only the balance between the individual’s freedom of choice and that same individual’s health status, we would most often find in favor of freedom; it would be paternalistic to do otherwise. But we are faced with the more difficult task of incorporating societal concerns—i.e., the concerns of all individuals combined—into the equation, and a significant population burden can outweigh an individual’s freedom. Courts have concurred with this approach. Legislators have the responsibility for regulating safety on public roads. If they allow the use of motorcycles—for which the death rate per million person-miles of travel is more than 10 times the rate for cars—then it makes sense that they should reduce the high risk of injury or death by requiring additional protection for motorcyclists.


CHILDHOOD INJURIES: THE COMMUNITY APPROACH TO PREVENTION

SP Baker

Perhaps my all-time favorite, this paper began as a richly-illustrated presentation at APHA that opened with a shot of an 1880s tombstone for three children from a single family, all of whom had died before age 5, probably of diphtheria or other diseases now rare. Once published, the paper conveyed its message so well that an Arizona judge phoned to tell me it was the crucial factor in his decision against a club that balked against fencing its swimming pool. The paper emphasizes the fact (illustrated by figures) that the most successful preventive measures are those requiring the least individual action and the least effort. As I often remind students, if we had to take our children to be vaccinated every month, few would be protected.

Abstract: This paper discusses childhood injuries that are caused by man-made products and environments. It excludes a most important category, namely, injuries related to motor vehicles, but the basic principles of injury control are equally relevant on and off the highway. In either instance, the term injury control is a good one because it emphasizes that our goal is controlling or preventing injuries and reducing their sequelae, not controlling people. Children will still be inquisitive, imaginative, and daring long after we have taken successful steps to keep them from dying because of these traits. It is pertinent to consider the factors that determine whether measures that could prevent injury if they are applied will in fact result in the needed protection. This is largely a function of the following: 1) Whether the measure is used, which in turn depends on (a) how often action is required of individuals; (b) how much individual effort is required; (c) the presence of other deterrents or incentives and 2) Whether the measure will be used correctly. As long as we place major responsibility for childhood injury prevention on children and their parents, potential solutions that have not been implemented in 1980 will still be largely unused in the year 2000, and easily preventable deaths and injuries will continue to occur. To try to prevent injuries with advice to behave safely, in light of what we know in 1981, is the equivalent of trying to control polio with advice to stay out of swimming pools even though an effective vaccine is available.


RECENT TRENDS IN FATAL POISONING BY OPIATES

JS Samkoff and SP Baker

Judith Samkoff, a medical student who was to become an applied epidemiologist, was helping me dig out facts for the first edition of The Injury Fact Book (she should have been a co-author of the book) when she showed me some data on poisoning trends that made no sense. “Either it’s a mistake, or it’s an important discovery,” I told her. It was the latter, and she untangled this mystery – learning in the process how to ‘focus her microscope’ on ever-smaller details until reaching the essence of an injury problem. In this case, that meant zeroing in on opiates and specific population groups. It is interesting that today’s availability of prescription opioids has triggered another dramatic upsurge in deaths, so that deaths from poisonings now outnumber those from motor vehicle crashes.

Abstract: Deaths in the United States classified as unintentional poisoning by drugs and medicaments fell from 14.7 per million population in 1975 to 8.8 in 1978, a 40 per cent decrease. Seventy-three per cent of this drop was attributable to a reduction in deaths coded to opiates and intravenous narcotism. These two categories accounted for 38 per cent of all unintentional drug deaths in 1975 but only 15 per cent in 1978. There was no simultaneous increase in other drug-related deaths, including suicides, to account for the reduction in deaths coded to opiates. The highest mortality rates and the greatest variation in mortality during 1970-78 occurred in 20-29 year old non-White males. Racial and sex differences in opiate poisoning mortality, notable early in the decade, were greatly reduced by 1978 due to a relatively larger decline in mortality of males and non-Whites. Time trends in mortality from opiate poisoning appear to coincide with variations in the amount of heroin smuggled into the country.


FATAL OCCUPATIONAL INJURIES

SP Baker, JS Samkoff, RS Fisher, and CB VanBuren

Today, firefighters heading to a fire ride inside the fire truck. But that was not true in 1981, when the strap on the back of a fire truck broke and a fire fighter fell to his death. Scores of other Maryland workers died on the job in that same year, as recounted below. The idea that workers susceptible to on-the-job homicide, such as taxi drivers, bank employees, and guards, should come under OSHA protection was brand new. So was the suggestion that employers should not provide workers with unsafe vehicles such as small cars. Dr. Russell Fisher, Chief Medical Examiner of Maryland, who had given me a place to work on my own for many years, joined us in this work that required getting sensitive data from other agencies.

Abstract: Deaths resulting from work-related injuries during a one-year period in Maryland were identified and reviewed. Of 148 workers killed, all but two were male. Transportation vehicles were involved in 41% of the deaths, with road vehicles accounting for 25% of the total. Other major groups involved non-road land vehicles (16%) and firearms, primarily handguns (11%). Two thirds of the workers died at the scene or were dead on arrival at the hospital. Head injuries were the most common cause of death. Eleven percent of the workers tested had blood alcohol concentrations of 0.08% by weight or greater. The majority of the deaths involved either hazards that are not addressed by the Occupational Safety and Health Act of 1970 or workers in categories that are excluded by law from regulation under this act.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/7097919
FATAL HOUSEFIRES IN AN URBAN POPULATION

MC Mierley and SP Baker

Research on housefires might seem an unlikely recipient of funding by the Insurance Institute for Highway Safety, but Bill Haddon realized that if the public health world was to adopt injury control, my research should go beyond highway carnage. This paper grew from collaborative efforts of the ME office, the fire department, and Marianne Mierley, an MHS student. Our finding that more than one-third of the Baltimoreans who died in cigarette-ignited housefires were not the smokers of the cigarettes starred in the effort to promote “fire safe” cigarettes. In July 2008, Maryland became the 12th state to require that all cigarettes sold in the state be manufactured with reduced potential to ignite fires. The Baltimore City Fire Department became a leader in many types of protection against fires, including regulatory requirements for sprinkler systems. Too many people had assumed that one or more smoke detectors in the home would give adequate protection, not recognizing that sprinklers would extinguish a fire even if occupants were too young, too old, or incapacitated, and, therefore, unable to protect themselves. Although the battle is being waged slowly, in individual jurisdictions, the day will surely come when even single-family homes are required to have sprinklers.

Abstract: House fires kill about 5,000 Americans annually, at a rate (2/100,000) that has remained almost constant for the past 50 years. House-fire deaths were studied in Baltimore, where 55 residents died during a three-year period. More than half of the deaths resulted from cigarette-ignited fires; 39% of the people who died in such fires were not the cigarette smokers themselves. For both blacks and whites, the death rate was highest in census tracts where property rental values were low. The death rate from fires ignited by heating or electrical equipment was nine times as high in the lowest-value census tracts as in the highest.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/6827724
INJURIES AMONG THE HOPI INDIANS:
A POPULATION-BASED SURVEY

SG Simpson, R Reid, SP Baker, and SP Teret

Sylvia Simpson and Ray Reid (a Navajo physician) were preventive medicine residents looking for a project, hardly expecting to spend 2 months living in a trailer on an Indian reservation. During two visits to our residents, I was captivated by the beauty of the land and impressed by the many hazards facing these stalwart, disadvantaged Native Americans. The roads were rough, without guardrail to keep vehicles from going down the steep embankments. Children riding in the back of pickup trucks were easily bounced out, people fell from roofs while watching ceremonial dancers, and, perhaps saddest of all, young men jailed for drunken binges hung themselves in their cells rather than face disgrace. Ray says the study helped him to understand the personal feelings people have about injuries.

Abstract: Injuries are the leading cause of death among American Indians. An epidemiologic study was conducted on the Hopi reservation to assess the incidence, circumstances, and outcome of injuries. The incidence of hospitalized or fatal injuries during 1979-1980 was 12 per 1,000 persons per year, with the highest incidence in the age group of those older than 84 years. Overall, falls, motor vehicle crashes, self-inflicted injuries, and assaults were the leading causes of injuries. Suicides and crashes were the leading causes of death. The 15- to 29-year age group, which constituted only a quarter of the population, accounted for 46% of all injuries. This age group had especially high rates of self-inflicted injuries, crashes, and assaults. Injury problems of special importance to the Hopis included single-vehicle rollover crashes, falls from pickup trucks, falls from mesas and pueblo roofs, and suicide attempts in jails.

Citation: Simpson SG, Reid R, Baker SP, Teret SP. Injuries Among the Hopi Indians: A Population-Based Survey. JAMA 249:1873-1876, 1983.

Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/6834582
SMOKE DETECTOR LEGISLATION:
ITS EFFECT ON OWNER-OCCUPIED HOMES

E McLoughlin, M Marchone, L Hanger, PS German, and SP Baker

Twenty-five years after her doctoral research that resulted in this paper, Liz McLoughlin is still remembered and revered by the fire-fighters she worked with. Smoke detector mandates, as rare at that time as sprinkler system requirements are today, were crying for evaluation. Liz finished her doctoral work in the shortest time of any Ph.D. candidate, and then went on to lead California efforts to require motorcycle helmet use and to assist in the 30-year effort to mandate fire-safe cigarettes in all states. She also worked with advocates to train health care professionals about domestic violence and abuse, and was active in California's ten-year-long youth Violence Prevention Initiative.

Abstract: Montgomery County, Maryland was the first major jurisdiction to pass a law requiring smoke detectors in all homes. Smoke detector coverage in the county was evaluated five years after the law's implementation and compared to the coverage in neighboring Fairfax County, Virginia, which has no such law. Firefighters visited 651 randomly selected owner-occupied homes and tested each detector. While a similar percentage of homes in Montgomery and Fairfax counties complied with detector codes (42 per cent vs 44 per cent, respectively), Montgomery County had a significantly lower percentage of homes with no working detectors (17 per cent vs 30 per cent) and with no detectors at all (6 per cent vs 16 per cent). In general, Montgomery County residents complied with what they believed the law required, but lacked knowledge of the law's details. New homes where building codes required detectors and homes where owners assumed that detectors were required by law were likely to have working detectors. Analyses of 12 years of fire data suggest that as a county approaches complete detector coverage, the risk of residential fire deaths decreases. An essentially unenforced law seems to be obeyed because it conforms to community values.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/4025645
Steve Hargarten, an EMS physician getting his MPH at Hopkins, joined me in this study of Peace Corps workers whose lives ended tragically. Although injuries were overwhelmingly the cause of most deaths of Peace Corps volunteers, they received little preventive attention from the Peace Corps. When the Peace Corps held a course in D.C. for its health workers, I gave a talk describing our findings. But the medical director left the auditorium for the duration of my talk about preventing these deaths. Sadly, injury prevention was clearly not a top priority, even though simple measures such as motorcycle helmet use requirements would have made a great difference.

