

Thunderstorm Asthma Leads to Sharp Rise in Emergency Medical Services

By Mindy Nash, OD

A thunderstorm asthma event caused an unexpected demand in emergency medical services for cases of acute respiratory disorders compared with historical trends, a new study has found. Implementing a forewarn system for predisposed patients could lessen the effect on public health.

Emily Andrew, MBiostat, and colleagues from the Centre for Research and Evaluation at Ambulance Victoria, in Doncaster, Australia, and from Monash University, in Melbourne, Australia, reported the results in the December 13, 2017, online publication of *The BMJ*.

According to the researchers, thunderstorm asthma is the rare occurrence of a severe asthmatic episode in predisposed individuals, precipitated by the presence of an allergen, usually pollen, and a particular weather condition. Rain causes the release of allergenic components from pollen grains into the air. Susceptible individuals inhale the allergic components, which irritates the airways and leads to asthma symptoms of coughing and wheezing.¹

However, “Thunderstorm asthma can affect patients with or without a history of asthma, but patients who experience hay fever are at an increased risk,” the researchers noted.

A thunderstorm asthma event occurred on November 21, 2016, in the state of Victoria, Australia, which led to an unexpected increase in demand for emergency medical services, according to the researchers. No other disastrous event, including the bushfires and heatwaves of 2009 in Victoria, culminated in such a high demand for emergency medical services.²

According to the Inspector-General for Emergency Management, Victoria’s emergency response plan is currently not designed for a complex emergency event such as thunderstorm asthma that has rapid onset and affects wide areas of the state.²

“To optimise the emergency medical response to future emergencies, we need to understand the direct effects of thunderstorm asthma on patients, caseloads, and associated deaths,” Emily Andrew explained. Earlier studies described the effect of thunderstorm asthma on primary care and emergency departments, but little research was conducted on its effect on emergency medical services, she added.

Study design

A retrospective study of the effects of the November 21, 2016, thunderstorm asthma event on the demand for emergency medical assistance was conducted. Only patients with an electronic medical record were included in the study.

For comparison with the thunderstorm asthma event, a time series analysis of the emergency caseload of Ambulance Victoria, Victoria, Australia, between January 1, 2015, and December 31, 2016, was completed. Also, a comparator period including the 3 Mondays prior to November 21, 2016, was analyzed. Out-of-hospital cardiac arrest data were collected from the Victorian Ambulance Cardiac Arrest Registry.

According to the Australian Bureau of Meteorology, November 21, 2016, was the warmest day of the spring season in Melbourne, Australia, with the highest recorded temperature of 35°C. The grass pollen count for the day was labelled extreme (≥ 100 grains/m³) due to gusty winds, according to the School of Biosciences at the University of Melbourne, Melbourne, Australia. A thunderstorm that moved westward to eastward across Melbourne caused severe wind gusts of 37 mph (60km/h) or more between 5 PM and 6:30 PM.

Effect of the thunderstorm asthma event

Hourly caseload, patient characteristics, and the effects of thunderstorm asthma on emergency services were analyzed.

From the hourly caseload analysis, on November 21, 2016, between 6 PM and midnight, emergency services encountered 1326 cases, which is 2.5 times the average (530 cases) caseload of the 2-year study period. "The caseload was so extreme that no ambulance could be dispatched to more than 500 cases; these were closed through paramedic telephone assessment," the researchers said.

Acute respiratory distress was observed by paramedics in almost half (332 of 774) of the calls involving breathing issues on November 21, 2016. During the event, a history of asthma was reported in almost half of the patients with acute respiratory distress, and of those patients, 26.4% (156 of 590) were on an asthma bronchodilator and 1.4% (8 of 590) were on preventative medication. Also, the patients on November 21, 2016, were significantly younger than in the comparator period.

Compared with the 2-year study period, the thunderstorm asthma event increased the overall caseload for emergency medical services by 41.7% and, when including the 3 days after the event, by 96.6%, after adjusting for temporal trends. Furthermore, the increase in patients with acute respiratory distress was 432.3% compared with the 2-year study period.

Other considerations

The researchers noted that the number of cases in the study for the thunderstorm asthma event was less than the actual number due to the analysis including only the cases recorded with electronic records. Furthermore, patient medications and pre-existing medical conditions may have been under-reported, they explained. In addition, the patients assessed with acute respiratory distress by paramedics did not have a confirmed hospital diagnosis.

With an increase in the number of cardiac arrests due mainly to respiratory issues, further studies are needed to investigate the effects of coarse particles on cardiovascular and respiratory systems, the researchers concluded.

Implementing a warning system to predisposed individuals and emergency medical services may aid in a more tailored emergency response, explained the researchers. "Our findings support the notion that preventative medication, such as corticosteroids, may be effective in preventing severe asthma attacks related to thunderstorm asthma if taken before the event," they added.

An unusual thunderstorm asthma event led to a sharp rise in demand for emergency medical services from patients with acute respiratory distress and cardiac arrests. Notably, fewer patients taking

preventative asthmatic medications than patients taking a bronchodilator alone suffered symptoms of acute respiratory distress.

Disclosures

The authors have no financial disclosures to report.

References

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Article Summary: A thunderstorm asthma event, in Australia, caused an unusually high number of acute respiratory distress cases that strained the local emergency medical services compared with a historical period. A review published in *The BMJ* suggests that forewarning patients may lessen the impact of the asthma event.

Take Note:

- A thunderstorm asthma event caused an unexpected and overwhelming number of acute respiratory distress and cardiac arrest cases for the local emergency medical service.
- Patients on preventative medication for asthma were less likely to be affected by thunderstorm asthma.
- Future thunderstorm asthma events could have less of a health impact if forewarn systems for patients are implemented.