



# San Francisco Severe Traffic Injury Trends: 2011-2017

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## Executive Summary

Vision Zero is San Francisco's initiative to eliminate traffic fatalities and reduce severe traffic-related injury on San Francisco's streets. The Department of Public Health's Vision Zero team monitors severe injuries utilizing hospital data from the Zuckerberg San Francisco General Trauma Center – our City's Level I Trauma Center where the most severely injured patients are seen and treated, and where injury severity is clinically assessed by medical professionals. We track both **severe injuries** as well as **critical injuries** - a subset of patients that are the most severely injured. This is our best and most reliable data source for detecting severe injuries in our transportation system. We supplement this data with SF police data collected from police traffic collision reports, which has been historically the primary data source for severe injury in San Francisco. The seven years of data presented in this report informs City and community understanding of those most severely injured on streets in San Francisco – and how that picture is shifting over time including since the adoption of Vision Zero in 2014. Vision Zero SF monitors and reports fatality data, which is more readily available, separately and on a monthly basis. This severe injury data helps us to further assess Vision Zero progress, and guide injury prevention initiatives.

### MONITORING SEVERE INJURIES IN OUR TRANSPORTATION SYSTEM USING ZUCKERBERG SF GENERAL HOSPITAL AND TRAUMA CENTER (ZSFG) DATA

#### WHO IS TREATED FOR SEVERE INJURY AT ZSFG?

- People walking comprise approximately one-third of severe and 30-40% of critical injuries in recent years (2015-2017, table 1).
- People in motor vehicles have comprised a growing proportion of severe and critical injuries treated at ZSFG in recent years, making up 33% of severe injuries and 30% of critical injuries in 2017. (See fig. 4, tables 1-2).
- People biking and people on motorcycles have comprised similar proportions of severe and critical injuries in recent years (2015-2017), each of approximately 20%. (See fig. 3, fig.5, tables 1-2).
- People biking and motorcycling have a notably higher burden of injury relative to the proportion of trips they represent on SF streets.

#### WHAT ARE TRENDS IN HOSPITAL SEVERE AND CRITICAL INJURY BY TRAVEL MODE?

##### OVERALL (See Fig. 1, Page 6)

- **Severe injuries:** Overall **severe injuries** trend upward in hospital data from 2015 on. Notably, implementation of Emergency Medical Services Agency triage guidelines led to more patients with severe injury being sent to ZSFG and contributed to this increase.
- **Critical injuries:** ZSFG has had relatively stable counts of critically (the most severely) injured patients during that same period, which should be less impacted by the change in triage practice.



#### PEOPLE WALKING (See Fig. 2, Page 7)

- **Severe injuries** increased 24% from 2013 – 2016 and may have begun to flatten out in 2017
- **Critical injuries** to people walking declined 40% from 57 in 2013 to 34 in 2017

#### PEOPLE ON BIKES (See Fig. 3, Page 7)

- **Severe injuries** to SF cyclists declined 22% in hospital data 2013-2017
- **Critical injuries** were relatively flat during that same period, despite reported increases in ridership during that same time.

#### PEOPLE IN MOTOR VEHICLES (See Fig. 4, Page 8)

- **Severe injuries** to people in motor vehicles noticeably increased 21% in hospital data between 2015 and 2017.
- **Critical injuries** to people in motor vehicles more than doubled between 2015 and 2017, from a low of 14 in 2015 to 33 critically injured people in 2017. Notably, hospital data includes people injured on freeways.

#### PEOPLE ON MOTORCYCLES (See Fig. 5, Page 8)

- Both **severe and critical injuries** to people riding motorcycles increased in 2015 and 2016 with a dip in 2017.

#### COMPARISON WITH SAN FRANCISCO POLICE DEPARTMENT (SFPD) DATA

We compare trends in hospital data with SFPD data, which was historically the primary source of severe injury data reported to the public and used by City staff. VZSF is shifting to reliance on hospital data for severe injury monitoring due to the aforementioned strengths. Notably, SFPD implemented a change in reporting of suspected traumatic brain injury in 2014, which likely contributed to increased reporting of severe injuries after that time.