**Abstract:** Fatalities among Peace Corps volunteers were analyzed for 1962 through 1983, with individual case histories reviewed for all deaths from 1977 through 1983. Unintentional injuries accounted for 70% of the 185 deaths of Peace Corps volunteers, with motor vehicle crashes the number 1 cause of death. The death rate from unintentional injuries for women was significantly higher than the comparable US rate. Motorcycles caused 12% of all Peace Corps deaths and 33% of all motor vehicle deaths. Suicide has emerged as a leading cause of death among volunteers, accounting for 13% of all deaths from 1981 through 1983. Greater emphasis on injury control measures is needed to reduce this toll.


**Link to Full-text:** http://www.ncbi.nlm.nih.gov/pubmed/4021010
This paper started in my head when I read the ME investigator’s report on a teenage girl who poisoned herself with her mother’s tranquilizers because she’d been ditched by her boyfriend. The numbers of such cases among teens dwarfed the problem of pediatric poisoning that caught everyone’s attention. Alison Trinkoff, a nurse who was a Ph.D. candidate at the time, agreed and took the lead on this paper, which she realized would be a good showcase for Haddon’s Ten Strategies. The strategies related to poisoning prevention are especially important today, when prescription drug overdoses are so prevalent among teenagers and older adults.

Abstract: Twenty-four deaths and 4,271 hospital admissions due to poisoning occurred in the 0-19 year age group in Maryland during 1979-82. Four-fifths of the deaths (83 per cent) and two-thirds of the admissions involved teenagers. Among teenagers, four out of five admissions and deaths were of suicidal or undetermined intent. Black males had the highest hospitalization rate among young children, and White females among teenagers. The most common poisons ingested by children aged 0-4 years were aspirin, solvents and petroleum products, tranquilizers, and iron compounds. Among teenagers, aspirin, tranquilizers, sedatives, and antidepressants were the most common substances ingested, with antidepressants and stimulants most common among the fatalities. Reducing the availability and toxicity of the most hazardous drugs is important if morbidity and mortality from poisoning are to be prevented.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/3706592
FALLS IN THE INSTITUTIONALIZED ELDERLY

AH Myers, SP Baker, EG Robinson, H Abbey, ET Doll, and S Levenson

When Ann Myers (a nurse with a PhD) and I went to talk with doctors at a nursing home in preparation for this study, we found they subscribed to the popular belief that falls in the elderly occurred because of hip fractures, rather than the other way around. Our results proved just the opposite. Although many patients had limitations that placed them at greater risk, the environmental factors played a major role: wet floors, inadequate railings to hold onto, and problems with walking aids, for example. Wheelchairs became our special concern, so we worked with engineering undergrads who developed a wheelchair modification that automatically braked the chair when no one was sitting in it, so it would not move when a patient was getting to her feet or sitting down. The size of the problem led to Ann’s research and early development of hip padding and eventually – with help from airbag inventor Carl Clark – hip airbags. Currently Ann is working to make the hip airbags user-friendly so their potential can be realized.

Abstract: Of all types of injuries, those from falls are the most serious threat to the elderly. Falls and the resulting injuries are associated with pain and suffering, fear, restricted activity, and a reduced level of functioning. Serious injuries, such as fracture of the femur, can result in long hospitalization and high costs and in a high case-fatality rate among older persons. Falls are an especially serious problem for the institutionalized elderly, who are more debilitated than younger people and less likely to recover as fully from serious injury. This report describes the findings of a study designed to identify risk factors associated with falls in the institutionalized elderly. Measures to reduce injurious falls are suggested. The largest proportion of injurious falls involved the patient tipping the wheelchair over, a problem apparently unreported in the literature. The second most frequent problem was that of unlocked wheelchairs. With increasing proportions of elderly persons in our society, the identification of those at high risk of injuries from falls and the evaluation of interventions have the potential to make a major impact on public health.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/10296858
HAZARDS OF MOUNTAIN FLYING:  
CRASHES IN THE COLORADO ROCKIES

SP Baker and MW Lamb

When I was in my mid-fifties I caught the flying bug, hoping a pilot’s license would give me a better understanding of what pilots do, before I dove into aviation research. The high rates of general aviation crashes in mountainous states, obvious from a map I made for the Injury Fact Book, led me to Margaret Lamb, an expert in mountain weather, mountain flying, and mountain climbing. I experienced all these with her, but our favorite research project – we called it “bird-feather epidemiology” – culminated in this paper. We flew her Navion over these crash sites and mountain passes, and landed at typical small mountain airports. In our conversations with instructors and other pilots, I was surprised that many admitted to not wearing their shoulder harnesses. Of the pilots in the study, it appeared that many had no appreciation of the degree to which their plane’s ability to climb out of blind canyons or over mountain passes deteriorated with the combination of altitude and rising temperature and local winds.

Abstract: Between 1964 and 1987, 232 airplanes crashed within 50 nautical miles of Aspen, CO; 90% were general aviation crashes. A total of 202 people died and 69 were seriously injured. The societal cost averaged more than $4 million annually. Most pilots were experienced and many were flight instructors, but 44% had flown less than 100 hours in the type of plane in which they crashed. Forty-one percent of the pilots were out-of-state residents. Crashes in the study area were more likely to be fatal than in the rest of Colorado. Airplanes with three or four occupants and low-powered four-seater aircraft were over-represented among crashes involving failure to outclimb rising terrain. In a subset of crashes examined for restraint use, 50% of the front seat occupants using only lap belts were killed, compared to 13% of those who also wore shoulder restraints. Preventive recommendations include shoulder restraint use and better training in mountain flying, with incentives provided by the FAA and insurance companies.

Citation: Baker SP, Lamb MW. Hazards of Mountain Flying: Crashes in the Colorado Rockies. Aviat Space Environ Med 60(6):531-536, 1989.

PILOTS INVOLVED IN MULTIPLE CRASHES: "ACCIDENT PRONENESS" REVISITED

SP Baker, G Li, MW Lamb and M Warner

“Accident proneness” has long been offered as an explanation for the fact that some individuals have more than “their share” of near-misses or injurious events. But rather than “accident repeaters” suffering apparently from inherent personal characteristics, we found that the hazardous environments in which some pilots fly contribute to their over-involvement in crashes. For example, in some instances, there was no airport and pilots had to land on sand bars or other “unstable terrain.” While behavior (e.g., alcohol overindulgence) and personality also can play major roles, the challenges of one’s occupation and recreational choices are very important – and often ignored by those who prefer to focus on the useless notion of an inborn tendency to be involved in mishaps.

Abstract: Analysis of crashes of air taxi and commuter flights explored the controversial issue of "accident proneness." There were 20 pilots who had 2 or more crashes during 1983-88. These pilots (repeaters) and their 42 crashes were compared with 534 pilots who were each involved in a single air taxi or commuter crash during the same period (nonrepeaters). Unexpectedly, repeaters were more experienced pilots with a mean total flight time of 7016 h vs. 5321 for nonrepeaters. Repeaters did not differ from nonrepeaters in the overall proportion of crashes in which pilot performance appeared to be a major factor. Repeaters differed significantly from nonrepeaters as to flight hours during the past 90 d (mean 215 vs. 183 h) and the proportion of their crashes that occurred in Alaska (48% vs. 24%). Alaska repeaters differed from non-Alaska repeaters with regard to the proportion of crashes on takeoff (40% vs 14%) and airport conditions as a factor (50% vs. 18%). The high proportion of repeaters involved in crashes in Alaska, where environmental conditions make flying more hazardous, and the substantially greater recent flight time suggest that the intensity and amount of occupational exposure are major determinants of pilot involvement in more than one crash.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/7695555
PRIOR CRASH AND VIOLATION RECORDS OF PILOTS IN COMMUTER AND AIR TAXI CRASHES: A CASE-CONTROL STUDY

G Li and SP Baker

Guohua Li arrived on my doorstep in 1989, soon after the Tiananmen Square massacre in Beijing. With a rural childhood, medical degree from Beijing and a master’s in statistics behind him, he settled down to work with me. In ten years he had finished a post-doc and a DrPH, made possible the second edition of the Injury Fact Book, made substantial contributions to injury research methodology, and perfected his English until he could out-write 99.9% of Americans. Thoughtful and innovative, he was soon on a fast trajectory to becoming a full professor and a pre-eminent injury epidemiologist. This outgrowth of his dissertation was one of the first of dozens of aviation papers.

Abstract: With a case-control design, this study examined the relationships of crash/incident history, violation history, pilot age, flight experience, and recent flight time with the likelihood of being involved in commuter aircraft and air taxi crashes. Cases (n = 725) were pilots who had been involved in commuter aircraft or air taxi crashes during 1983-88, identified from the National Transportation Safety Board aviation crash database. From the Federal Aviation Administration (FAA) airmen information system, 1,555 pilots were randomly selected as controls. Controls were frequency-matched with cases on medical class and calendar year. Different databases within the FAA’s airmen information system were linked to ascertain information about the crash/incident and violation records in the previous 3 years, age, total flight time, and flight time in the prior 6 months. Multivariate logistic regression models were fitted to estimate odds ratios and evaluate dose-response effects, non-linear relationships, and interactions. Cases had significantly higher prevalence rates of prior crash/incident and violation records. The estimated odds ratio of being involved in a commuter aircraft or an air taxi crash was 1.7 (95% confidence interval [CI], 1.3-2.4) for crash/incident history, and 1.6 (95% CI, 1.1-2.2) for violation history. A "dose-response effect" was found with both crash/incident history and violation history, with higher odds ratios for pilots involved in crashes versus incidents or pilots with more serious violations. Total flight time showed a diminishing protective effect. Either very small or very large recent flight time increased the risk of being involved in a commuter aircraft or an air taxi crash.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/7840750
EXPLORING THE MALE-FEMALE DISCREPANCY IN DEATH RATES FROM BICYCLING INJURY: THE DECOMPOSITION METHOD

G Li and SP Baker

This paper, forerunner to Guohua Li’s award-winning paper in Epidemiology (1998, “Are female drivers safer?”) was the first application of the decomposition method to an injury problem. It arose from my observation that the population-based death rate equals the case-fatality rate times the ratio of injuries to exposure (e.g., trips) times the ratio of exposure to population. This method allows us to tease out the contribution of specific factors, such as exposure and injury severity as well as age and gender, to differences among various population groups in their injury death rates. In the case of both this paper and the 1998 paper, as well as other papers on male and female pilots, we found that media attention could always be counted on when the topic was gender differences.

Abstract: The population-based death rate as an important indicator of health status has been widely used in injury research. Generally, the death rate from injury for males is about three times that for females. The importance of the various factors that contribute to this male-female discrepancy, however, has not been well understood. Using the innovative Decomposition Method, data from the Nationwide Personal Transportation Survey, the National Electronic Injury Surveillance System, and the National Center for Health Statistics were analyzed to explore the determinants of the male-female difference in death rates from bicycling injury. The results revealed that males have a higher death rate from bicycling injury than females because they have a greater exposure rate and case fatality rate. When exposure measured by number of bicycle trips is taken into account, males are at slightly lower risk of injury than females. The relative contribution of case fatality, exposure, and risk to the 6.4-fold difference in death rates from bicycling injury between men and women is 53%, 51%, and -4%, respectively.


