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Original Research

The Impact of Helicopter Emergency Medical Service Night Operations in South East England

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A B S T R A C T

Objective: This study sought to assess the impact of a helicopter emergency medical service (HEMS) capable of night operations.

Methods: This is a retrospective case review of all night HEMS missions attended by a charity air ambulance service in South East England over a 2-year period (October 1, 2013, to October 1, 2015).

Results: During the 2-year trial period, the HEMS service undertook a total of 5,004 missions and attended to 3,728 patients. Of these, 1,373 missions, or 27.4% of the total HEMS activity, were night missions. Night missions increased from year 1 (n = 617) to year 2 (n = 756). A mean of 1.9 missions per night were conducted, resulting in the treatment of 1.3 patients per night. A higher proportion of patients were transported to a major trauma center at night (64% vs. 51%, $\chi^2 = 41.8$, $P < .0001$). Weather conditions prevented HEMS from responding at night via air for 15% of the night operational hours.

Conclusion: A 2-year trial period of a night HEMS service in South East England showed the predicted activation rate, with a mean of 1.3 patients attended to per night. Patients transported to a major trauma center had a mean Injury Severity Score of 23. Further research is warranted to determine if the night HEMS service conveys a patient outcome benefit.

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Major trauma is a leading cause of serious morbidity and mortality.^{1,2} Advanced prehospital care can improve the outcome for major trauma patients.^{3,4} Kent, Surrey & Sussex Air Ambulance Trust (KSSAAT) delivers advanced prehospital care by deploying 2 doctor/paramedic teams by aircraft or response car. The 2 teams respond from 2 separate bases in South East England, 1 based in Surrey and 1 based in Kent. Historically, KSSAAT was operational between 0700 and 1900 hours 7 days per week. However, major trauma frequently occurs overnight, and the lack of a night helicopter emergency medical service (HEMS) was felt to be detrimental to enhanced patient care because no enhanced prehospital medical care was available overnight.

Before any night HEMS service was available, KSSAAT undertook a prospective study in 2010 to explore the possible impact that a night HEMS service may have.⁵ This study showed the likely need of a night HEMS team being tasked 1.7 times per night during the hours of 1900 to 0700. The incidence of these predicted cases continued throughout the entire night period but with gradually decreasing frequency. Most

nights of the week were predicted to have similar levels of activity with the exception of Saturday, which appeared to be the busiest night of the week. A high number of the cases identified resulted in the patient being transported to a major trauma center (MTC), indicating that HEMS activation may well have been warranted.

Based on this study, KSSAAT made the decision to commit itself to exploring the options for night HEMS operations. This commitment was the start of a 3-year research, development, and training process, which culminated with the launch of a 2-year night HEMS operational trial on the night of September 26, 2013. At this point, KSSAAT became the first 24/7 helicopter-based HEMS in the United Kingdom. The purpose of this study is to review the activity, case mix, and demographics of the 2-year night HEMS trial period. We sought to compare the actual activity of the night HEMS service with the previously estimated need.

Methods

The region that KSSAAT serves has a resident population of over 4.5 million people spread over an area of approximately 9,000 km² (3,600 square miles). Based on prolonged (>1.5 hours in some cases) time to reach incidents within this area, it was felt that an HEMS service was warranted over a land-based response model.

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To comply with Clean Air Act regulations⁶ and to deploy the safest possible night HEMS service, a new aircraft (MD902, McDonnell-Douglas helicopters) was deployed. This aircraft was operated by 2 pilots and fully equipped for night flight with the necessary instrument flight certification, traffic collision avoidance system, search light, wire cutters, and bespoke navigation equipment. In addition, all members of the crew (including doctors and paramedics) wore night vision goggles. During the mission planning phase of every activation, an ad hoc site was identified as close to the incident location as possible. In addition, presurveyed landing sites across the region were used, such that every mission always had a secondary, presurveyed site as a backup.

All cases of night HEMS activation are recorded on a bespoke electronic database (HEMSbase; MedicOne Systems Ltd, Surrey, UK). All activations during the hours of 1900 to 0700 were prospectively recorded. We analyzed all HEMS missions from October 1, 2013, to October 1, 2015. This study met National Institute for Healthcare Research guidelines as a service evaluation, and, therefore, formal ethical approval was not required.