#### POLICE DATA – WHO IS SEVERELY INJURED?

Among severely injured people in police data, proportions of people injured while engaged in various travel modes are comparable to hospital data. An exception is that police data show lower proportions of people injured in motor vehicles compared to hospital data (tables 1-3). This is likely at least in part due to the fact that hospital data include injuries occurring on freeways, while police data do not.

#### POLICE DATA – SEVERE INJURY TRENDS

Overall severe injury trends in police data are comparable to that in hospital data, as are trends for people walking and motorcycling. (See fig. 1, 2, 5). Severe injuries to people riding bicycles in police data were relatively flat from 2013-2017, comparable to critical injuries in hospital data (fig. 3). Severe injuries to people in motor vehicles in police data did not see the same increases as in hospital data, potentially in part due to police data not including freeway injuries (fig. 4).



## Detailed Findings: 2011-2017 Severe Traffic Injury Trends

### Methodology

Hospital data indicate severity using a clinical injury severity score (ISS) ranging from 1-75, as well as whether someone required hospital admission for treatment. Excluding fatal injuries, police data offer three categories of injury severity, assessed at the injury scene: Severe Injury, Other Visible Injury, and Complaint of Pain. This analysis presents severe injuries from hospital data coded as *critical* (ISS greater than 15) and/or *severe* (all traffic injuries resulting in hospital admission), and severe injuries from police data.<sup>1</sup> For hospital data, critical injury is included in severe injury counts and statistics.

*Please note:* SFPD and ZSFG injury assessments represent overlapping populations and do not compare severity between data sources. We know that some of the injured people in police data are also captured in hospital injury data, while some injured people are included in police or hospital data only. To address this issue SFDPH completed a pilot linkage of SFPD and ZSFG data for 2013-2015, creating San Francisco's Transportation-related Injury Surveillance System which found that 59% of records classified as severe appeared both in police and hospital data. In 2019 SFDPH will complete another linkage of 2016-2018 data. The linked data from 2013-2018 will then become our primary data source to monitor severe injury trends as we will have six years of data, accounting for records in both police and hospital data sources.

### Interpretation Notes

At the end of 2013, the **San Francisco Emergency Medical Services Agency (SF EMSA)** issued **retriage guidelines** to ensure the most severely injured people were treated at ZSFG, even if they initially reported to another hospital. People with severe injury are best served when treated in a trauma center. Recognizing this, the protocol change in the SF EMSA retriage guidelines facilitate the rapid transfer of critically injured trauma patients from non-trauma hospitals to the trauma center with unconditional acceptance. This change helps increase our inclusion of the most severely injured in the ZSFG hospital data – and also likely contributed to the increased but stable number of severe injuries observed from 2015 forward, relative to earlier years (fig. 1). We expect the impact of this change in protocol to stabilize the more time passes. Additionally, a shift to the new International Classification of Diseases medical coding system (ICD-10) beginning with 2017 data affects the categorization of traffic modes, but is not anticipated to have substantially changed number of patients attributed to each mode. Please note – hospital data includes people injured on SF freeways, which makes it distinct from VZSF Fatality data which excludes people on freeways.