AT WORK AND PLAY IN A HAZARDOUS ENVIRONMENT: INJURIES ABOARD A DEPLOYED U.S. NAVY AIRCRAFT CARRIER

MJ Krentz, G Li, and SP Baker

This paper reflects my long-time interest in injuries in the military. Mike Krentz was an MPH candidate when we began this review of injuries on a carrier. I could never get funding for recreational injuries in an occupational setting – NIOSH said recreational injuries were CDC's problem, but CDC would not touch occupational injuries, claiming that was NIOSH's responsibility. This research was my introduction to injuries on aircraft carriers and led to a later invitation from Mike, when he was CMO (Chief Medical Officer) on the George Washington: “Sue, would you like to spend a couple of weeks with us on maneuvers in August?” “Love to! But I could only go for a week.” So I walked onto the carrier in Norfolk one evening and after an exciting and instructive week was catapulted off in a cargo plane.

Abstract: Background: A deployed U.S. Navy aircraft carrier is a hazardous environment where work and recreation intermingle. Injuries causing time lost from assigned duties may impact aviation safety and operational readiness. This descriptive study examines injuries sustained on the flight deck, in the hangar bay, or in the gym of a deployed aircraft carrier, focusing on those injuries resulting in lost duty days. Methods: Injuries recorded by the ship's medical department were analyzed, relating lost duty injuries to the following parameters: division, rank, time of day, location of injury event, whether injury was job-related or recreational, type of recreational activity, and mechanism, type, and anatomic site of injury. Results: During a 6-mo deployment, 335 injuries occurred in the shipboard locations studied. More than one-third (36%) of these injuries resulted in lost duty time, accounting for 768 man-days of lost duty during the deployment. Recreational injuries represented 19% of all injuries, but 25% of all lost duty injuries, a statistically significant contribution to lost duty time when compared to job-related injuries (p = 0.04). The sports of basketball, volleyball, and football were more likely than other recreational activities to cause injuries resulting in lost duty time (p = 0.01). Musculoskeletal injuries, particularly injuries involving the lower extremity, neck, and back, were also associated with increased risk of lost duty time (p < 0.001). Conclusions: Although recreational injuries are less frequent than job-related injuries in the study population, they contribute disproportionately to lost duty time. Injury prevention in similar environments should address recreational as well as work-related activities.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/9006883
BIOMECHANICAL EPIDEMIOLOGY:
A NEW APPROACH TO INJURY CONTROL RESEARCH

FK Winston, DF Schwarz, and SP Baker

When Flaura Winston arrived in 1994 for a post-doctoral fellowship with me, sponsored by the Snively Foundation, she was part pediatrician and part biomechanical engineer, eager to put her two passions together for the benefit of injury victims. During that year, she began a new course for our doctoral students and laid the foundation for interdisciplinary work in injury control, applying a new discipline she called ‘Biomechanical Epidemiology.’ Soon she would be on her way to building a unique partnership with State Farm Insurance Companies that would collect, analyze, and publish invaluable information on children in motor vehicle crashes. Development of her Center for Injury Research and Policy soon followed at the Children’s Hospital of Philadelphia. Like Carol Runyan, she was honored by being admitted into the Society of Scholars of the Johns Hopkins University.

Abstract: Injury control studies, from inception and design to dissemination of results, tend to remain within individual discipline. This is largely because each of the disciplines has a unique language and approach to research. Collaborative research is often performed serially with one discipline presenting the results of that discipline's studies to another discipline. Epidemiologists and clinicians tell engineers to design a safety technology to prevent a specific injury. Engineers tell lawyers what is feasible to include in standards. As a result, epidemiological studies lack mechanical data needed by the engineers and engineering studies lack generalizability. The procedure for incorporating the best of multiple disciplines throughout the performance of injury control studies has not existed until recently and is presented conceptually in this manuscript. This new approach, Biomechanical Epidemiology, is an exciting enhancement to current injury control research.


Michel Aboutanos is a trauma surgeon who was getting his MPH when we met. He grew up in Beirut, learning first-hand as a child the challenges to civilian survival during wartime in 1975 to 1983. He told me, “I am totally convinced that our entire family would have been killed many times had it not been for my father’s entire modification of our apartment in Beirut, based on his army and police experience. Our apartment was shelled many times; once a rocket exploded in our bedroom. We were isolated in the middle of the building (my dad counted how many walls needed to be hit and destroyed before the bomb could hit us in the little corridor where we stayed for weeks, huddled with another family). My dad was the only one who would leave in order to get water and some bread, avoiding attacks of the snipers who targeted people trying to get food. I would watch him leave, trying to remember his face, thinking that this is the last time I would see this great man. Worst of all for me was the sound of an exploding bomb followed by deadly silence, then the hail of shrapnel falling like rain on our balcony, then the sound of distant screaming. You feel helpless.” Michel’s experiences contributed to our suggested preventive measures, organized using Haddon’s Ten Basic Strategies.

Abstract: Background: Trauma is the most important public health risk in wartime. Most preventive efforts have addressed the political etiology of armed conflicts and the secondary effects of war (food, water, shelter, sanitation, and vector control). Little to no efforts have addressed the direct prevention and control of war trauma. Methods: An extensive review of the literature, with compilation of the most important data. Results: Civilians are the major wartime targets in recent wars, and account for most of the killed and wounded. The trend has been toward a greater proportion of injuries from powerful explosive devices such as artillery shells and mines. Lessons learned from Bosnia and Lebanon show that the most effective way to achieve successful surveillance and injury prevention is to enhance the local skills and resources. Conclusions: New approaches are needed to minimize trauma to civilians. Both political advocacy and local efforts (including modifying firearms and ammunition, bullet proof helmets for children, anti-sniper shields) are needed.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/9356079
A MODIFICATION OF THE INJURY SEVERITY SCORE THAT BOTH IMPROVES ACCURACY AND SIMPLIFIES SCORING

T Osler, SP Baker, and WB Long

Ever since publication of the ISS in 1974, I had been asked “Why not count more than one injury in any given body region? Isn't it a whole lot worse to have both a ruptured liver and spleen than just a spleen?” My answer was that when I did the original research, I would read a patient’s record and record the single worst injury in each region – that was a lot better than the usual information at the time, namely just using the MAIS (Maximum Abbreviated Injury Scale), a single code for the patient's worst injury. When I was asked that same question by Turner Osler, a trauma surgeon at UNM (and later at UVM) with great statistical skill, I suggested that he use his wealth of data to answer the question. Our subsequent research revealed that the New Injury Severity Score was not only a better predictor of death but also far easier to calculate than the ISS. Our big mistake was our failure to realize that 'NISS' had been omitted from the title, a lesson in reading galley proofs!

Abstract: Objectives: The Injury Severity Score (ISS) has served as the standard summary measure of anatomic injury for more than 20 years. Nevertheless, the ISS has an idiosyncrasy that both impairs its predictive power and complicates its calculation. We present here a simple modification of the ISS called the New Injury Severity Score (NISS), which significantly outperforms the venerable but dated ISS as a predictor of mortality. Design: Retrospective calculation of NISS and comparison of NISS with prospectively calculated ISS. Materials and Methods: The NISS is defined as the sum of the squares of the Abbreviated Injury Scale scores of each of a patient's three most severe Abbreviated Injury Scale injuries regardless of the body region in which they occur. NISS values were calculated for every patient in two large independent data sets: 3,136 patients treated during a 4-year period at the American College of Surgeons' Level I trauma center in Albuquerque, New Mexico, and 3,449 patients treated during a 4-year period at the American College of Surgeons' Level I trauma center at the Emanuel Hospital in Portland, Oregon. The power of NISS to predict mortality was then compared with previously calculated ISS values for the same patients in each of the two data sets. Measurements and Main Results: We find that NISS is not only simple to calculate but more predictive of survival as well (Albuquerque: receiver operating characteristic (ROC) ISS = 0.869, ROC NISS = 0.896, p < 0.001; Portland: ROC ISS = 0.896, ROC NISS = 0.907, p < 0.004). Moreover, NISS provides a better fit throughout its entire range of prediction (Hosmer Lemeshow statistic for Albuquerque ISS = 29.12, NISS = 8.88; Hosmer Lemeshow statistic for Portland ISS = 83.48, NISS = 19.86). Conclusion: NISS should replace ISS as the standard summary measure of human trauma.


Back Injury in Municipal Workers: A Case-Control Study

AH Myers, SP Baker, G Li, G Smith, S Wiker, K Liang, and JV Johnson

Ann Myers and Gordon Smith, a medical epidemiologist, took the lead on this ambitious study; it involved everything from measuring workers' height and girth to examining the specific circumstances of injury. One important thing we learned was that if you ask a person, "How would you keep someone else from being injured the way you were?" you often receive a useful, perceptive answer — in this case, a way to redesign the job. (If you asked how their injury might have been prevented, they’d say, “I should have been more careful.”) Our study was a surprise to the ergonomists who believed many workers were faking work-related back injury. When they went to the scenes of injury, however, they found the workers had been required to accomplish daunting tasks such as loading heavy mowers onto trucks without assistance from required equipment that never arrived. We reported our results to city officials. A year or two later we were told the city had greatly reduced back injury claims—not by addressing any of the problems we identified and reducing injuries but, sadly, by being a lot stricter about granting claims. Even during the period of our study, workers had to prove that their back pain was due to a specific event at work, even though we know that many cases are due to cumulative exposures over time.

Abstract: Objectives: The purpose of this study was to identify factors associated with acute low back injury among municipal employees of a large city. Methods: For each of 200 injured case patients, 2 coworker controls were randomly selected, the first matched on gender, job, and department and the second matched on gender and job classification. In-person interviews were conducted to collect data on demographics, work history, work characteristics, work injuries, back pain, psychosocial and work organization, health behaviors, and anthropometric and ergonomic factors related to the job. Psychosocial work organization variables were examined with factor analysis techniques; an aggregate value for job strain was entered into the final model. Risk factors were examined via multivariate logistic regression techniques. Results: High job strain was the most important factor affecting back injury (odds ratio [OR] = 2.12, 95% confidence interval [CI] = 1.28, 3.52), and it showed a significant dose-response effect. Body mass index (OR = 1.54, 95% CI = 1.08, 2.18) and a work movement index (twisting, extended reaching, and stooping) (OR = 1.42, 95% CI = 0.97, 2.08) were also significant factors. Conclusions: Results suggest that increasing workers' control over their jobs reduces levels of job strain. Ergonomic strategies and worksite health promotion may help reduce other risk factors.


EFFECTS OF HIGH SCHOOL DRIVER EDUCATION ON MOTOR VEHICLE CRASHES, VIOLATIONS, AND LICENSURE

JS Vernick, G Li, S Ogaitis, EJ MacKenzie, SP Baker, and AC Gielen

A 1977 article about me in People magazine mentioned my skepticism about the value of high school driver education courses; two decades later, I felt vindicated by our findings in this paper. With stars such as Ellen MacKenzie; then the director of the Center for Injury Research and Policy; Andrea Gielen, who was to become the current director; Guohua Li, who would eventually head a similar center at Columbia; and Jon Vernick, the stellar leader of this project who did most of the work, there probably was no need for me on the project. But our conversations around the table, discussing the findings of Jon and Suzanne Ogaitis (our project manager) were productive and memorable. In fact, there was little cause for debate.

