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## Brief Report

## Full Moons and Helicopter Emergency Medical Services (HEMS) Activations in The United States

Aditya C. Shekhar<sup>1,2,\*</sup>, Ira J. Blumen<sup>3,4</sup><sup>1</sup> Icahn School of Medicine at Mount Sinai, New York City, NY<sup>2</sup> Harvard Medical School, Boston, MA<sup>3</sup> Section of Emergency Medicine, The University of Chicago, Chicago, IL<sup>4</sup> University of Chicago Aeromedical Network (UCAN), Chicago, IL

## A B S T R A C T

A long-standing misconception in emergency medicine is that full moons are associated with increased patient volume. Although there has been ample work debunking this belief, virtually no scholarship has tackled this question from the perspective of helicopter emergency medical services (HEMS). We examined a national-level database populated by EMS agencies throughout the United States (NEMSIS) and compared three-day periods containing every full moon in 2019 with control three-day periods one week immediately before and one week immediately after a given full moon. The daily average number of HEMS activations was then compared. A significant increase was defined as full moon periods having at least 20% more HEMS activations than the control periods before and after the full moon. In 2019, full moons had a daily average of 496 HEMS activations, and non-full moon periods had a daily average of 510 HEMS activations. Furthermore, no months saw full moons having a significant increase in HEMS activations. Our data provides important support for the idea that full moons do not translate into increased HEMS activations.

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## Background

There is a long-standing belief in emergency medicine that full moons are somehow associated with increases in patient volume or acuity.<sup>1</sup> Despite this, quantitative analyses repeatedly demonstrate there is not an association between full moons and patient volume/acuity in a variety of emergency care settings.<sup>2–4</sup> In the United States and a variety of other countries, helicopter emergency medical services (HEMS) transports thousands of high-acuity patients every year.<sup>5</sup> In a review of the medical literature, there has not been a broad-scale study analyzing whether full moons are associated with increases in HEMS volume. We utilized a large and nationally-representative database of emergency medical services (EMS) in the United States to ascertain whether

full moons might be associated with increases in HEMS activations.

## Methods

The National Emergency Medical Services Information System (NEMSIS) is a database supported by EMS agencies throughout the United States. Data are populated directly from EMS patient care reports, allowing for broad-scale research into trends involving EMS. For this study, we examined HEMS activations across all months in 2019. For every month, we isolated a three-day period containing the full moon and compared the average daily number of HEMS activations during that period with the average daily number of HEMS activations during the corresponding three-day period one week immediately prior and one week immediately after. This approach allows us to control for potential variations in HEMS volume across days-of-the-week and months-of-the-year. Although data were available, we avoided looking at 2020

and 2021 because the COVID-19 pandemic may have affected trends in HEMS – multiple studies have uncovered changes in the usage of ground ambulances during the COVID-19 pandemic.<sup>6,7</sup>

## Results

Across 54,588 HEMS activations occurring on both full moon periods and non-full moon (control) periods, full moon periods had a daily average of roughly 496 activations and non-full moon (control) periods had a daily average of 510 activations. Furthermore, no months in 2019 saw a significant increase in HEMS activations when comparing full moon periods with the non-full moon (control) periods during the same month.

## Discussion

Our analysis shows full moons are not associated with increases in HEMS activations nationally. In fact, full moon periods were actually associated with a slight

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\*Correspondence to: Aditya C. Shekhar.

E-mail address: [shekh046@umn.edu](mailto:shekh046@umn.edu) (A.C. Shekhar).

reduction in the average daily number of HEMS activations when compared with non-full moon (control) periods (496 activations/day vs. 510 activations/day). Of course, this result should not be interpreted to mean full moons lead to decreases in HEMS activations. Rather, our findings are likely due to stochastic variations in HEMS utilization during any given day.

This study joins a number of other items in the literature that have shown full moons are not associated with increases in patient volume in various emergency care settings, including trauma centers, emergency departments, and ground ambulances.<sup>2–4</sup> For instance, Coates et al. looked at trauma admissions between full moon periods and non-full moon periods at a major urban level 1 trauma center over one calendar year. They found full moons were not associated with increases in the number of trauma admissions, trauma mortality, injury severity, and length of stay.<sup>2</sup> Thompson & Adams<sup>3</sup> examined emergency department (ED) patient volumes over a four-year period and compared full moon periods and non-full moon periods. There were no differences in

patient volume, number of EMS transports, or admissions when comparing full moons with non-full moons.<sup>3</sup> Our group recently explored whether full moons may be associated with increases in the number of 911-initiated EMS activations involving ground ambulances using the NEMSIS database. We identified three-day periods containing the full moon and calculated the daily average number of EMS activations during that period and compared the daily average during full moon periods with control periods one week before and one week after. We found no increases when comparing full moons with non-full moon periods.<sup>4</sup> Further research efforts should continue to provide data-driven insight into various misconceptions and superstitions within emergency medicine and the healthcare sector.

### Conclusions

Our examination of a large and nationally-representative database reveals full moons are not associated with increases in HEMS activations in the United States. Our findings are consistent with other studies that have been published.

### CRedit statement

**Aditya C. Shekhar:** Conceptualization, Methodology, Formal analysis. **Ira J. Blumen:** Conceptualization, Supervision, Writing – review & editing.

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