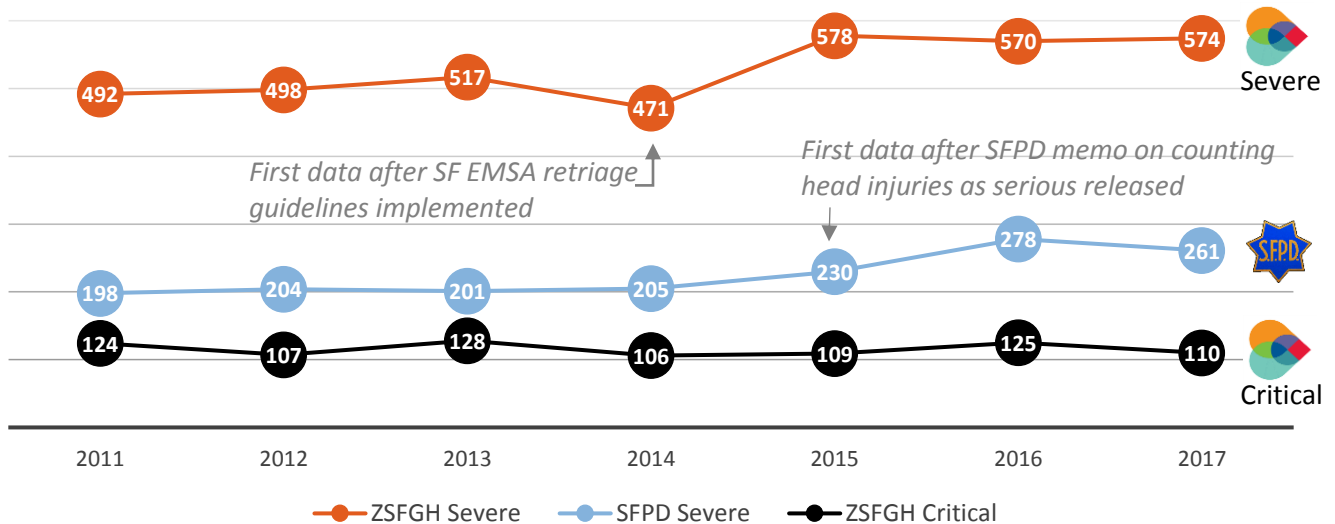
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<sup>1</sup> Note: Severe injury reporting excludes deaths that occur within 30 days of injury which are tracked separately for Vision Zero fatality monitoring. Distinct from fatality monitoring for Vision Zero SF, hospital injuries *include* those sustained on freeways, underground in MUNI and BART stations and in the Presidio. Police data do not. Protocol available at: [https://www.sfdph.org/dph/files/EHSdocs/PHEs/VisionZero/Vision\\_Zero\\_Traffic\\_Fatality\\_Protocol.pdf](https://www.sfdph.org/dph/files/EHSdocs/PHEs/VisionZero/Vision_Zero_Traffic_Fatality_Protocol.pdf)



Separately, a memo released to SFPD officers in Dec. 2014 advised head injuries be classified as severe to avoid under-reporting of traumatic brain injury. This guidance likely partially accounts for the increase in severe injuries recorded in police data from 2015 onward (fig. 1).

Figure 1: Total Traffic Injury Counts by Year



Overall injury trends reflect stable counts of critically injured patients, and elevated numbers of severe injuries in both hospital and police data from 2015 onward.

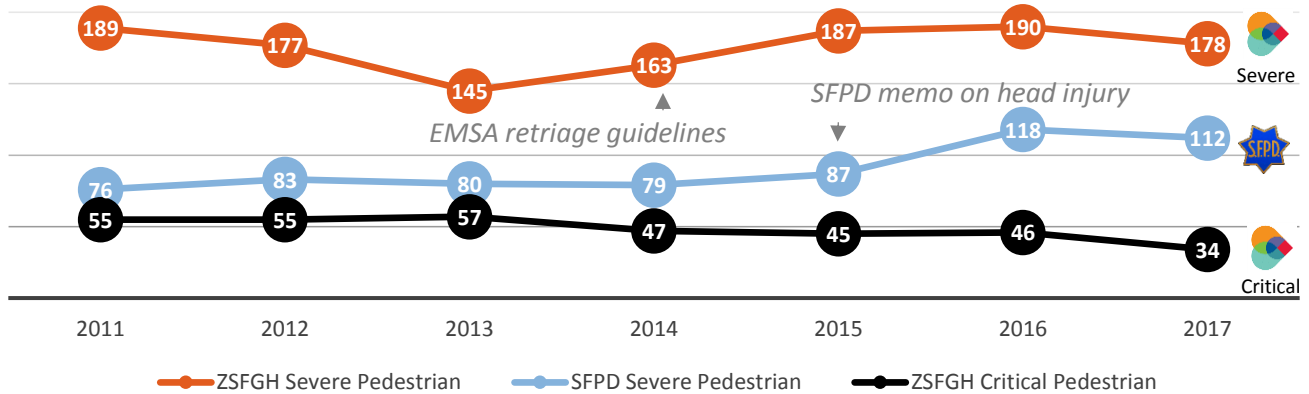
**Note:** Several factors must be considered when interpreting trend charts presented here:

