

Please log onto Editorial Manager at <http://asem.edmgr.com> to submit your letters to the editor. If you have not already done so, you will need to register with the journal.

Letter to the Editor: Instrument Meteorological Conditions Are an Important Determinant of Fatal Accident Risk for Both Day and Night HEMS Operations

Dear Editor:

With great interest, we have read the article of Aherne et al. on fatal night Helicopter Emergency Medical Service (HEMS) accidents.¹ In addition to the cited factors, we would like to emphasize instrument meteorological conditions (instrument flight rules conditions) as the most substantive factor influencing aviation safety and risk. In a previous study on German HEMS accidents,² we used the FIA score⁴ in an alternate approach for risk analysis and found that it is a valuable and simple to use tool for predicting fatalities.³ The FIA Score uses three parameters (F = fire; I = Instrument meteorological conditions; A = Away from airport) to determine the fatality risk after a crash.⁴ In our study,³ a total of 99 HEMS accidents (occurring between September 1970 and December 2009) were analyzed. Depending on the FIA Score (categories: FIA0, FIA1, FIA2, and FIA3; depending on the number of factors, i.e., F/I/A), crash fatality rates of 0.0%, 8.1%, 53.3%, and 100.0%, respectively, were calculated. Accordingly, instrument meteorological conditions pose one of the greatest risks for a fatal HEMS accident, thus arguing for training focus and aircraft equipage for such flight.

Jochen Hinkelbein, Jan Schmitz, and Christoph Adler
Universitätsklinikum Köln (AöR), Köln, Germany

REFERENCES

1. Aherne BB, Zhang C, Chen WS, Newman DG. Systems safety risk analysis of fatal night Helicopter Emergency Medical Service accidents. *Aerosp Med Hum Perform.* 2019; 90(4):396–404.
2. Hinkelbein J, Schwalbe M, Neuhaus C, Wetsch WA, Genzwürker HV. Incidents, accidents and fatalities in 40 years of German helicopter emergency medical system operations. *Eur J Anaesthesiol.* 2011; 28(11):766–773.
3. Hinkelbein J, Schwalbe M, Wetsch WA, Neuhaus C, Spelten O. Application of the FIA score to German rescue helicopter accidents to predict fatalities in Helicopter Emergency Medical Systems (HEMS) crashes. *J Emerg Med.* 2012; 43(6):1014–1019.
4. Li G, Gebrekristos HT, Baker SP. FIA Score: a simple risk index for predicting fatality in aviation crashes. *J Trauma.* 2008; 65(6):1278–1283.

In Response:

We thank Dr. Hinkelbein et al. for their interest in our paper. We agree with their emphasis on instrument meteorological conditions (IMC) as a significant hazard to visual flight rules (VFR) aviation safety and risk.

Our work follows on from the research of Baker et al.,³ who identified the hazards of night-time and adverse weather in relation to fatal HEMS accidents and more broadly with de Voogt and van Doorn's⁴ large helicopter accident dataset identifying the influence of similar hazards. The nighttime VFR environment makes see and avoid of in-flight IMC increasingly difficult, placing a greater dependency on preflight risk assessment. The operational accidents in our study² highlighted that nighttime fatal accidents made the greatest contribution to the overall U.S. HEMS fatal accident rate during the study period.

Our earlier paper¹ identified the temperature dew point spread (TDPS) and its correlation with increased fatalities as TDPS reduced. This relationship correlates potential cloud ceiling directly with fatal accident risk. As such, TDPS becomes a potentially useful preflight measure of weather-related hazard and fatal accident risk.

The work by Hinkelbein et al. focuses predominantly on the post-crash fatality risk.⁵ Our studies are concerned with the preflight decision-making of HEMS pilots and the variables that may affect it.^{1,2} Our aim is to cast some light on these issues with a view to improving the safety of all flight crew (pilot, physician, paramedic, and flight nurse) involved in HEMS operations.

Finally, we would agree with Hinkelbein et al.'s contention that flight in IMC poses a significant risk for a fatal HEMS accident, but we would add that the risk is much higher when IMC entry is inadvertent, not adequately planned, the flight is

Reprint & Copyright © by the Aerospace Medical Association, Alexandria, VA.
DOI: <https://doi.org/10.3357/AMHP.5410.2019>

conducted at night, and operated by a single pilot with low domain task experience.

Bryan B. Aherne, Crystal Zhang, Won S. Chen
Swinburne University, Melbourne, Australia
and David G. Newman
Monash University, Melbourne, Australia

REFERENCES

1. Aherne BB, Zhang C, Chen WS, Newman DG. Pilot decision making in weather-related night fatal helicopter emergency medical service accidents. *Aerosp Med Hum Perform*. 2018; 89(9):830–836.
2. Aherne BB, Zhang C, Chen WS, Newman DG. Systems safety risk analysis of fatal night helicopter emergency medical service accidents. *Aerosp Med Hum Perform*. 2019; 90(4):396–404.
3. Baker SP, Grabowski JG, Dodd RS, Shannahan DE, Lamb MW, Li G. EMS helicopter crashes: what influences fatal outcomes. *Ann Emerg Med*. 2006; 47(4):351–356.
4. de Voogt AJ, van Doorn RR. Helicopter accident analysis: datamining the NTSB database. Proceedings of the European Rotorcraft Forum; September 11–13, 2007; Kazan, Russia. Kazan: Vertolet Publishing; 2007:1–7.
5. Hinkelbein J, Schwalbe M, Wetsch WA, Neuhaus C, Spelten O. Application of the FIA score to German rescue helicopter accidents to predict fatalities in helicopter emergency medical systems (HEMS) crashes. *J Emerg Med*. 2012; 43(6):1014–1019.