Abstract: Objective: We sought evidence in the research literature to determine if (1) high school-aged persons who enroll in a driver education course have fewer motor vehicle-related crashes or violations, or are more likely to obtain a drivers license, than those who do not enroll in driver education courses, and (2) the availability of high school driver education courses is associated with lower community rates of motor vehicle crashes among young drivers. Methods: To be included, a study must: (1) assess the effects of driver education courses or legislation for high school-aged persons; (2) present non-self-reported data for at least one of the following outcome measures: driver licensure rates, motor vehicle-related violations, or crashes; (3) include some form of no intervention comparison group; (4) adequately control for potentially confounding variables; (5) randomly assign participants to control or treatment groups, if a controlled trial. Results: Nine studies met our inclusion criteria. Based on these studies, there is no convincing evidence that high school driver education reduces motor vehicle crash involvement rates for young drivers, either at the individual or community level. In fact, by providing an opportunity for early licensure, there is evidence that these courses are associated with higher crash involvement rates for young drivers. Conclusions: Although few driver education curricula have been carefully evaluated, in the absence of evidence that driver education reduces crash involvement rates for young persons, schools and communities should consider other ways to reduce motor vehicle-related deaths in this population, such as graduated licensing.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/9921385
CARRYING PASSENGERS AS A RISK FACTOR
FOR CRASHES Fatal TO 16- AND 17-YEAR OLD DRIVERS

LH Chen, SP Baker, ER Braver, and G Li

My curiosity about what was going on in the cars of teenagers who crashed must have been contagious: Li-Hui Chen, a doctoral candidate, took this on as her dissertation subject. Our results have contributed to the design and adoption of restrictions on the carrying of passengers by teenage drivers – restrictions now incorporated in most GDL programs. To date, however, our findings about the additional hazard when passengers are male have not been reflected in any policy changes. Given the over-representation of males in teens’ crashes, whether as drivers or passengers, perhaps insurers will eventually make an extra charge if your teenage driver is a male! Seems unlikely, but think of the other amazing changes in the recent decades.

Abstract: Context: Injuries from motor vehicle crashes are the leading cause of death among teenagers. Carrying passengers has been identified as a possible risk factor for these crashes. Objective: To determine whether the presence of passengers is associated with an increased risk of crashes fatal to 16- and 17-year-old drivers and whether the risk varies by time of day and age and sex of drivers and passengers. Design and Setting: Incidence study of data from the Fatality Analysis Reporting System and General Estimates System (1992-1997), as well as the Nationwide Personal Transportation Survey (1995). Subjects: Drivers aged 16 and 17 years who drove passenger cars, vans, or pickup trucks. Main Outcome Measure: Driver deaths per 10 million trips by number of passengers, driver age and sex, and time of day; and driver deaths per 1000 crashes by passenger age and sex. Results: Compared with drivers of the same age without passengers, the relative risk of death per 10 million trips was 1.39 (95% confidence interval [CI], 1.24-1.55) for 16-year-old drivers with 1 passenger, 1.86 (95% CI, 1.56-2.20) for those with 2 passengers, and 2.82 (95% CI, 2.27-3.50) for those with 3 or more passengers. The relative risk of death was 1.48 (95% CI, 1.35-1.62) for 17-year-old drivers with 1 passenger, 2.58 (95% CI, 2.24-2.95) for those with 2 passengers, and 3.07 (95% CI, 2.50-3.77) for those with 3 or more passengers. The risk of death increased significantly for drivers transporting passengers irrespective of the time of day or sex of the driver, although male drivers were at greater risk. Driver deaths per 1000 crashes increased for 16- and 17-year-olds transporting male passengers or passengers younger than 30 years. Conclusion: Our data indicate that the risk of fatal injury for a 16- or 17-year-old driver increases with the number of passengers. This result supports inclusion of restrictions on carrying passengers in graduated licensing systems for young drivers.

Citation: Chen LH, Baker SP, Braver ER, Li G. Carrying Passengers as a Risk Factor for Crashes Fatal to 16- and 17-Year Old Drivers. JAMA 283:1578-1582, 2000.

A flight instructor once told me that he would much prefer training women to training men because, “The women tend to show up better prepared for their flying lessons than the men.” He rated female pilots slightly better in their stick-and-rudder skills, but males seemed to have the edge with regard to rapid assessment and reaction. But neither impression proved to be right when we studied crashes of general aviation pilots (the level at which he had done most of his instructing): in general, the women made better decisions, and most of the women’s crashes involved stick-and-rudder skills. Whether these gender characteristics are widespread, and whether they apply to driving, remains to be seen.

Abstract: Background: General aviation crashes in the United States were analyzed to identify differences between male and female pilots in the circumstances of their crashes and the types of pilot errors involved. Methods: All 144 female pilots who were born between 1933 and 1942 and who were involved in general aviation crashes between 1983 and 1997 were matched 1:2 with 287 male pilots by age within 2 yr, medical certificate and pilot certificate, state or region of crash, and year of crash. Results: Mechanical failure, gear up landings, improper IFR approaches, and collisions with wires or poles were more common in crashes of male pilots. Loss of control on landing/takeoff was more common in crashes of female pilots. Mishandling aircraft kinetics was the most common error of pilots of both genders and was noted more often in female pilots' crashes (81% vs. 48%) (p < 0.001). Males' crashes were more likely to involve flawed decisions (29% vs. 19% of females' crashes) (p = 0.027) or inattention (32% vs. 19%) (p = 0.004). Older pilots made fewer errors: among males age 55-63, 26% of crashes were without obvious pilot error compared with only 7% at age 40-49 (p = 0.003). Conclusion: There are large gender differences in the types of pilot error involved in general aviation crashes. Mishandling aircraft kinetics, poor decision making, and inattention are the most common pilot errors and merit increased attention in pilot training.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/11346011
AGE, FLIGHT EXPERIENCE, AND RISK OF CRASH INVOLVEMENT
IN A COHORT OF PROFESSIONAL PILOTS

G Li, SP Baker, JG Grabowski, Y Qiang, ML McCarthy, and GW Rebok

During my years of active flying (mainly in the classic Navion of Margaret Lamb, a specialist in mountain flying), my pilot’s license proved to be the ticket to more opportunities. I was fortunate to be allowed by the FAA and two airlines to fly jump-seat—i.e., sitting right behind the pilots on the flight deck. Often their conversation concerned the topic of discrimination against aging pilots: why should they have to retire at age 60, when their skills and knowledge were generally better than those of many young pilots who had higher crash rates? As the issue rose to a head in Congress, the government turned to some of our research findings, including those in this paper. The resulting change in the regulation—so that pilots could fly until age 65—still smacks of discrimination on the basis of a pilot’s age rather than capability, but at least it provides an extra five years of productive life for those whose health and stamina allow it. Ironically, aging pilots with fewer than 10 passengers can still fly commercially despite the lack of a second pilot to take over in a medical emergency: fear of such emergencies had often been used to justify the age-60 rule.

Abstract: Federal aviation regulations prohibit airline pilots from flying beyond the age of 60 years. However, the relation between pilot age and flight safety has not been rigorously assessed using empirical data. From 1987 to 1997, the authors followed a cohort of 3,306 commuter air carrier and air taxi pilots who were aged 45-54 years in 1987. During the follow-up period, the pilots accumulated a total of 12.9 million flight hours and 66 aviation crashes, yielding a rate of 5.1 crashes per million pilot flight hours. Crash risk remained fairly stable as the pilots aged from their late forties to their late fifties. Flight experience, as measured by total flight time at baseline, showed a significant protective effect against the risk of crash involvement. With adjustment for age, pilots who had 5,000-9,999 hours of total flight time at baseline had a 57% lower risk of a crash than their less experienced counterparts (relative risk = 0.43, 95% confidence interval: 0.21, 0.87). The protective effect of flight experience leveled off after total flight time reached 10,000 hours. The lack of an association between pilot age and crash risk may reflect a strong "healthy worker effect" stemming from the rigorous medical standards and periodic physical examinations required for professional pilots.


INMATE-MADE WEAPONS: ASSESSING THE RISK

JM Lincoln, LH Chen, JS Mair, PJ Biermann, and SP Baker

Jennifer Lincoln went on to focus her attention on workers whose jobs of fishing on the high seas put them at great risk, but she spent a year of her pre-doctoral life working with me and our colleagues to reduce the hazards to correctional officers. These oft-ignored workers are the targets of prisoners who have little to do except for trying to design and fashion a weapon from any available object. Through visits to prisons and hundreds of phone calls, we were able to characterize the seemingly innocuous materials typically used to devise lethal weapons. (For example, one inmate rolled up a magazine and blew out a dart made from paper hardened with toothpaste. In his first test, it pierced a carton in the cell across the corridor!)

Abstract: More than 2400 correctional workers in the United States required medical attention in 1999 following assaults by inmates, often with unconventional "homemade" weapons. Little information is available about these weapons. The authors surveyed 101 state prisons for a 12 month period within 2002-03, and 70 responded. A total of 1326 weapons were either confiscated (1086) or used to injure inmates (203) or staff (37). Staff were most often attacked with clubs. The prison store was the most common source of materials used to make confiscated weapons. Issued items were the most common source of materials used to make weapons to injure staff. The injury rate for staff was 1.0/1000 workers per year. The annual cost of injuries for time lost and medical care for staff was estimated at $1,125,000 in these 70 prisons. Results identify materials that should be redesigned to prevent modifications to make weapons. Prison stores and issued items deserve special attention.


CRASH RESISTANT FUEL SYSTEM EFFECTIVENESS IN CIVIL HELICOPTER CRASHES

MS Hayden, DF Shanahan, LH Chen, and SP Baker

During his years as a researcher at the US Army Aeromedical Research Laboratory and other Army crash investigation organizations, Dennis Shanahan had opportunities to evaluate the effectiveness of a variety of countermeasures designed to reduce injury to members of the military. This paper stemmed from his realization that the excellent standards for crashworthy fuel systems of military helicopters were in danger of being reduced to the less protective Federal standards applied to civilian helicopters. Apparently, there was some thought that, “If the standards for civilian helicopters are adequate, why not save money by applying them to the military?” Mark Hayden, an Army industrial hygienist and master's candidate in Environmental Health Sciences, took the lead on analyzing data and writing up the results. Mark had a vested interest in aviation safety because he frequently found himself as cargo in military aircraft in combat zones. Our hope is that this paper helps the military standards to survive and, ultimately, to benefit civilians as well as the military.

