The impact of 24 h consultant shop floor presence on emergency department performance: a natural experiment

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ABSTRACT

Objectives As a result of gaps in middle-grade cover in the emergency department it became necessary for consultants to work some night shifts. This study aimed to examine the effect of this change in practice on performance.

Methods A prospective observational study was conducted. Staffing and workload variables were collected over a period of 6 months in a single district general emergency department. The outcomes assessed were process times, the proportion of patients admitted and the proportion of patients returning within 7 days.

Results Consultants worked 26 of 182 night shifts during the period studied. There were no differences in the number of patients present in the department at the start of the middle-grade or consultant night shifts. Fewer patients presented per hour during middle-grade night shifts: 3.8 patients per hour versus 4.4 patients per hour during consultant nights. Compared with middle-grade night shifts, the median waiting time was on average 19.6 min less and the median emergency department length of stay was 20.5 min less during consultant night shifts. The proportion of patients admitted from the emergency department was on average 3.9% less than during middle-grade night shifts but there was no difference in the proportion returning within 7 days.

Conclusion In this small single-site study, a consultant working nights has been shown to reduce process times and the rate of admission. It remains unclear whether such improvements would be sustained in the longer term.

In 2010, the College of Emergency Medicine published a set of workforce recommendations for emergency medicine consultants.[1] The aim of the recommendations was to increase consultant numbers, allowing a more comprehensive shop floor presence in emergency departments. It was said that this would improve the quality of patient care and enhance patient safety, as well as enabling the development of emergency care and increasing cost effectiveness. The recommendations were for a minimum consultant presence in the emergency department of 16 h a day, 7 days a week, but is this enough?

There have been a number of papers demonstrating improved patient outcomes when patients are seen early by senior clinicians.[2–5] However, the nature of emergency medicine means that significant numbers of patients attend the emergency department outside of core hours (both at weekends and overnight). For example, in one hospital it was shown that a quarter of all ambulance alert calls occurred between midnight and 06:00 hours.[2]

A number of previous studies have shown significant benefits from the presence of consultants in the emergency department. Sen *et al*[3] showed that in a single shift, consultants see more patients than junior or middle-grade doctors. They admit fewer, have fewer leaving without treatment, refer fewer to clinic and have a faster turnaround time. This was found to be consistent in every triage category.

White *et al*[4] found that increased consultant presence in the emergency department can reduce the rate of inappropriate discharges by 9%, concluding that input from a senior doctor impacts positively on patient safety and improves departmental flow. Further studies have shown that consultant presence was associated with a reduction in complaints of 41%,[5] and reduction in unplanned returns of 30%.[6]

A review by Wallis and Guly[7] concluded that more senior grade doctors were needed to improve the standard of care in emergency departments. They showed senior doctors to be considerably better than senior house officers at interpreting radiographs, and according to Wyatt *et al*,[8] patients with major trauma have a better outcome if treated by a consultant. Cooke *et al*[9] found the presence of senior staff was associated with reduced admissions and delays.

As a result of gaps in the middle-grade rota in our emergency department, it became necessary for consultants to cover some night shifts in order to maintain senior clinical cover. This study aimed to use this as an opportunity to assess the impact of consultants working night shifts in an emergency department.

METHODS

This prospective observational study was undertaken at Barnsley District General Hospital emergency department. The department sees approximately 75 000 new attendances per annum. Data were collected over a 6-month period from 1 February 2010 to 2 August 2010. The data noted the number of healthcare professionals present on the shop floor and patients in the department at the beginning of each hour. In addition, data were also collected detailing the mode of arrival of each patient, disposal from the emergency department, waiting time (defined as time from arrival in the department until seen by a doctor or nurse practitioner) and emergency department length of stay (defined as time from arrival until admission, discharge or transfer). Finally, each episode was followed up for a period of

1 week to determine which patients returned to the emergency department during this time. This allowed comparative analysis between consultant and middle-grade workload.

Data analysis

The analysis was undertaken using MySql V.5.1.53 and SPSS V.19.

Case mix

To assess the case mix of patients present at the start of each shift or attending during each shift, the patients were assigned to the following groups according to their age at presentation: age less than 16 years, age 16–65 years and age over 65 years. The latter two groups were further subdivided according to whether or not the patient arrived by ambulance.

To determine the state of the department at the start of the shift, the number of patients in each group present in the department was recorded.

To determine the case mix of patients presenting during the night shift, the number of patients in each group was expressed as a percentage of the total attendances during that shift.

