Cost of Auto-versus-Pedestrian Injuries San Francisco, 2004 - 2008

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Introduction

Auto-versus-Pedestrian (AVP) Collisions have remained high in San Francisco. The age-adjusted rate was 92/100,000 in 2008, compared to 63/100,000 in the United States. San Francisco's rate is also 4.5 times greater than the Healthy People 2010 goal of 19/100,000.[1] Since 2003, approximately 650 to 750 AVP collisions have resulted in visits to San Francisco General Hospital (SFGH) each year. SFGH is the only Level 1 Trauma Center serving San Francisco. As such, we receive 98% of all traumas that occur in the City and are confident that most, if not all, AVP injuries were treated at SFGH.

Given the public's concern for pedestrian safety in San Francisco and the current economic state, we decided to conduct an analysis of the direct medical cost resulting from AVP collisions in San Francisco. The overall goals of the study were to provide tangible "bottom line" data to stakeholders working on pedestrian safety issues throughout the City and to provide direct feedback to the Board of Supervisors about the cost in their district.

A more technical report has been submitted for publication to the *Journal of Trauma*. The target audience for the present report is the general public and pedestrian safety advocates. Given that research takes many years to be implemented into practice, we wanted to share the findings with the public and help other City agencies in their efforts to improve pedestrian safety.

We believe that making an economic case for prevention can help save lives and improve the state of pedestrian injury in San Francisco.

This study was approved by the Committee on Human Research at the University of California, San Francisco.

Method

Using diagnostic codes assigned by physicians, we selected all patients visiting SFGH for an AVP injury between January 2004 and December of 2008. Any injuries treated at SFGH and known to have occurred in San Mateo County (the neighboring county to the South) were excluded from the cost analysis (n=20). Any AVP injuries occurring as a result of "assault using a vehicle" were also excluded because these injuries were intentional. After these exclusions, 3,598 AVP cases remained and were included in our analysis.

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Method (cont.)

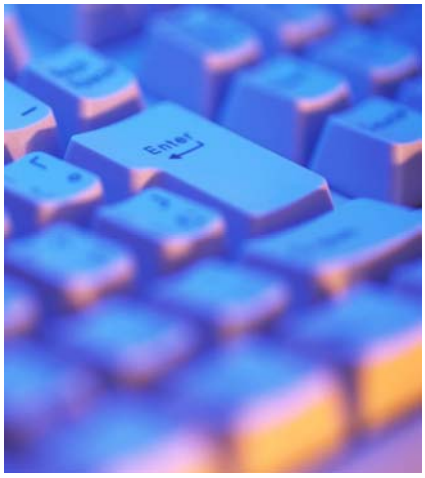
Two groups of patients naturally emerged: 1) Patients seen in the Emergency Department and released within 24 hours, and 2) Patients admitted to the hospital for further observation or treatment, such as surgery. These groups will be referred to as "nonadmitted" and "admitted" patients, respectively.

As we were collecting the data, we found that the admitted patients accounted for the majority of the cost even though they accounted for one fourth of the total number of AVP collisions. For this reason, we decided to geocode the more expensive admitted patients according to Supervisorial district. We wanted to know if injuries were more expensive in one area of the City compared to another.

Using data from police reports, also known as "SWITRS" (Statewide Integrated Traffic Record System) data, we geocoded the location of injury for admitted patients. We were successfully able to match 77% of our admitted patients to the SWITRS database in order to map the intersection or address where the injury occurred. Using the San Francisco Geographic Information System (SFGIS), we coded each intersection by its corresponding Supervisorial District.

"One of the unique features of our study is that it focuses on cost —or what was actually paid out— rather than charges— or what was actually billed" - Dr. Rochelle Dicker, Trauma Surgeon and Principal Investigator

Data Sources and Data Analysis



Five databases were used, including the hospital's trauma database, the San Francisco Department of Public Health (SFDPH) Billing Information System (BIS), the Emergency Medical Record (EMR), the Statewide Integrated Traffic Record System (SWITRS), and the San Francisco Geographic Information System (SFGIS).[2]

Dr. Wendy Max, a health economics expert and Professor at UCSF guided the methodology for calculating costs. The detailed methodology is summarized in the article submitted for publication. On a conceptual level, cost of direct medical care was calculated by summing three components of care: 1) hospital costs, 2) professional fees for specialty care, such as surgery, and 3) cost of transporting a patient via ambulance.