- **Retriage guidelines implemented at ZSFG in Nov. 2013** likely contribute to the increased but stable number of severe injuries observed from 2015, relative to earlier years.
- ZSFG severe injury numbers *include* ZSFG critical injury counts.
- Separately, a **memo released to SFPD officers in Dec. 2014** advised head injuries be classified as serious to avoid under-reporting of traumatic brain injury. This guidance likely accounts for some of the increase in severe injuries recorded in police data from 2015 onward.



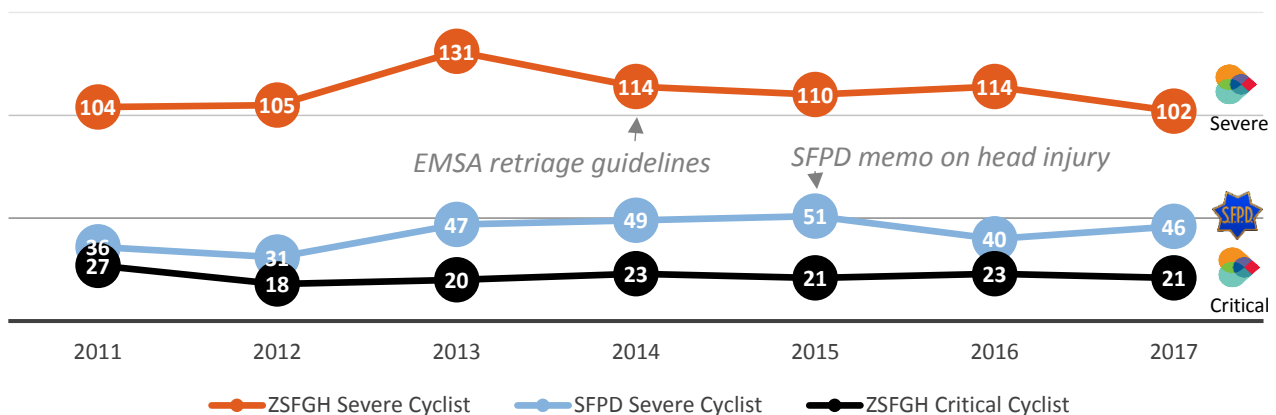
## Severe Injury by Mode of Travel

Figure 2: Pedestrian Traffic Injury Counts by Year



Pedestrian injury is the most common severe traffic injury reported by ZSFG and SFPD. Notably, the annual count of critical pedestrian injuries decreased from 57 to 34 from 2013-2017.

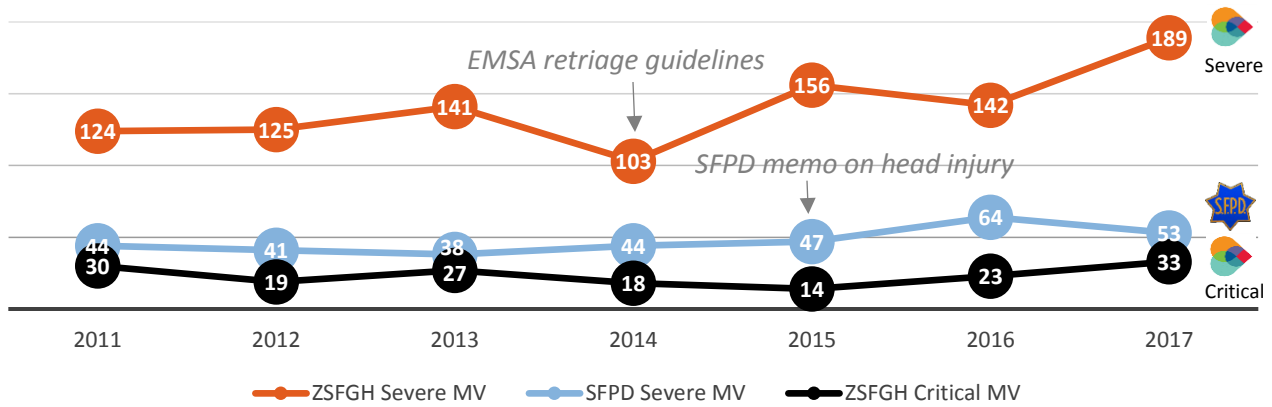
Figure 3: Bicycle Traffic Injury Counts by Year