Staffing

The total hours worked by nursing staff, senior house officers, middle-grade doctors and consultants was determined for each shift.

Whether the night shift was covered by a middle grade or consultant was indicated by a binary variable. Any additional hours worked by other middle grades or consultants during the period of the night shift were also recorded.

To account for variations in the length of the night shift the total hours worked by each staff group were divided by the shift length.

Outcome measures

Five outcome measures were determined for each shift. These were: the median waiting time; median emergency department length of stay; percentage of patients with an emergency department length of stay of less than 4 h; percentage of patients admitted to hospital and the percentage of patients returning to the emergency department within 7 days of their initial attendance.

In determining the outcome measures, all patients whose time of arrival fell within the duration of the night shift were included in the calculation.

Impact upon daytime working

For any day except Saturday and Sunday it was assumed that if a consultant had not been working a night shift they would have been available to work in the emergency department during the daytime on the date on which the night shift commenced. To assess whether this potential depletion of consultant staff during the day had any impact upon the performance of the department, the above outcome measures were determined for patients presenting during the day shifts on Monday to Friday. The differences between days when a consultant subsequently worked a night shift were compared with days when this did not occur.

Mean values and 95% CI were determined for the above variables. Values were compared using an independent samples t test.

Table 1 Mean number of patients in the department at the start of the night shift

	Middle-grade night (95% CI)	Consultant night (95% CI)
Total	21.7 (20.7 to 22.8)	20.4 (17.4 to 23.3)
Under 16 years of age	5.6 (5.0 to 6.1)	4.5 (3.4 to 5.7)
Over 65 years of age	3.7 (3.4 to 4.0)	3.3 (2.5 to 4.1)
Ambulance arrivals age 16–65 years	3.6 (3.3 to 3.9)	3.9 (3.0 to 4.7)
Non-ambulance arrivals age 16–65 years	8.8 (8.2 to 9.5)	8.6 (6.8 to 10.4)
Ambulance arrivals age over 65 years	2.7 (2.4 to 2.9)	2.4 (1.7 to 3.0)
Non-ambulance arrivals age over 65 years	21.7 (20.7 to 22.8)	20.4 (17.4 to 23.3)

Table 2 Mean case mix of patients presenting during the night shift

	Middle-grade night (95% CI)	Consultant night (95% CI)
Male (%)	55.0 (53.8 to 56.2)	55.1 (51.4 to 58.7)
Under 16 years of age (%)	16.8 (15.6 to 17.9)	18.5 (15.9 to 21.1)
Over 65 years of age (%)	16.8 (15.7 to 17.9)	14.5 (12.7 to 16.3)
Ambulance arrivals age 16–65 years (%)	28.7 (27.2 to 30.2)	29.1 (26.5 to 31.8)
Non-ambulance arrivals age 16–65 years (%)	37.7 (36.4 to 39.1)	37.9 (34.5 to 41.2)
Ambulance arrivals age over 65 years (%)	14.3 (13.3 to 15.3)	12.0 (10.0 to 13.9)
Non-ambulance arrivals age over 65 years (%)	2.5 (2.1 to 2.9)	2.5 (1.6 to 3.5)

RESULTS

During the 182-day period studied, consultants worked 26 night shifts. Of the shifts worked by consultants, 69% (18/26) were Friday, Saturday or Sunday nights compared with 38% (60/156) of nights worked by middle-grade doctors.

The number of patients in the emergency department at the start of each night shift is compared for consultant and middle-grade night shifts in table 1. There were no significant differences between any of the variables at the start of the middle-grade and consultant night shifts.

During middle-grade night shifts significantly fewer patients presented per hour compared with consultant night shifts. The mean number of patients presenting per hour was 3.8 (95% CI 3.6 to 4.0) and 4.4 (95% CI 4.0 to 4.9), respectively; t=2.8, p=0.006.

The mean case mix of patients presenting during the shifts is shown in table 2. There was no significant difference between middle-grade and consultant night shifts for any of the case mix variables.

The staffing levels are compared for middle-grade and consultant nights in table 3. The data represent the total number of hours worked by each staff group divided by the shift length. Middle-grade and consultant hours do not include those hours worked by the individual working the night shift.

The data do not include the hours worked by the middle grade or consultant covering the night shift. There was no significant difference in any of the staffing variables when compared with an independent samples t test.

The outcomes of patients presenting during the night shift are shown in table 4.