Data were analyzed using expert statistical consultants and advanced statistical software.

Terminology

Charge refers to the amount billed for all health care services provided. Charges can be likened to the "retail" price for health care. Charges will not be described in detail in this report.

Cost refers to the actual amount paid for healthcare, including room fees, medications, medical supplies and devices, nursing and allied health care, medical care, administrative services, overhead, and ambulance transportation. In order to compare cost by year, we used Consumer Price Indices published by the U.S. Bureau of Labor to express all costs in 2008 dollars.

Payer refers to the funding source to which charges for medical care were billed.

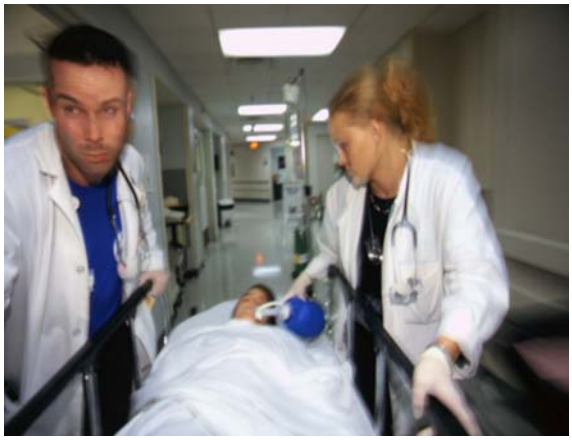
Supervisorial District refers to the geographic area assigned to a San Francisco City Supervisor.

Countermeasures refers to safety measures that are available for reducing the likelihood of collisions. These may include engineering countermeasures, enforcement efforts, and educational interventions.

General Findings– All Injured Pedestrians, SFGH (2004-2008)

- 3,598 pedestrians included in the study
- 931 (26%) were admitted and 2,667 were nonadmitted (74%)
- Age ranged from 0 to 94 years
- Children (0 and 19 year) accounted for 14%
- Adults (20 to 64 years) accounted for 72%
- Elderly patients (over 65 years) accounted for 13%
- Over 50% of the sample consisted of Caucasians (33%) and Asians (25%)
- 98% lived in California at the time of the injury
- 74% lived in the City of San Francisco at the time of the injury
- 0.6% were visiting San Francisco from a foreign country at the time of injury
- Homeless people accounted for 7%
- 74% were released from the Emergency Department within 24 hours (nonadmitted)
- 26% were admitted to the hospital

General Findings—All Admitted Injured Pedestrians (2004-2008)



- 931 (26%) injured pedestrians were admitted over the 5-year period
- On average, their hospital length of stay was 11.6 days
- 30% of admitted patients required a stay in the Intensive Care Unit (ICU) for an average of 2.8 days
- Of those in the ICU, 56% required mechanical ventilation for about 2.1 days
- 55% of admitted patients were discharged home
- 7% were transferred to another acute care facility
- 7% were discharged to an acute rehabilitation center
- 19% were discharged to a Skilled Nursing Facility
- 9% died

Total Cost of Injury (2004-2008)

- The total cost of Pedestrian Injury was $74.3 million for all 5 years
- Admitted patients (26%) accounted for 82% of the total cost
- The strongest predictors of high cost were the number of ICU days, hospital days, and age.