Severe and critical cyclist injury counts in all data sources have been relatively flat since 2013. However, people riding bicycles remain vulnerable road users that are over-represented in severe injury data relative to their proportion of trips on San Francisco streets. It is possible that rising levels of cycling in San Francisco paired with steady critical injury counts among people riding bicycles point to a relative improvement in bicyclist safety over time.

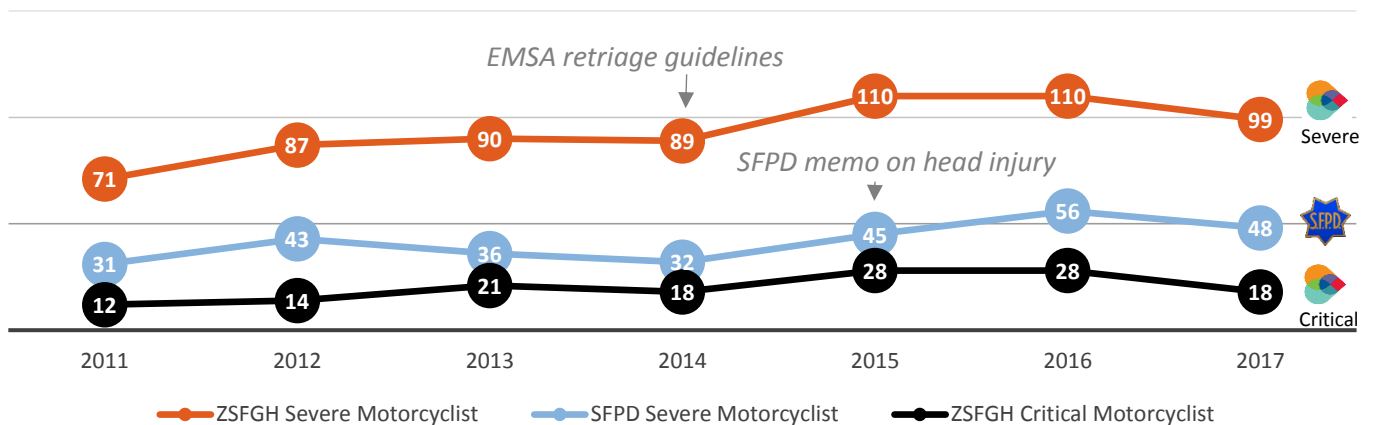


Figure 4: Motor Vehicle Traffic Injury Counts by Year



Severe motor vehicle injury has risen to the levels of pedestrian injury admissions to ZSFG in 2017. Critical motor vehicle injury is also on the rise. Notably, hospital data includes freeway injuries.

Figure 5: Motorcycle Traffic Injury Counts by Year



Motorcycle injury has been on the rise, but appeared to dip in both hospital and police data in 2017.

Table 1: Count of Severe Injuries and Proportion by Travel Mode - from Hospital Data

| Year | Pedestrian | Cyclist   | Motorcyclist | Motor vehicle occupant | Other/Unknown | Total      |
|------|------------|-----------|--------------|------------------------|---------------|------------|
| 2011 | 189 (38%)  | 104 (21%) | 71 (14%)     | 124 (25%)              | 4 (1%)        | 492 (100%) |
| 2012 | 177 (36%)  | 105 (21%) | 87 (17%)     | 125 (25%)              | 4 (1%)        | 498 (100%) |
| 2013 | 145 (28%)  | 131 (25%) | 90 (17%)     | 141 (27%)              | 10 (2%)       | 517 (100%) |
| 2014 | 163 (35%)  | 114 (24%) | 89 (19%)     | 103 (22%)              | 2 (0%)        | 471 (100%) |
| 2015 | 187 (32%)  | 110 (19%) | 110 (19%)    | 156 (27%)              | 15 (3%)       | 578 (100%) |
| 2016 | 190 (33%)  | 114 (20%) | 110 (19%)    | 142 (25%)              | 14 (2%)       | 570 (100%) |
| 2017 | 178 (31%)  | 102 (18%) | 99 (17%)     | 189 (33%)              | 6 (1%)        | 574 (100%) |