Abstract: Background: Crash-resistant fuel systems (CRFS) have demonstrated close to 100% effectiveness in survivable crashes of Army helicopters, but the technology has been slow to transfer into the civil helicopter arena. Federal standards for civil helicopter CRFS are less stringent than those for military helicopters. A reduction in standards for CRFS in military helicopters is being considered. Objective: The goal of this study was to determine whether crashes of civil helicopters with CRFS are less likely to result in post-crash fire than crashes of those without. Method: Crashes of civil helicopters during 1982-2004 were analyzed, comparing Bell 206 helicopters manufactured with CRFS with Aerospatial 350 helicopters manufactured during the same period (post-1981), but lacking CRFS. Bell 206 helicopters with CRFS were also compared with earlier models without CRFS. Results: The highest proportion of crashes with post-crash fires (11.3%) was in AS-350s manufactured after 1981 (non-CRFS), and the lowest (3.7%) was in Bell 206s (with CRFS) [unadjusted risk ratio (RR) = 3.3, 95% confidence interval (CI) = 1.04, 10.50; adjusted for light and weather, RR = 2.81, CI = 0.82, 9.69]. Earlier models of Bell 206s without CRFS had higher risk of post-crash fire than post-1981 models with CRFS. Conclusions: The results of this study suggest a better performance, in terms of post-crash fire prevention, of CRFS-equipped civil helicopters as compared with those without CRFS. It is possible that CRFS in civil helicopters have not achieved the same degree of effectiveness as CRFS in military helicopters. CRFS should be used more widely in civil helicopters. The more stringent CRFS requirements for military helicopters should not be reduced without further research.

Citation: Hayden MS, Shanahan DF, Chen LH, Baker SP. Crash resistant fuel system effectiveness in civil helicopter crashes. Aviat Space Environ Med 76:782-785, 2005.

Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/16110696
EMS HELICOPTER CRASHES: WHAT INFLUENCES FATAL OUTCOME?

SP Baker, JG Grabowski, RS Dodd, DF Shanahan, MW Lamb, and G Li

In 1988, Bob Dodd’s research for the NTSB reported that EMS helicopters had a fatal crash rate that was more than three times the rate for helicopter air taxis. His subsequent dissertation research revealed that crew members in the rear of EMS helicopters sustained more severe crash injuries than the flight crew in the cockpit, a finding he tied to the lack of protection for the EMS providers who tended the patients. The high occupational death rate for EMS helicopter crews and the need for protection of these high-risk workers stimulated the following paper, which recommended elimination of non-essential flights, among other suggestions. Not long thereafter, Maryland EMS flights by state helicopters dropped by half.

Abstract: Study Objective: In recent years, air transport of patients has been associated with disproportionate increases in crashes and deaths. We identify factors related to fatal outcome in air medical helicopter crashes and suggest preventive measures. Methods: This was a retrospective study using National Transportation Safety Board records for helicopter emergency medical services (EMS) crashes between January 1, 1983, and April 30, 2005. The main outcome measure was the percentage of air medical crashes resulting in 1 or more deaths. Results: There were 182 helicopter EMS crashes during the 22.3-year study period; 39% were fatal. One hundred eighty-four occupants died: 45% of the 44 patients and 32% of the 513 crewmembers. Fifty-six percent of crashes in darkness were fatal compared with 24% of crashes not in darkness. Seventy-seven percent of crashes in instrument meteorological conditions were fatal compared with 31% in visual conditions. Thirty-nine percent of all deaths occurred in crashes with post-crash fires; 76% of crashes with post-crash fire were fatal compared with 29% of other crashes. Multivariate logistic regression revealed that controlling for other factors, the odds of fatal outcome was increased by post-crash fire (odds ratio [OR] 16.1; 95% confidence interval [CI] 5.0 to 51.5], bad weather (OR 8.0; 95% CI 2.4 to 26.0), and darkness (OR 3.2; 95% CI 1.3 to 7.9). Conclusion: Fatalities after helicopter EMS crashes are associated especially with post-crash fire and with crashes that occur in darkness or bad weather and can be addressed with improved crashworthiness and measures to reduce flights in hazardous conditions. Further studies will be necessary to determine which changes will decrease the fatal crash rate and which are cost effective.


Graduated driver licensing programs are now an accepted part of the fabric of the teen driving experience. This was far less true in 2006. Results of our study have contributed to the adoption of and stiffening of GDL programs in many states. This study for NHTSA was followed by one sponsored by, and in collaboration with, the AAA Foundation. The escalation of GDL has been rewarding, but there is still too little emphasis on protecting teens when they crash. When parents ask me for advice about how to keep their teens safe, I astound them by encouraging them to insist that their teens use the newest car available, because that will usually give the best protection in a crash. It is not unusual for parents to provide youngsters with the oldest, cheapest wheels in the family, apparently more interested in protecting their new car than their children.

Abstract: Context: Implementation of graduated driver licensing programs is associated with reductions in crash rates of young drivers, but graduated driver licensing programs vary in their components. The impact of programs with different components is unknown. Objective: The purpose of this work was to determine which graduated driver licensing programs are associated with the greatest reductions in fatal motor vehicle crashes involving 16-year-old drivers. Methods: We conducted a retrospective study of all 16-year-old drivers involved in fatal crashes in the United States from 1994 through 2004 using data from the Fatality Analysis Reporting System and the US Census Bureau. We measured incidence rate ratios of fatal motor vehicle crashes involving 16-year-old drivers according to graduated driver licensing programs, adjusted for state and year. Results: Compared with state quarters with no graduated driver licensing program components, reductions of 16% to 21% in fatal crash involvement rates of 16-year-old drivers occurred with programs that included a mandatory waiting period of at least 3-months, a nighttime driving restriction, and either at least 30 hours of supervised driving or passenger restrictions. Reductions of 18% to 21% occurred in state quarters with programs that included at least 5 of the 7 components examined. Drivers aged 20 to 24 or 25 to 29 years did not experience significant reductions. Conclusion: Comprehensive graduated driver licensing programs are associated with reductions of approximately 20% in 16-year-old drivers’ fatal crash involvement rates. The greatest benefit seems to be associated with programs that include age requirements and at least 3 months of waiting before the intermediate stage, nighttime driving restriction, and either 30 hours or more of supervised driving or passenger restriction.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/16818549
Steve Teret and I had long argued that therapeutic misadventures, such as wrong-side surgery and prescription mix-ups, should be considered with other injuries, since the basic causes and preventive strategies are the same. Soon after taking my summer injury epidemiology course in Minnesota, Janine Jagger attended a seminar at the University of Virginia where needle-stick injuries were being addressed as a behavioral problem (e.g., staff neglected to put used needles into protective boxes). She immediately recognized that the problem was with the design of needles and syringes and began designing devices that would protect the user. She went on to perform groundbreaking research, develop the Health Care Worker Safety Center at UVA, and obtain legislation requiring worker protection. When Martin Makary, a Hopkins surgeon, came to my office one day to discuss injury prevention in the surgical suite, I was impressed with the potential for preventing injuries to staff by not even using needles and sharp instruments.

**Abstract:** Percutaneous injuries occur frequently during surgical procedures and represent a significant occupational hazard to operating room personnel. **Objectives:** To evaluate the feasibility of performing select general surgical procedures using a combination of non-sharp devices and techniques to replace the conventional use of scalpels and needles. **Design, Setting, and Participants:** Candidate procedures for which sharpless techniques could replace conventional scalpels and suture needles were identified preoperatively. Non-sharp techniques included monomeric 2-octyl cyanoacrylate adhesive, electrocautery, tissue stapler, and minimally invasive instrumentation. **Main Outcome Measures:** We rated the feasibility of performing specific procedures without sharps. We also documented the rate of overall reversion to sharps during operations on patients that had been identified preoperatively as candidates for sharpless surgery. **Results:** Of 358 procedures, 91 were identified preoperatively as appropriate for sharpless surgery. Of these, 87% (79/91) were completed without the use of sharps, including 13/22 (59%) open laparotomy procedures, 20/22 (91%) laparoscopic procedures, and 46/47 (98%) soft tissue procedures. **Conclusions:** Select common procedures can be performed entirely with sharpless techniques, eliminating the risk to surgical personnel associated with intraoperative percutaneous injuries.


News of a crash of a sightseeing helicopter flight in Hawaii caught Margaret Lamb’s attention. She was aware of a number of such helicopter crashes there, and she had seen a terrifying video taken on an air tour as a chopper skimmed low over Hawaii’s scenic terrain. My appetite was whetted for doing this research, but never did I wish to take such a flight. Then Wren Haaland, a Hopkins undergrad, sent me an email out of the blue, wondering if I had a research position available. In addition to her world-championship in jumping rope, she turned out to be an enthusiastic and productive researcher, ferreting out the details for this paper.

Abstract: Introduction: Crashes of sightseeing helicopter flights in Hawaii and the resulting tourist deaths prompted the FAA to issue regulations in 1994 specific to air tours in Hawaii. Research was undertaken to examine the effect of the 1994 Rule and to describe the circumstances of such crashes. Method: From National Transportation Safety Board data, 59 crashes of helicopter air tour flights in Hawaii during 1981-2008 were identified; crash investigation reports were read and coded. Crashes in 1995-2008 were compared with those in 1981-1994. Results: The 1994 Rule was followed by a 47% decrease in the crash rate, from 3.4 to 1.8/100,000 flight hours. The number of crashes into the ocean decreased from eight before the Rule to one afterwards. VFR-IMC crashes increased from 5 to 32% of crashes. There were 46 tourists and 9 pilots who died in 16 fatal crashes. Aircraft malfunctions, primarily due to poor maintenance, precipitated 34 (58%) of the crashes and persisted throughout the 28-yr period. Pilot errors were apparent in 23 crashes (39%). Flight from visual to instrument conditions occurred in two cases before the Rule and seven cases after. Terrain unsuitable for landing was cited in 37 crashes (63%). Conclusion: Decreases occurred in the overall number and rate of crashes and in ocean crash landings. The increase in VFR-IMC crashes may be related to the requirement that tour helicopters fly at least 1500 ft. above terrain. Attention is still needed to maintenance, pilot training, and restricting flights to operating areas and conditions that enable safe emergency landings.

Citation: Haaland WI, Shanahan DF, Baker SP. Crashes of sightseeing helicopter tours in Hawaii. Aviat Space Environ Med 80:637-642, 2009.

PREVENTING INJURIES BY UNDERSTANDING ENERGY DAMAGE

CW Runyan and SP Baker

It has always been fun to partner with Carol Runyan, whom I met when she was an injury epidemiology student in Minnesota. At that time she impressed me with her ability to conduct meaningful research using a single dime at a phone booth. Later she came to Hopkins as a postdoctoral fellow. She went on to lead one of the nation’s most productive injury centers, at the University of North Carolina, Chapel Hill. Later Hopkins honored her by inducting her into the Society of Scholars. We both revered Bill Haddon, as is clear from the following article.