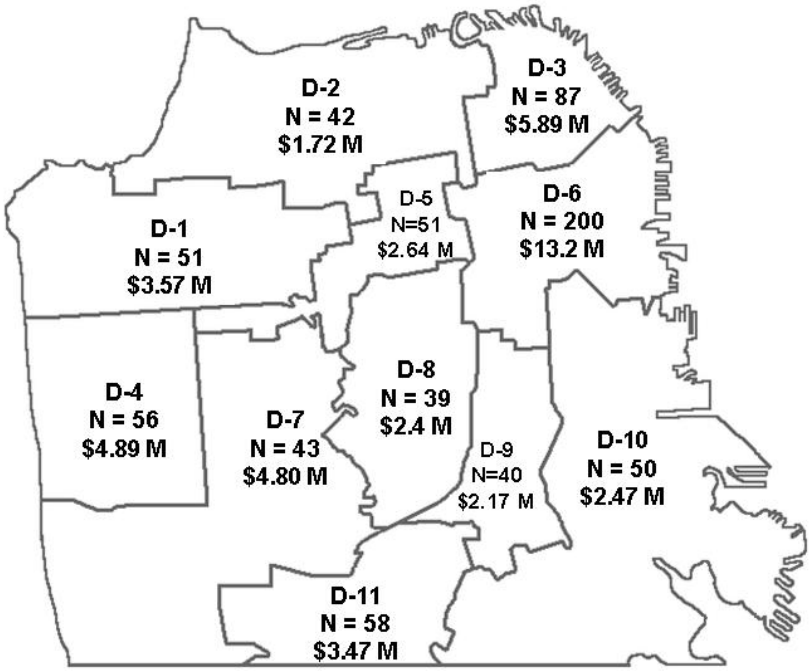
Collision Year	Total Cost (2008 Dollars)	2008 Pop	Cost Per Capita
2004	$11,257,143.03	840,462	$13.39
2005	$13,480,653.08	840,462	$16.04
2006	$16,574,112.85	840,462	$19.72
2007	$17,673,296.91	840,462	$21.03
2008	$15,358,023.35	840,462	$18.27
All Years	$74,343,229.22	840,462	$88.46

Mean Cost per Pedestrian for Admitted and Nonadmitted Patients

	Admitted			Nonadmitted		
Year	Mean	Confidence Interval	Frequency	Mean	Confidence Interval	Frequency
2004	$47,303	($38,739, $57,760)	200	$3,798	($2,401, $6,006)	473
2005	$55,989	($46,467, $67,461)	194	$5,165	($3,533, $7,550)	507
2006	$76,440	($64,803, $90,168)	181	$4,881	($3,367, $7,075)	561
2007	$77,679	($66,336, $90,961)	195	$4,534	($3,081, $6,674)	557
2008	$72,754	($60,799, $87,058)	161	$6,405	($4,643, $8,837)	569

Total Cost for Admitted Patients by Supervisorial District

By mapping the admitted patients (most costly) according to Supervisorial District, we were able to highlight "hotspots" where an economic case can be made for implementing and evaluating sustainable countermeasures.



Who is paying for this?

Approximately 76% ($56.7 million) of the total cost was paid for by public funding, including Medicare, MediCal, and patients themselves. Conversely, 24% ($17.6 million) of the cost was paid for by private insurance. The minimum amount billed directly to an uninsured patient was $5,143 and the maximum was $505,952.

Conclusion

Compelling arguments must be put forth to policymakers to invest in changes to enhance pedestrian safety. Pedestrian injury carries the intangible price tag of human life and the tangible price tag of health care expenditures. Providing not only an account of where collisions occur but also the monetary cost of the injuries incurred at those sites gives credence to instituting life-saving and cost-saving measures targeting specific locations and specific road traffic issues.

Interagency collaboration as well as support from the City Supervisors and Mayor will be crucial to the improvement of pedestrian safety. Several sustainable and cost-effective countermeasures in the areas of urban planning, engineering, enforcement, and education have shown promise both in the City of San Francisco and in the scientific literature.[3-5] We hope that the cost of pedestrian injury will be strongly considered when making decisions to allocate funds for injury prevention strategies in San Francisco.

About the SF Injury Center

The San Francisco Injury Center for Research and Prevention (SFIC) is one of 13 Injury Control Research Centers funded by the National Center for Injury Prevention and Control at the Centers for Disease Control and Prevention (CDC). The SFIC was established in 1989 and is located at the San Francisco General Hospital campus of the University of California, San Francisco, School of Medicine.

The SFIC is a center without walls - bringing together multidisciplinary faculty investigators from throughout the UCSF campus and beyond. The resulting collaborative efforts in laboratory research, clinical trials and injury prevention research have the potential to improve outcomes for victims of trauma in our region and to influence the field of injury control on a global basis.

Next steps…

- We plan to share our data with other agencies to help improve pedestrian safety.
- We plan to calculate the indirect cost of productivity losses and disability from pedestrian injury, as well as longer-term costs including the costs incurred from rehabilitation and long-term care.
- We plan to replicate this study with auto-versus-bicycle collisions in San Francisco.

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