

Assessment of National Trauma Trends for Motor Vehicle Accidents

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ABSTRACT

Background: The aim of this study was to determine if emergency department (ED) visits due to motor vehicle accidents (MVA) are affected by patient demographics, national holidays, and days of the week.

Methodology: This was a retrospective, secondary database analysis research exploring the motor vehicle accident patterns in 2018 using data from the National Hospital Ambulatory Medical Care Survey (NHAMCS), which is a secondary database of the utilization of ambulatory care services in hospital EDs. The incidence of ED visits due to MVA were assessed as it relates to various patient demographics, which included age, sex, race, in addition to geographic region, national holidays, and days of the week.

Results: The study found that the incidence of MVA varies significantly by the time of the year, the days of the week, patient characteristics, and various holidays. Christmas (31.8%), Fridays (30.5%), Sundays (24.8%), Northeast region (36.2%), and the White population (48.9%) had the greatest number of MVA versus their comparable demographics. Males were affected in the majority of the cases (52.2%). One-third (34%) of the MVA were fatal.

Conclusions: Strict enforcement of roadside checks for impairment and speeding must be enforced during the periods and days of the week as identified in this study. MVA can be reduced by law enforcement during holidays that have high-risk of crashes. High-risk groups identified in this study should be encouraged to take defensive driving training. There should be more signs, lighting and enforcement during bad weather to enforce road safety. Adherence to driving rules, and promoting awareness amongst the vulnerable groups would reduce the MVA significantly resulting in reduced morbidity, mortality, and societal cost.

Keywords

Emergency department, Motor vehicle crashes.

Introduction

In 2020, there were over 2.1 million emergency department visits for injuries from motor vehicle crashes [1]. Motor vehicle accidents (MVA) are a public health concern, and are a leading cause of death resulting in the fatality rate of over 100 people every day [2]. Leading causes of accidents are bad visibility, unsafe road design, other drivers' lack of caution, alcohol, under aged driving, speeding, weather, and many more reasons [3]. It is estimated that fatal and nonfatal crash injuries cost the US

economy approximately \$242 billion dollars annually [4]. The risk of MVA is higher among teens, over the weekend, varies by major holidays, race, sex, and time of the week [2].

In 2019, almost 2,400 teens in the United States aged 13-19 were killed and about 258,000 were treated in emergency departments for injuries suffered in motor vehicle crashes [5]. That means that every day, about seven teens died due to motor vehicle crashes, and hundreds more were injured. In that same year, data suggest that the motor vehicle death rate for male drivers aged 16-19 was over two times higher than the death rate for female drivers of the same age [6]. A study also concluded that young drivers that also have

lower socioeconomic status are more likely to have a car crash than those with higher socioeconomic status of the same young age [7]. Black and Hispanic Americans have higher traffic fatality rates than White Americans across the transportation system, requiring urgent attention [8]. A common variable for drivers of all ages is that nighttime driving is riskier than daytime and that certain days of the week and months of the year have higher risks than others [6,9]. According to the data collected by the national safety council, in 2021, fatal car crashes had high trends on weekends, peaking on Saturdays; and nonfatal crashes had higher trends on weekdays, peaking on Friday [9]. When looking at months of the year, the number of traffic deaths trended low from January through March and had sustained elevation from May through October.

Holidays are known to have increased travel and traffic fatalities [10]. One of the main reasons for the increase in traffic accidents during the holidays is the traffic volume on the roads. More people travel to visit family and friends, which means more cars on the road. In addition, unfortunately, more cars on the road means more accidents. This combined with how the holidays themselves can already be stressful, leading to traffic rule violations and driving distracted and recklessly. Driving under the influence is very common during the holidays, as many holiday gatherings go hand in hand with alcohol consumption.

Motor vehicle crashes are a public health concern both in the United States and abroad. In the United States, motor vehicle crashes are a leading cause of death, and kill over 100 people every day [1]. However, motor vehicle crash injuries and deaths are preventable. There are proven strategies that can help prevent these injuries and deaths. Whether you are a driver, passenger, cyclist, or pedestrian, you can take steps to stay safe on the road. Every day, hundreds of road traffic accidents occur across the country. Road accidents occur for a variety of reasons. Often, drivers are distracted while behind the wheel, taking their focus away from the road. In other cases, drivers can become tired after spending multiple hours at the wheel, resulting in preventable errors. Sometimes, accidents occur for a combination of reasons, from bad visibility to unsafe road design, or other drivers' lack of caution, alcohol, under aged driving, speeding, weather, and many more reasons. While the causes of accidents can vary, the consequences are often the same, resulting in everything from vehicular and property damage to serious injuries. Distracted driving is the most common cause of road accidents in the United States, resulting in more crashes every year than speeding, drunk driving, and other major accident causes [4]. Distracted driving is not only the leading cause of car accidents. Drivers can become distracted behind the wheel for a variety of reasons. Some of the leading causes of distracted driving accidents include using a cellphone while driving, as well as eating food or drinking from a mug or bottle while behind the wheel. Speeding is the second most common cause of road accidents in the United

States. Since car accidents that involve speeding typically occur at high speeds, it's also a major cause of fatal road injuries. The aim of this study was to determine if emergency department (ED) visits due to MVA are affected by patient demographics, national holidays, and days of the week.