Abstract: It is more than 35 years since William Haddon, as president of the Insurance Institute for Highway Safety in Washington, DC, published his now classic paper, “Energy damage and the ten countermeasure strategies”, in the Journal of Trauma. This paper further developed ideas from his article published three years earlier in the American Journal of Public Health, “On the escape of tigers: an ecologic note.” Both papers have withstood the test of more than 35 years as critical conceptual pieces in the field of injury control. In them, Haddon presents a conceptual framework that is not limited as a tool for injury prevention, but can be used successfully as a way to identify preventive interventions for almost any public health problem. In his classic paper, Haddon addressed the notion that injury occurs through the transfer of energy, of which there are several types: kinetic, thermal, chemical, electrical and ionizing radiation – and that damage to the body results when energy is transferred in quantities or at rates that the body cannot withstand. He presents his analysis of how injuries occur in parallel to the way the medical world has come to understand the infectious process: through the transfer of infectious agents to the human host. Haddon stressed that this allows for a more systematic approach to prevention through the development of countermeasures that address one or more elements of the injury process. We encourage careful reading of this classic paper and the use of Haddon’s strategies in the development of approaches to injury and violence prevention worldwide. Resources are too scarce and the lost lives too precious and numerous for us to develop interventions without the benefit of clear thinking of the type Haddon’s models stimulate. As we work to create a trained cadre of professionals responsible for the practice of injury control, these concepts are central – much like teaching Koch’s postulates to bacteriologists or Newton’s laws of physics to engineers.

Citation: Runyan CW, Baker SP. Preventing injuries by understanding energy damage. Bull World Health Organ. 2009 May;87(5):402-3.

Controversy over allowing Mexican trucks into the US initially led me to investigate differences between Mexican- and US-licensed truck drivers with regard to characteristics of their crashes and, in particular, the extent to which alcohol was involved. It turned out alcohol was rarely found in the crash-involved drivers of big trucks—only about 2% of either Mexican or US drivers. Because there were huge differences among countries in the proportion of vehicles that were large trucks (about half of the Canadian vehicles that crashed in the US were big trucks compared to a small percentage of US and Mexican trucks), we excluded the large trucks from further analysis. To our surprise, differences between Mexican and US drivers were generally minor, and were non-existent with respect to alcohol. The Canadian drivers, in contrast, provided the major findings. Joanne Brady’s hard work on myriad analyses made possible this and many of our aviation papers.

**Abstract:** Objective: To determine the prevalence of alcohol involvement and impairment in fatal crashes in the USA involving Mexican and Canadian drivers. Methods: Drivers in fatal crashes in the USA were identified during 1998 to 2008 from the Fatality Analysis Reporting System, and the prevalence of alcohol involvement and impairment (defined as blood alcohol concentrations ≥0.01 g/dl and ≥0.08 g/dl, respectively) was compared among drivers licensed in Mexico (n=687), Canada (n=598), and the USA (n=561,908). Results: The prevalence of alcohol involvement was 27% for US drivers, 27% for Mexican drivers, and 11% for Canadian drivers. Alcohol impairment was found in 23% of US drivers, 23% of Mexican drivers, and 8% of Canadian drivers. With adjustment for driver demographic characteristics and survival status and for crash circumstances, the prevalence of alcohol involvement was significantly lower for Canadian drivers (adjusted prevalence ratio (PR) 0.63, 95% CI 0.49 to 0.80) than for US drivers, and was similar between Mexican and US drivers (adjusted PR 0.91, 95% CI 0.81 to 1.02). Conclusions: Alcohol involvement in fatal motor vehicle crashes in the USA is similarly prevalent in US and Mexican drivers, but is substantially less common in Canadian drivers.


INJURY STATISTICS, HIGH RISK GROUPS, AND INDIVIDUALS: FALLING THROUGH THE CRACKS

SP Baker

“Falling through the cracks” aptly describes the injury problems that have attracted me. Whether rare, as in the case of hot dog choking, or common, as with recreational injuries in the military, my attention has been drawn to injuries that few people were thinking about. Therefore this title of a talk I gave when Columbia School of Public Health honored me, in my 80th year, with the Frank Calderone Prize. It was fun to look back over a 40-plus-year career to find the common threads. Pulling them brought memories of colleagues and the research, advocacy, challenges, and rewards that we shared.

Abstract: The Frank A Calderone Prize in Public Health, the pre-eminent award in the field, is overseen by Columbia University's Mailman School of Public Health and presented to someone who has made “a transformational contribution in the field of public health.” The Prize recognizes an individual who has achieved extraordinary distinction in public health and/or who has made a specific contribution which has had long-term national or global implications. On 6 May 2010, the prize was awarded to Susan Baker. This is the first time the Prize has been bestowed upon an injury control researcher.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/20805617
COMPARING ROAD TRAFFIC MORTALITY RATES FROM POLICE-REPORTED DATA AND DEATH REGISTRATION DATA IN CHINA

G Hu, SP Baker, and TD Baker

Forty years ago, in Rio de Janeiro, I found four times as many pedestrian deaths in the records of the Instituto Medical Legal as police had reported. That kind of discrepancy is still evident in many countries. In China, statistics on road deaths are compiled by the police. But China also has a health data system built on a sample of health departments, considered to be representative of the country. I had been told the police kept two sets of data—one reflecting what really happened, the other, typically supportive of government policy. Fortunately, Guoqing Hu was able to access the health data and documented the discrepancy described in our paper.

Abstract: Objective: To compare death rates from road traffic injuries in China in 2002-2007 when derived from police-reported data versus death registration data. Methods: In China, police-recorded data are obtained from police records by means of a standardized, closed-ended data collection form; these data are published in the China statistical yearbook of communication and transportation. Official death registration data, on the other hand, are obtained from death certificates completed by physicians and are published in the China health statistics yearbook. We searched both sources for data on road traffic deaths in 2002-2007, used the $\chi^2$ test to compare the mortality rates obtained, and performed linear regression to look for statistically significant trends in road traffic mortality over the period. Findings: For 2002-2007, the rate of death from road traffic injuries based on death registration data was about twice as high as the rate reported by the police. Linear regression showed a significant decrease of 27% (95% confidence interval, CI: 35-19) in the death rate over the period according to police sources but no significant change according to death registration data. Conclusion: The widely-cited recent drop in road traffic mortality in China, based on police-reported data, may not reflect a genuine decrease. The quality of the data obtained from police reports, which drives decision-making by the Government of China and international organizations, needs to be investigated, monitored and improved.


Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/21346889
My husband Tim (Professor of International Health) and I have worked together on many papers, but this one was unique because it began as a presentation by the two of us for the Western Trauma Association at Steamboat Springs. A few years later, when Sara Haack, a med student, was getting her MPH, she joined us and carried the ball all the way to publication. Like a number of our papers, it was triggered by recognition of a dramatic shift in injury mortality rates.

Abstract: Background: Russia has made substantial, largely unrecognized contributions to the field of trauma. These include the early development of triage, improvement of blood transfusions and blood bank networks, and Mobile Emergency Medical Services. Despite these advances, injury fatality rates in Russia are alarmingly high (∼50% higher than other Eastern European countries). They fluctuated dramatically during 1980 to 2006, a period that included the dissolution of the Union of Soviet Socialist Republics. Suggested causes, including inaccurate data, alcohol use, and economic hardship, are investigated in this article. Methods: Injury mortality rates for homicide, suicide, accidental poisoning, and total injuries (source: World Health Organization), alcohol consumption (source: World Health Organization), and economic data (source: United Nations Economic Commission for Europe) for the Russian Federation from 1980 to 2006 were examined and compared with the Baltic States, Central Asian Republics, other Eastern European nations, and the United States. Results: Injury mortality rates declined in Russia from 1980 to 1987. The total injury mortality rate more than doubled between 1987 and 1994, followed by a 40% decline from 1994 to 1998. The 1984 to 1994 mortality rates generally parallel alcohol consumption trends. The 1991 to 1994 climb coincides with the dissolution of the Union of Soviet Socialist Republics. A smaller rise in fatality rates occurred in the early 2000s. Conclusions: Deaths caused by injuries in the Russian Federation are related to multiple factors. Some authors conclude that the data accurately reflect injury mortality. Financial concerns during these times may have led to riskier behaviors resulting in more deaths from injuries. Heavy alcohol consumption also likely contributes to high injury mortality rates. Excessive injury mortality calls for action by Russian policy makers.

Citation: Baker TD, Baker SP, Haack SA. Trauma in the Russian Federation: then and now. J Trauma. 2011 Apr;70(4):991-5.

HELCIOPTER CRASHES RELATED TO OIL AND GAS OPERATIONS IN THE GULF OF MEXICO

SP Baker, DF Shanahan, WI Haaland, JE Brady, G Li

The disastrous oil spill in the Gulf of Mexico in 2010 claimed 11 lives and resulted in well-deserved media attention. During the 27 years encompassed by the following study, an average of 5 deaths occurred each year, with many opportunities for intervention but little press attention; this illustrates the fact that deaths that occur one or two at a time receive little attention. The terrorist attacks on September 11, 2001 claimed about 3000 lives, but that is fewer than the number of deaths on US highways every month, year in and year out. Injury researchers must find ways to win attention to the great majority of deaths and injuries that occur one at a time.

Abstract: Introduction: The hazards inherent in flight operations in the Gulf of Mexico prompted investigation of the number and circumstances of crashes related to oil and gas operations in the region. Methods: The National Transportation Safety Board (NTSB) database was queried for helicopter crashes during 1983 through 2009 related to Gulf of Mexico oil or gas production. The crashes were identified based on word searches confirmed by a narrative statement indicating that the flight was related to oil or gas operations. Results: During 1983-2009, the NTSB recorded a total of 178 helicopter crashes related to oil and gas operations in the Gulf of Mexico, with an average of 6.6 crashes per year (5.6 annually during 1983-1999 vs. 8.2 during 2000-2009). The crashes resulted in a total of 139 fatalities, including 41 pilots. Mechanical failure was the most common precipitating factor, accounting for 68 crashes (38%). Bad weather led to 29 crashes (16%), in which 40% of the 139 deaths occurred. Pilot error was cited by the NTSB in 83 crashes (47%). After crashes or emergency landings on water, 15 helicopters sank when flotation devices were not activated automatically or by the pilots. Discussion: Mechanical failure, non-activation of flotation, and pilot error are major problems to be addressed if crashes and deaths in this lethal environment are to be reduced.

Citation: Baker SP, Shanahan DF, Haaland WI, Brady JE, Li G. Helicopter crashes related to oil and gas operations in the Gulf of Mexico. Aviat Space Environ Med. 2011 Sep;82(9):885-9.

Link to Full-text: http://www.ncbi.nlm.nih.gov/pubmed/21888272
TRUCK DESIGN TESTIMONY

Statement of Susan P. Baker, MPH
Public Meeting on Heavy Truck Safety
Sponsored by the National Highway Traffic Safety Administration
U.S. Department of Transportation
September 10, 1979

For many people, truck safety means being safe from big trucks, since in collisions the occupants of smaller vehicles fare less well than the truck drivers. But I have also been concerned about the safety of truck drivers, who have a very high rate of on-the-job injury and death. During the following testimony I brandished the steering wheel from an 18-wheeler, to make my point that its edge would focus crash forces on the driver’s abdomen.

At one time my research showed that some truck drivers in fatal crashes (albeit a small percentage) were intoxicated, and perhaps it was this that prompted someone in the trucking industry to hire a researcher to try to discredit my research. Fortunately, he was unsuccessful. He told me about it, so I got a good story.