Among severe injuries from hospital data, pedestrian injury frequently ranks as the most prevalent mode of injury, ranging from 28-38% of severe injuries. In 2017 the proportion of severe injuries attributable to motor vehicle collisions rose sharply to 33%, just surpassing the proportion of severe pedestrian injuries (31%).

Table 2: Count of Critical Injuries and Proportion by Travel Mode - from Hospital Data

| Year | Pedestrian | Cyclist  | Motorcyclist | Motor vehicle occupant | Other/Unknown | Total      |
|------|------------|----------|--------------|------------------------|---------------|------------|
| 2011 | 55 (44%)   | 27 (22%) | 12 (10%)     | 30 (24%)               | 0 (0%)        | 124 (100%) |
| 2012 | 55 (51%)   | 18 (17%) | 14 (13%)     | 19 (18%)               | 1 (1%)        | 107 (100%) |
| 2013 | 57 (45%)   | 20 (16%) | 21 (16%)     | 27 (21%)               | 3 (2%)        | 128 (100%) |
| 2014 | 47 (44%)   | 23 (22%) | 18 (17%)     | 18 (17%)               | 0 (0%)        | 106 (100%) |
| 2015 | 45 (41%)   | 21 (19%) | 28 (26%)     | 14 (13%)               | 1 (1%)        | 109 (100%) |
| 2016 | 46 (37%)   | 23 (18%) | 28 (22%)     | 23 (18%)               | 5 (4%)        | 125 (100%) |
| 2017 | 34 (31%)   | 21 (19%) | 18 (16%)     | 33 (30%)               | 4 (4%)        | 110 (100%) |

Among critical injuries, the proportion attributable to injured pedestrians has declined from 51% in 2012 to 31% in 2017. However, pedestrian injury remains the leading mode of critical injury. The proportion of critical injury occurring among people riding bicycles has been relatively level over the past few years (~20%), while injury to motor vehicle occupants increased from 18% in 2016 to 30% in 2017.

Table 3: Count of Severe Injuries and Proportion by Travel Mode - from Police Data

| Year | Pedestrian | Cyclist  | Motorcyclist | Motor vehicle occupant | Other/Unknown | Total      |
|------|------------|----------|--------------|------------------------|---------------|------------|
| 2011 | 76 (38%)   | 36 (18%) | 31 (16%)     | 44 (22%)               | 11 (6%)       | 198 (100%) |
| 2012 | 83 (41%)   | 31 (15%) | 43 (21%)     | 41 (20%)               | 6 (3%)        | 204 (100%) |
| 2013 | 80 (40%)   | 47 (23%) | 36 (18%)     | 38 (19%)               | 0 (0%)        | 201 (100%) |
| 2014 | 79 (39%)   | 49 (24%) | 32 (16%)     | 44 (21%)               | 1 (0%)        | 205 (100%) |
| 2015 | 87 (38%)   | 51 (22%) | 45 (20%)     | 47 (20%)               | 0 (0%)        | 230 (100%) |
| 2016 | 118 (42%)  | 40 (14%) | 56 (20%)     | 64 (23%)               | 0 (0%)        | 278 (100%) |
| 2017 | 112 (43%)  | 46 (18%) | 48 (18%)     | 53 (20%)               | 2 (1%)        | 261 (100%) |

Among police-designated severe injuries, pedestrian injury consistently ranks as the most prevalent mode of injury – comprising 43% in 2017. The disproportionate burden of injury to motorcyclists and bicyclists compared to motor vehicles seen in hospital data above is also seen in police data, as they each make up 18% of severe injury reports in 2017 yet comprise a relatively smaller proportion of trips in San Francisco.