Methodology

In this retrospective, secondary database analysis research, the incidence of ED visits due to MVA were assessed among various patient demographics, which included age, sex, race, in addition to geographic region, national holidays, and days of the week. National holidays studied were Memorial Day, Independence Day, Labor Day, Columbus Day, Thanksgiving, and Christmas. In addition, the ED visit rates due to MVA were compared by weekdays and weekends. The lack of outcomes information has been listed as a limitation of the study. The severity of injury on presentation to the ED has been added as "Immediate," "Urgent," "Semi-urgent," based on how the severity is reported in the database. A total of 3,313 patients presenting to the ED after a MVA, meeting the criteria of being injured in an unspecified MVA (ICD-10 code: V89.2), were extracted from the 2018 National Hospital Ambulatory Medical Care Survey (NHAMCS). Data for this report were from the 2018 NHAMCS, a nationally representative survey of nonfederal, general, and short-stay hospitals conducted by the National Center for Health Statistics (NCHS). Additional information on the methodology of the NHAMCS is available as public-use data files [11]. The NHAMCS is depicted to collect data on the utilization and provision of ambulatory care services in hospital EDs. This database is collected by the NCHS, which is a division of the Department of Health and Human Services. Findings are based on a national sample of visits to the EDs and outpatient departments [12].

Statistical Analysis

The extracted data were checked for integrity to meet the predetermined inclusion and exclusion criteria, and exported into Excel®. Missing and partial data entries were filtered, and the refined data was coded. The extracted dataset was checked for missing cases and data integrity. The resultant data was exported into Statistical Package for Social Sciences (SPSS®) version 27.0 for statistical analysis. Data were analyzed using various statistical techniques, including descriptive analysis and chi square at an alpha significance level of 0.05.

Results

Data Analysis

The total number of people presenting to the ED after a motor vehicle accident was 3,313 of which, one third (34%) were fatal. Less than 20 years of age comprised 16.3% of the study population. Over one-third of the study population were in the age range of 20 to 30 years old. The lowest percentage of the study population

were in the age range of 31–40 years old (15.8%), whereas 32.5% comprised 41 years of age and above. The majority of people involved in a motor vehicle accident were males (52.2%), White (48.9%), followed by Blacks (22.4%), Hispanics (15.1%), Asians (8.3%), and other races (5.4%) (Table 1).

Demographic Variables	Frequency (n=3313)	Percentage (%)
Sex		
Male	1731	52.2
Female	1582	47.8
Age		
Less than 20	540	16.3
20-30	1173	35.4
31-40	522	15.8
41 and above	1078	32.5
Race		
Black	742	22.4
White	1620	48.9
Hispanic	499	15.1
Asian	274	8.3
Other	178	5.4
Region		
Northeast	1199	36.2
Midwest	645	19.5
South	641	19.3
West	585	17.7
Severity Level		
Immediate	828	25.0
Urgent	558	16.8
Semi-urgent	960	29.0
Non-urgent	967	29.2

Table 1: ED Visit Rates for Motor Vehicle Accidents in the U.S.

As far as geographical location, Northeast (36.2%) and Midwest (19.5%) had the majority of cases, followed by South (19.3%) and West (17.7%). The breakdown by the type of holidays showed that Christmas was the holiday with the greatest number of gunshot wounds (32%), followed by Independence Day (21.5%) and Memorial Day (16.4%) (Figure 1).

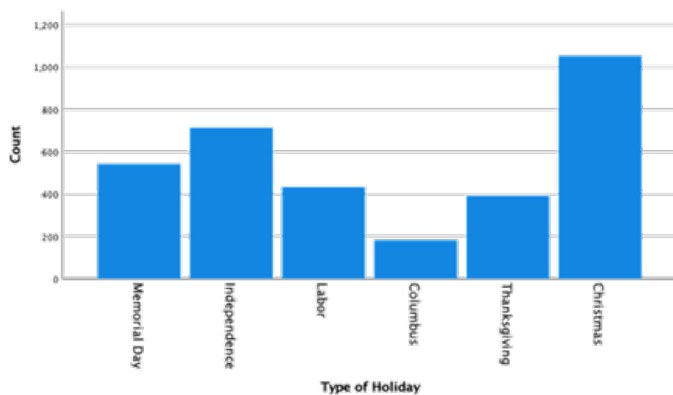


Figure 1: Type of Holiday for Motor Vehicle Accidents.

As far as the day of the week, most MVA were seen on Fridays (30.5%) and weekends (20.6% on Saturdays and 24.8% on Sundays). This study found that the incidence of MVA varies significantly by the time of the year, patient characteristics, and various holidays. There was a statistically significant difference amongst various age groups, with the age group of 20-30 years presenting with the highest number of fatalities ($p = 0.001$). There was a statistically significant difference amongst various age groups, with the age group of 20-30 years and above presenting with the most MVA and on Christmas Day ($p = 0.001$). There was a statistically significant difference amongst males and females in regards to region, with males presenting with the most MVA in the Northeast region and females in the West, respectively ($p = 0.017$).

Discussion & Conclusion

Black males 20 to 30 years of age were the most at risk group visiting the ED for MVA warranting focused safety and intervention for this group. Christmas tends to be the holiday with most MVA followed by Independence Day. The Northeast had the most MVA as compared to other regions. Weekends had the most MVA as compared to any other days of the week. This study was limited to the data sources of the NHAMCS 2018 survey of patients who visited the ED and by the operational definitions of the study.

Response time and the quality of emergency medical care varies across communities that could affect the outcomes of similar severity by the differences among demographics. The following implications and recommendations were made; strict enforcement of roadside checks for impairment and speeding must be enforced during the periods and days of the week as identified in this study. MVA can be reduced by law enforcement during holidays that have high-risk of crashes. High-risk groups identified in this study should be encouraged to take defensive driving training. Since weekends happened to be the days with the most cases of MVA, additional efforts should be undertaken to ensure that healthcare settings, such as EDs and trauma centers, are properly staffed with enough trauma specialists. There should be more signs, lighting and enforcement during bad weather to enforce road safety. Adherence to driving rules, and promoting awareness amongst the vulnerable groups would reduce the MVA significantly resulting in reduced morbidity, mortality, and societal cost.

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