Miss Claybrook, members of the panel:

I am Susan P. Baker, Associate Professor at the Johns Hopkins School of Public Health, and a former member of the Truck and Bus Subcommittee of the National Highway Safety Advisory Committee.

During the past few hours, 200 heavy truck cabs have rolled off the assembly lines. Chances are that one of those 200 cabs will eventually be stained with the blood of a dead occupant. Many more will inflict non-fatal injuries on their drivers.

We’ve heard a lot about how hard it can be to squeeze in behind the wheel of some of today’s trucks. But whether it’s a tight squeeze or a comfortable space between the driver and the steering wheel, think what it would be like to hit the rim of that wheel with your belly at 55 mph.

I’ve never done it, but I’ve seen the results, because my office is in the Baltimore City morgue. That’s where a truck driver is likely to be autopsied if he is killed near Baltimore. What do the autopsies show? In particular, a lot more injuries to the abdominal organs than we see in other dead drivers. Half of the fatally injured drivers of heavy trucks have serious abdominal injuries. Not just one abdominal injury, but 3 or 4 different organs injured in a single driver. We see lots of ruptured livers and spleens. We see ruptured diaphragms, which are rare in other drivers, and torn blood vessels. In addition, three-quarters have fractured ribs and many have lethal injuries of the lungs, aorta, or heart.

I’ve never heard of crash tests in which a heavy truck with an 85th percentile truck driver dummy was subjected to a 35 mph barrier crash. In my mind’s eye, though, it’s too easy to see the abdomen hitting the rim of the wheel, the driver jackknifing over the wheel, his chest hitting the top of the steering column.

1 As I spoke those words, I brandished a Volvo truck steering wheel.
Isn’t it time we did some crash testing with trucks and dummies, rather than with drivers themselves? And isn’t it time that trucks were designed with the assumption that they’ll be in crashes at or near their maximum operating speeds? Unfortunately it’s a reasonable assumption, and I think it carries an obligation to provide automatic, built-in protection for these high risk workers when they are in a crash.

I’d like to challenge the truck manufacturers and designers—with input from owners and drivers—to come up with something better than today’s steering wheel, to turn it into something that protects drivers in a crash rather than killing them.

I’ve seen films of a tank truck, built to protect hazardous cargo, hitting a barrier at high speed. The tank came through intact. The cab was a mess, to put it mildly, having served as an energy-attenuating device to protect the cargo.

It’s time now to give as much thought to protecting drivers as we’ve given to protecting cargo. I’ve emphasized the steering wheel because that’s the first thing the driver hits in a life-threatening frontal collision. But attention must be given to the entire cab, until we no longer can look at 200 new trucks with the realization that someone is going to die in one of them.
AIRBAG TESTIMONY
Statement of Susan P. Baker, MPH
on behalf of the American Public Health Association
at a Public Hearing on FMVSS 208, Passive Restraints
December 5, 1983

Year after year, Congress went back and forth over the passive restraint standard, depending upon which political party was in power. After one hearing I asked Bill Haddon, “Do you think we will ever get airbags in cars?” “Sue,” he replied, “go read the history of the battle over milk pasteurization.” I did so, and was amazed to learn of the decades of delay – after we knew that thousands of people were being sickened despite the availability and known benefits of life-saving pasteurization. It gave me hope that eventually we would have airbags.

I am Susan Baker, an associate professor at The Johns Hopkins School of Hygiene and Public Health and an epidemiologist specializing in injury prevention. I am here today to speak on behalf of the American Public Health Association and its membership of 50,000 health professionals.

We are deeply concerned about the continued delay in implementing the passive restraint standard. Today, motor vehicle crashes are the number one cause of death in this country from age 1 to age 34. This means that for almost half of the average life span, we are more likely to die on the highway than from cancer or homicide or any other cause. The largest category of people killed by motor vehicles are passenger car occupants in frontal and semi-frontal crashes.

The technology to protect them has long been available. Yet for more than a decade, the Department of Transportation has repeatedly delayed its passive restraint standard that would require cars to automatically protect occupants in frontal crashes at moderate speeds. Seven years ago tomorrow, Secretary of Transportation William Coleman completed an extensive review of testimony and data on passive restraints. He concluded that “Air bags have gone through more laboratory engineering analysis and testing than any other item of equipment required by Federal motor vehicle safety standards…I am convinced, after a painstaking examination of the record, that passive restraints are technologically feasible, would provide substantially increased protection to the public in traffic accidents, and can be produced economically.”

On the seventh anniversary of the Coleman decision, the Department of Transportation is again holding hearings on the future of the passive restraint standard. Since the early 1970’s, much of the delay in implementing the standard has hinged on the argument that seat belt use can be increased by education, incentives, or laws to a degree that will make automatic crash protection unnecessary. There is absolutely no basis for that supposition. In Australia, Canada, Sweden, and other countries with “successful” belt use laws, tens of thousands of motor vehicle occupants are still dying unnecessarily. Why? Because the people who are the most likely to be in crashes are the least likely to be wearing seatbelts. Seatbelts are used less by people driving at night, when severe crashes are more common. They are used much less by people who have been drinking. In illustration, a roadside
survey in Quebec Province (where there is a seat belt law) found that only 36% of the intoxicated drivers were wearing seat belts, compared with 54% of the sober drivers.

Similarly, belt use laws have less effect on teenagers, who have the highest death rates in crashes. In Ontario, teenagers paid little attention to the seat belt law, although it doubled belt use by older people.

Belt use is also rare among residents of low income areas. These people too are at especially great risk of being killed in crashes. Recent research shows that among people who live in low income areas of the U.S., the motor vehicle occupant death rate is almost three times the rate in areas where income is high.

The inescapable message is that unless you are willing to condemn to death teenagers and the poor and everyone else who doesn’t routinely buckle up, law or no law, we must have built-in, automatic crash protection for the many people and the many moments when belts are not used.

Most people do not realize how long that kind of protection has been feasible. Thirteen and a half years ago, in June of 1970, I was among almost 200 people at a meeting in Washington that was sponsored by the Insurance Institute for Highway Safety. We were privileged to see the premiere of the Institute’s film called “In the Crash.” Portions of that movie showed dummies being gently cushioned by airbags instead of being smashed by potentially lethal crash forces. These airbag tests, which had been filmed a year or so earlier by Eaton, Yale, and Towne, showed us technology that was already so well developed that within a few years, General Motors would put airbags in a fleet of 1,000 Chevrolets to be used by its own employees. Despite their excellent performance, airbags have never been made available to the public except in luxury cars; even those were not publicized by the manufacturer and were hard to find or to order.

It is now 14½ years since Eaton, Yale, and Towne made that film showing the life-giving potential of airbags. Since then, close to 400,000 front seat occupants of passenger cars have been killed. Four hundred thousand! What does such a number mean? It is common to make comparisons with deaths from wars or diseases, but it may be easier to comprehend the number by translating it into living men, women, and children. Four hundred thousand is two-thirds of the population of Washington, D.C.; it’s more than all the people in Newark or Minneapolis, Portland or Honolulu. Most of the people who died were young, and would still be alive today if they hadn’t been killed in a car crash.

In addition to the 400,000 who were killed during those years, about 4 million men, women, and children were injured so severely as front seat occupants that they had to be hospitalized. That roughly equals the population of Maryland. It’s almost double the entire population of Kansas. If all 4 million people had been injured at the same time, there would have been 4 of them for every single hospital bed in the United States.

As well as the pain, grief, and disability, the costs to society are enormous. Sometimes it’s too easy to forget that our resources are limited, that there are finite numbers of hospital beds and ambulances and medical personnel. People who are injured tax these resources to the utmost, perhaps most of all in the case of quadriplegics and paraplegics. Over the past 14 or 15 years, the total number
who have sustained irreparable damage to their spinal cords is so great that if you placed their hospital beds head to foot they would stretch from Baltimore to Washington, D.C.

Airbags can’t prevent every death, just as ejection seats and parachutes can’t save every military pilot whose plane crashes. But just like ejection seats, airbags can make huge reductions in unnecessary deaths and injuries, and no one should be “caught dead” without them.

The Department of Transportation will never address another issue that involves sacrificing—or saving—the lives of so many citizens. Because the human losses are astronomical and unacceptable; because automatic protection is humane, feasible, and effective; because the technology is available but is not being applied, the Department of Transportation should end the delays and make sure that effective crash protection is built into all cars at the earliest possible date.

Specifically, I urge the Department of Transportation to require driver-side airbags in all cars at the earliest possible date, followed by a requirement for passive restraints on the passenger-side as soon as possible. There would be some additional benefit of seat belt use laws, and these should be strongly supported. But to back away from airbags—in spite of their 100% ‘usage’ rate—in hopes of achieving miraculously high seat belt use rates, would not be fair to the American public.

According to NHTSA’s Preliminary Regulatory Impact Analysis for FMVSS 208 (October, 1983), even if airbags were only 30% effective, manual belts would have to be used by 60% of people in potentially fatal crashes in order to save as many lives as airbags. According to the same report, manual seat belts are used by about 3 percent of Americans in high-speed crashes. Nowhere in the world, even in the countries with seat belt laws, are seatbelts used by even half of the occupants in potentially fatal crashes.

The American Public Health Association would remind you that each year you delay, you are sacrificing the lives of thousands of Americans. The sacrifice is unnecessary and should no longer be tolerated.

Thank you.
My earliest recollection of the years I labored over The Injury Fact Book was the week I spent in our mountain cabin outlining the book in great detail. Colleagues at the Insurance Institute for Highway Safety, especially Brian O’Neill, contributed generously of their time and ideas. I particularly liked the way the 50 maps turned out—especially the dramatic map of general aviation death rates that inspired me to become a pilot and fly in those high-risk mountain states. When finished, the book won highest praise from Bill Haddon, so I will let him describe it.

Injuries are the leading cause of death in the United States from the first year of life to age 44. An incalculable cause of human suffering, injuries are also a major source of medical costs and losses to the economy. Yet the subject is largely unknown territory, even to professionals concerned with impairments to the health of the American people and ways in which the quality of life in the United States can be improved. Only rarely do colleges or universities teach the scientific aspects of injuries—except with respect to the treatment of the injured.

This is not because of lack of knowledge. Since about 1940, what is now termed “injury control” has evolved rapidly from the prescientific folklore that still dominates much popular thinking about the causes, prevention, and amelioration of injuries to a mature scientific field with sophisticated research methods, a practical theoretical base, an extensive body of empirical knowledge, and increasing examples of the successful control of the human damage.

In these respects, injuries and their prevention are the last of the great human plagues to be the subject of scientific inquiry and understanding. But, unlike the situation in the case of infectious, cardiovascular, and neoplastic diseases, until the preparation of this book there has been no body of truly competent, comprehensive information giving, so to speak, the statistical lay of the land in the case of many kinds of injuries.

Most of the basic analyses had never even been done before the authors meticulously performed them using a variety of governmental and other sources. Analyzed by cause, age, sex, race, socioeconomic status, urbanization, geography, time, and other variables, the results of this book, together with those the authors have drawn from other works, will constitute the indispensable statistical reference on injuries for years to come. The book will also undoubtedly be the source to which graduate students and others turn for injury research information, since the reasons for many of the trauma distributions it documents are, as yet, only poorly understood.

