

Is It Ever Too Hot or Too Cold for Trauma?

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Background/Purpose: It is commonly believed weather conditions have a direct effect on trauma volumes. We hypothesize that the rate of orthopaedic trauma will be altered by extreme deviations (Tdev) from normal: daily temperature maximums (Tmax) that exceed 90°F, and minimums (Tmin) below 32°C will affect trauma volumes.

Methods: Data were obtained from the trauma databases of two major metropolitan Level I trauma centers, with seasonal weather variability over a 4-year time period collated. Our study criteria included adult patients >18 years of age and an orthopaedic trauma injury determined by an AIS (abbreviated injury scale)-extremity >1. The National Weather Service-local international airport data collected were: Tmax, Tmin, Tdev, and precipitation. The total data were evaluated then divided by season and month. Data analysis included descriptives, analysis of variance, and logistic regression. Nominal variables were analyzed using χ^2 . The alpha was 0.05 for significance.

Results: There were 5879 trauma admissions during the study period of 48 months, (1461 days) with an average of 4.03 traumas per day. There was a total of 583 days without trauma admissions between the 2 hospitals. Admission demographics consisted of 3900 (66%) males versus 1979 (34%) females. Mechanism of injury included motor vehicle collision 2062 (35%), motorcycle collision 631 (11%), pedestrian versus auto 276 (5%), fall 1845 (31%), gunshot wound 412 (7%), and other 653 (11%). 1901 traumas occurred during 488 days with precipitation. Total traumas that occurred with a Tmax of 80°-89°F numbered 1399 (over 295 days), with an average of 4.74 traumas per day. When the Tmax was 90°-99°F there were 949 traumas (over 193 days), with an average of 4.92 traumas per day. When Tmax was >100°F the rate dropped to 3.9 traumas per day with 156 traumas (occurring over 40 days). The trauma rate with a Tmin <32°F was 3.21 per day with 1030 traumas seen (occurring over 321 days).

Conclusion: The occurrence of orthopaedic trauma does increase during warmer seasons/ months with the peak number occurring in August. Precipitation leads to a decrease in overall rate of traumas. The rate of trauma did increase as temperatures increased from 80-89°F to 90-99°F but once the Tmax exceeded 100°F the rate dropped. It appears from the data that High temperatures are “too hot for trauma” once extreme temperatures of Tmax >100°F are reached. The overall trend of orthopaedic trauma decreases in the winter time which is evident with the associated drop in Tmin<32°F.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an “off label” use). For full information, refer to page 600.

| Season (days) | Total # Traumas | Average Traumas/day | Trauma + Precipitation | Trauma + No Precip | Days With No Trauma | No Trauma + Precip | No trauma + No Precip |
|---------------|-----------------|---------------------|------------------------|--------------------|---------------------|--------------------|-----------------------|
| Winter (356) | 1180 | 3.3 | 375 (32%) | 805 (68%) | 170 | 52 (31%) | 118 (69%) |
| Spring (372) | 1624 | 4.4 | 660 (41%) | 964 (59%) | 127 | 63 (50%) | 64 (50%) |
| Summer (376) | 1704 | 4.5 | 473 (28%) | 1231 (72%) | 126 | 38 (30%) | 88 (70%) |
| Fall (357) | 1371 | 3.9 | 376 (25%) | 995 (75%) | 161 | 54 (34%) | 107 (66%) |