Results

Missions and Patient Contact

During the 2-year trial period of this study, KSSAAT performed a total of 5,004 missions and attended to 3,728 patients. Between year 1 and year 2, we experienced a 7.5% growth in activity (year 1: 2,412 vs. year 2: 2,592 missions) and a 4.2% rise in patient numbers. Of this activity, 1,373 missions (27.4% of the total HEMS activity) were night missions. These missions resulted in KSSAAT treating 942 patients, which is equal to 25.3% of our patient total. Night missions increased from year 1 ($n = 617$) to year 2 ($n = 756$).

We predicted that KSSAAT activity levels at night would be approximately 1.7 missions per night.⁵ The experience of the 2-year trial is that activity levels equated to an average of 1.9 missions per night, resulting in the treatment of 1.3 patients per night. Activity at night grew across the 2-year period, resulting in year 1 performing an average of 1.7 missions and treating 1.2 patients per night and in year 2 an average of 2.1 missions and 1.4 patients per night. Although there were month-by-month peaks and troughs in activity, the overall trend was indicative of a continuing growth in night activity, as shown in Figure 1.

Day of the Week

The busiest nights of the week were found to be Saturday and Sunday, as shown in Figure 2.

Time of Night

Two thirds of the activity occurred in the first half of the night shift, before 0100 hours, with the remaining third falling in the second half of the shift. Activity decreased across the night evenly such that in the first 4 hours of the night shift we performed on average 1 mission per night; in the second 4 hours, we performed a little over 1 mission every other night; and in the final 4 hours, we performed 1 mission every third night (Fig. 3).

Patient Population

A higher proportion of younger (15-30 years) patients were encountered by night. The average age of night patients was 37.8 years old, 4.4 years younger than the average patient we treat by day.

Mission Type

The median night planning phase from activation to launch was noted to be 14 minutes. We observed a difference in the type of incidents attended by night compared with those attended by day. Although road traffic collision was by day the leading cause of activation, it was at a significantly reduced rate. Most notable among night patients were the significantly increased rates of victims of assault and self-harm compared with the day patient cohort.

Patient Acuity

A surrogate marker for injury severity in the prehospital phase is whether patients are conveyed directly to an MTC. After the introduction of the night HEMS service, a significantly higher proportion (64% vs. 51%, $\chi^2 = 41.8$, $P < .0001$) of patients were conveyed directly to an MTC compared with during daytime operations. The mean Injury Severity Score for patients transported to an MTC by night was higher than those transported during the day (23.5 vs. 22.0, $P < .05$).

A significant number of severely injured ($>$ Injury Severity Score 15) patients received enhanced prehospital care, with a higher proportion of severely injured patients being encountered at night than during the day. Having an HEMS service available by night allowed enhanced medical care to be delivered to the scene more rapidly than by land response.

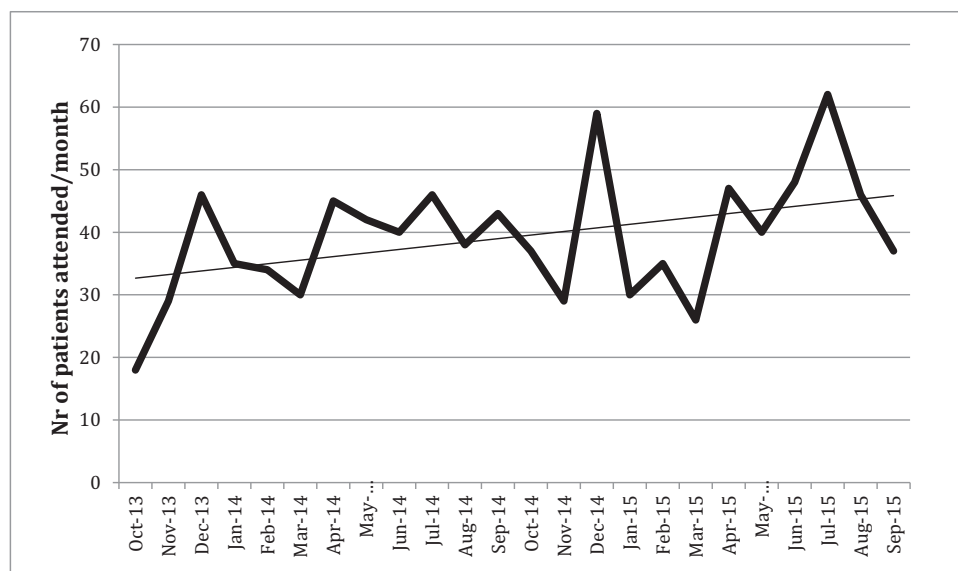


Figure 1. The night activity during the trial period by 24 linear months.

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