Since in many respects the authors have broken entirely new ground, many of the results they report will surprise, and in some cases shock, even specialists in the field. For example:

Death rates from drowning are higher at ages one and two than at any other age, and remain high throughout the preschool period.
State death rates from motor vehicle crashes correlate closely with death rates in the same states from other unintentional injuries.

The death rate per freight ton-mile varies a thousand-fold, depending on the transportation mode employed. The lowest death rates are for freight moved by pipeline and maritime transport, the highest for freight moved by highway.

Firearm suicide rates decrease and non-firearm suicide rates increase with increased socioeconomic status.

Per capita, Asians have by far the lowest motor vehicle death rates; Native Americans have by far the highest.

During World War II, more than 20,000 U.S. military personnel died in plane crashes in the continental United States.

With only four known exceptions, all male injury death rates greatly exceed those of females. The exceptions are deaths from falls on the same level (the rates for which are about equal), deaths from barbiturates and psychotherapeutic drugs, and deaths from strangulation, which show marked female excesses compared to males.

Although it was not the authors’ intent to discuss injury theory, research, or prevention, their statistics are laced with incisive comments about the wide variations in incidence, explanations of many of the findings, and references to relevant work. In the process, they have also documented the substantial success of several injury control efforts.

An example is provided by childhood poisonings: “Since 1960, poisoning deaths among children younger than 5 years have decreased dramatically. The rate for poisoning by solids and liquids was 2.2 per 100,000 in 1960 and 0.5 in 1980…Between 1960 and 1980, the number of deaths from lead poisoning dropped from 78 to 2. Deaths from kerosene and other petroleum products dropped from 48 to 9, while those from aspirin dropped from 144 to 12…An especially steep decline in childhood poisoning death rates occurred after childproof packaging was required on all drugs and medications beginning in 1973. The 50 percent decrease in poisoning by all drugs and medications in the first three years (1973-1976) was substantially greater than the decrease in poisonings by other solids and liquids, most of which were not required to be packaged in childproof containers…During 1968-1979, the period analyzed for most causes of death in this book, the 80 percent decline in poisoning death rates for children ages 1-4 exceeded that for any other major cause of childhood injury death.”

In 1930, 348 people died in elevator failures. With improved elevator designs and government regulations and inspections, such deaths, despite huge increases in elevator use, have become so rare that they are no longer recorded separately in the nation’s vital statistics.

The dramatic change in injury deaths, whether inadvertent or deliberate, that can result from correcting an environmental hazard is also illustrated by what happened when coal gas (which had a higher carbon monoxide content) was replaced by natural gas. In 1947, domestic piped gas caused about 1,000 unintentional deaths and was the agent in some 1,200 suicides. In 1980, after the change
to natural gas, the corresponding totals were only 61 and 23 deaths, a decrease of more than 90 percent.

Despite such examples, the injury picture presented in this book is generally grim. It resembles the situation in the history of infectious diseases before the sanitary revolution and subsequent preventive and therapeutic measures. In contrast, the magnitude and characteristics of the injury problem documented in this book make it clear that the country and the relevant professions have a huge amount of catching up to do to bring injury control to the level of success already achieved with the infectious diseases and the level being approached with respect to malignancies and afflictions of the cardiovascular system. The data in the book are a baseline against which that objective will long be measured. Thorough familiarity with this book will long be necessary for professional literacy in the fields with which it deals and in those to which it relates. In addition, the data and commentary this book provides will long be invaluable resources for insurers, public health workers, and, in fact, for everyone concerned with the occurrence, reduction, and cost of injuries of all kinds.

William Haddon, Jr., M.D.

<table>
<thead>
<tr>
<th>ACRONYMS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAAM</td>
<td>Association for the Advancement of Automotive Medicine</td>
</tr>
<tr>
<td>AJPH</td>
<td>American Journal of Public Health</td>
</tr>
<tr>
<td>APHA</td>
<td>American Public Health Association</td>
</tr>
<tr>
<td>ASMA</td>
<td>Aerospace Medical Association</td>
</tr>
<tr>
<td>ER</td>
<td>emergency room</td>
</tr>
<tr>
<td>GDL</td>
<td>Graduated Driver Licensing</td>
</tr>
<tr>
<td>IIHS</td>
<td>Insurance Institute for Highway Safety</td>
</tr>
<tr>
<td>ISS</td>
<td>Injury Severity Score</td>
</tr>
<tr>
<td>ME</td>
<td>Medical Examiner</td>
</tr>
<tr>
<td>MPH</td>
<td>Master of Public Health</td>
</tr>
<tr>
<td>NHTSA</td>
<td>National Highway Traffic Safety Administration</td>
</tr>
<tr>
<td>NISS</td>
<td>New Injury Severity Score</td>
</tr>
<tr>
<td>NTSB</td>
<td>National Transportation Safety Board</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
</tbody>
</table>
# INDEX OF AUTHORS

## A

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbey, H</td>
<td>25</td>
</tr>
<tr>
<td>Aboutanos, MB</td>
<td>32</td>
</tr>
</tbody>
</table>

## B

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker, TD</td>
<td>48, 49</td>
</tr>
<tr>
<td>Biermann, PJ</td>
<td>39</td>
</tr>
<tr>
<td>Brady, JE</td>
<td>46, 50</td>
</tr>
<tr>
<td>Braver, ER</td>
<td>36</td>
</tr>
</tbody>
</table>

## C

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chang, D</td>
<td>43</td>
</tr>
<tr>
<td>Chen, LH</td>
<td>36, 39, 40, 42</td>
</tr>
<tr>
<td>Cornwell III, EE</td>
<td>43</td>
</tr>
</tbody>
</table>

## D

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietz, PE</td>
<td>8</td>
</tr>
<tr>
<td>Dodd, RS</td>
<td>41</td>
</tr>
<tr>
<td>Doll, ET</td>
<td>25</td>
</tr>
</tbody>
</table>

## F

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fisher, RS</td>
<td>6, 15, 19</td>
</tr>
<tr>
<td>Freischlag, JA</td>
<td>43</td>
</tr>
</tbody>
</table>

## G

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>German, PS</td>
<td>22</td>
</tr>
<tr>
<td>Gertner Jr., HR</td>
<td>5</td>
</tr>
<tr>
<td>Gielen, AC</td>
<td>35</td>
</tr>
<tr>
<td>Grabowski, JG</td>
<td>37, 38, 41</td>
</tr>
</tbody>
</table>

## H

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haack, S</td>
<td>50</td>
</tr>
<tr>
<td>Haaland, WI</td>
<td>44, 50</td>
</tr>
<tr>
<td>Haddon Jr., W</td>
<td>7, 56</td>
</tr>
<tr>
<td>Hanger, L</td>
<td>22</td>
</tr>
<tr>
<td>Hargarten, S</td>
<td>23</td>
</tr>
<tr>
<td>Hayden, MS</td>
<td>40</td>
</tr>
<tr>
<td>Hu, G</td>
<td>48</td>
</tr>
</tbody>
</table>

## J

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johnson, JV</td>
<td>34</td>
</tr>
</tbody>
</table>

## K

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karlson, TA</td>
<td>12</td>
</tr>
<tr>
<td>Karwacki Jr., JJ</td>
<td>13</td>
</tr>
<tr>
<td>Krentz, MJ</td>
<td>30</td>
</tr>
</tbody>
</table>

## L

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamb, MW</td>
<td>26, 27, 37, 41</td>
</tr>
<tr>
<td>Levenson, S</td>
<td>25</td>
</tr>
<tr>
<td>Li, G</td>
<td>27, 28, 29, 30, 34, 35, 36, 37, 38, 41, 42, 46, 50, 58</td>
</tr>
<tr>
<td>Liang, K</td>
<td>34</td>
</tr>
<tr>
<td>Lincoln, JM</td>
<td>39</td>
</tr>
<tr>
<td>Long, WB</td>
<td>7, 33</td>
</tr>
</tbody>
</table>

## M

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacKenzie, EJ</td>
<td>35</td>
</tr>
<tr>
<td>Mair, JS</td>
<td>39</td>
</tr>
<tr>
<td>Makary, MA</td>
<td>43</td>
</tr>
<tr>
<td>Marchone, M</td>
<td>22</td>
</tr>
<tr>
<td>Masemore, WC</td>
<td>6</td>
</tr>
<tr>
<td>McCarthy, ML</td>
<td>38</td>
</tr>
<tr>
<td>McLoughlin, E</td>
<td>22</td>
</tr>
<tr>
<td>Mierley, MC</td>
<td>20</td>
</tr>
<tr>
<td>Millman, EA</td>
<td>43</td>
</tr>
<tr>
<td>Morton, BF</td>
<td>12</td>
</tr>
<tr>
<td>Myers, AH</td>
<td>25, 34</td>
</tr>
</tbody>
</table>

## O

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ogaitis, S</td>
<td>35</td>
</tr>
<tr>
<td>O’Neill, B</td>
<td>7, 58</td>
</tr>
<tr>
<td>Osler, T</td>
<td>33</td>
</tr>
</tbody>
</table>

## P

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pronovost, PJ</td>
<td>43</td>
</tr>
</tbody>
</table>
Q
Qiang, Y________________________38

R
Rebok, GW ______________________37, 38
Reid, R__________________________21
Robertson, LS____________________4, 9
Robinson, EG____________________25
Runyan, CW______________________45
Rutherford, RB___________________5

S
Samkoff, JS______________________18, 19
Schwarz, DF_____________________31
Shanahan, DF___________________40, 41, 44, 50
Simpson, SG____________________21
Smith, G_______________________34
Sopher, IM_______________________6
Spitz, WU_______________________2, 3, 4, 5
Syin, D_________________________43

T
Teret, SP_______________________16, 21
Trinkoff, A_______________________24

V
VanBuren, CB____________________19
Vernick, JS_______________________35

W
Warner, M_______________________27
Weiss, ES_______________________43
Wiker, S________________________34
Winston, FK______________________31
ABOUT THE AUTHOR

Susan P. Baker received a BA degree from Cornell in 1951 and an MPH in 1968 from the Johns Hopkins School of Hygiene and Public Health, now known as the Johns Hopkins Bloomberg School of Public Health. Working initially in the Office of the Chief Medical Examiner of Maryland, she joined the faculty of the School as a Research Associate in the Division of Forensic Sciences in 1968; by 1983 she had been promoted to the rank of Professor in the Department of Health Policy and Management. In 1988 the University of North Carolina at Chapel Hill awarded her an Honorary Doctor of Science degree. She was the founding Director of the Johns Hopkins Center for Injury Research and Policy, which has been funded since 1987 by CDC. She has researched many areas of highway crashes, aviation safety, drowning, poisoning, homicide, and suicide, and is known for developing the Injury Severity Score. Among her works are more than 250 scientific papers and three books, including The Injury Fact Book. She is proud of her students, who have founded at least five other centers for injury prevention and control and are conducting research and injury prevention programs all over the world while they train the leaders of the future.