Table 3 Mean staffing levels

	Middle-grade night (95% CI)	Consultant night (95% CI)
Nursing staff	6.99 (6.9 to 7.1)	6.76 (6.6 to 6.9)
Senior house officers	1.76 (1.7 to 1.8)	1.91 (1.8 to 2.0)
Middle-grade	0.14 (0.1 to 0.2)	0.22 (0.1 to 0.3)
Consultant	0.03 (0.0 to 0.0)	0.05 (0.0 to 0.1)

Table 4 Outcome measure for attendances during the night shift

	Middle-grade night (95% CI)	Consultant night (95% CI)
Median waiting time (min)	80.0 (73.0 to 86.9)	60.4 (46.9 to 73.9)*
Median emergency department length of stay (min)	143.7 (138.3 to 149.2)	123.9 (112.7 to 135.1)*
Proportion of patients treated within 4 h (%)	98.4 (97.7 to 99.0)	98.4 (96.9 to 100.0)
Proportion of patients admitted (%)	31.0 (29.6 to 32.5)	27.1 (24.2 to 30.1)*
Proportion returning to department within 7 days (%)	8.1 (7.4 to 8.9)	7.9 (6.5 to 9.3)

Values shown are means.
*Significant difference in an independent samples t test.

During consultant nights the median waiting time was on average 19.6 min less than during middle-grade nights; t=2.64, p=0.012. The median emergency department length of stay was similarly reduced, being on average 20.5 min less during consultant night shifts; t=3.5, p=0.001. There was no difference in the proportion of patients treated within 4 h. During consultant night shifts the proportion of patients admitted from the emergency department was on average 3.9% less than during middle-grade night shifts (t=2.08, p=0.039); however, there was no difference in the proportion of patients returning within 7 days.

The performance during the weekday daytime shifts is shown in table 5. There was no significant difference in any of the outcome measures.

DISCUSSION

This study has shown that, when compared with middle-grade doctors, the presence of a consultant working the night shift is associated with a reduction in process times and admission rates.

How might such improvements have come about? We hypothesise that the improvement in process times does not result just from consultants seeing patients more quickly than middle-grade doctors, but arises partly from the active management of the department as a whole, facilitating all staff to work more quickly. The decreased admission rate is likely to arise from both consultants discharging a greater proportion of the patients they have seen, as well as offering advice to junior staff allowing them to discharge a greater proportion of patients safely. These trends have previously been noted by Sen *et al*[3] when fewer patients were admitted and a faster turnaround time was noted when patients where seen by a consultant.

Table 5 Outcome measure for attendances during the day shifts on Monday to Friday

	Middle-grade night (95% CI)	Consultant night (95% CI)
Median waiting time (min)	66.3 (60.9 to 71.7)	69.7 (51.3 to 88.1)
Median emergency department length of stay (min)	109.1 (105.4 to 112.9)	110.5 (97.9 to 123.0)
Proportion of patients treated within 4 h (%)	99.2 (99.0 to 99.3)	98.7 (98.0 to 99.5)
Proportion of patients admitted (%)	21.9 (21.1 to 22.8)	24.1 (21.4 to 26.8)
Proportion returning to department within 7 days (%)	5.5 (5.1 to 5.9)	5.2 (4.1 to 6.3)

Values shown are means.

Scheduling consultants to work night shifts inevitably affects the availability of consultants to work during daytime hours. Although we have found no adverse effect upon the outcome measures during the day shifts in this study, it is likely that there were adverse effects on other areas of the consultant duties that we have not measured, particularly the non-clinical responsibilities. Furthermore, we have only assessed the effect of this change in practice over a relatively short period of time, and participation of consultants in the working pattern was voluntary. It may be that, if sustained over longer periods of time or if it was mandatory that all consultants covered the night shifts, the effects we have demonstrated may not be found to be consistent over time.

Consultants covering the night shifts received extra remuneration for doing so. Were this incentive to be removed, it is possible that consultant participation might decrease and that the positive effects upon performance during the night shift may be reduced.

Our study was conducted in a single site and it is therefore difficult to generalise the findings to other sites. Although we have demonstrated improvements in a number of outcome measures when consultants worked night shifts, we cannot judge from this study whether these improved outcomes would be cost effective. The assessment of other outcome measures, such as longer-term effects upon error rates, complaints and litigation may allow a case to be made for such a change in practice to be cost effective. However, an economic analysis was beyond the scope of this study.

In conclusion, we have demonstrated that in our department the presence of a consultant working the night shift was associated with faster care and a reduced admission rate. A multicentre investigation is required to determine if these effects can be replicated in other departments and whether such a change is cost effective.

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Competing interests None.

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