

EDUCATION AND TRAINING

Out-of-hours task allocation: implications for foundation training and practice

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ABSTRACT

Introduction

The role of foundation year-1 (FY1) doctors during the out-of-hours (OOHs) period was explored, identifying areas to improve their training.

Methods

Data were retrospectively collected for 1 year of foundation training (2018–2019) from an electronic task system between 17:00 to 08:00, Monday to Sunday, in a 798-bed teaching hospital in Exeter, UK.

Results

Thirty-two thousand, two hundred and sixty OOHs jobs were requested with 21,816 (67.6%) assigned to FY1 doctors and the clinical site practitioner. Jobs were distributed with 12,044 (55.2%) for FY1 medicine, 5,739 (26.3%) for FY1 surgery and 4,033 (18.5%) for the clinical site practitioner. The three most common jobs requested were prescribing (31.1%), patient reviews (17.9%), and interpreting or taking bloods (11.6%). Procedural jobs accounted for 22.2% of all jobs. Prescribing and patient review jobs were further categorised into commonly encountered themes.

Conclusion

This study describes the nature of jobs performed by FY1 doctors working OOHs and identifies three areas to focus foundation doctor training. First, improving the preparedness of new graduates as guided by commonly identified jobs. Second, monitoring the appropriateness of performed jobs. Third, ensuring the evolving roles of allied health professionals and foundation doctors are clearly understood in relation to one another.

KEYWORDS: foundation doctor, out of hours, workload, training

DOI: 10.7861/fhj.2022-0040

Introduction

UK postgraduate medical education is undergoing a transformation following the Shape of Training review.¹ It made recommendations to move full General Medical Council (GMC) registration forward to the end of medical school and encourages

a broader generalist approach to patient care.¹ Currently, full GMC registration can be obtained after completing the first year of the 2-year postgraduate UK Foundation Programme. The Shape of Training review offers a timely opportunity to reassess the role of the foundation doctor; an important consideration given the apparent discrepancy between required postgraduate learning objectives and the self-reported role of the foundation doctor.²

With the retention of junior doctors proving challenging and many hospitals affected by 'rota gaps', the hospital staffing environment has needed to evolve with increasing support from allied health professionals (AHPs) in 'medical roles.' The introduction of advanced nurse practitioners and physician associates has been well received, although their final roles are still being shaped.^{3–10} There is an increasing overlap between foundation doctors and AHPs, with AHPs filling vacancies left by a shortfall in foundation doctors despite increasing medical graduate numbers.^{6,8} The COVID-19 pandemic has tested the roles of doctors and AHPs, redefining roles to meet the challenges posed by the workforce and workload stress. We would anticipate that, in the future, this may lead to a greater focus on clinical management decisions being made by foundation doctors, while an increasing proportion of practical jobs will be absorbed into the roles of AHPs.

Following the changes of Modernising Medical Careers, the European Working Time Directive (legislation protecting and restricting doctor working hours to an average of 48 hours per week with an option to opt out) and the move from 'firm-based' delivery of care to the introduction of shift patterns, trainees are often caring for multiple wards with patients and nursing staff that they do not know during the out-of-hours (OOHs) period.^{11,12} This is concerning given that over 70% of the 'working' year falls outside of the normal working week (Monday to Friday, 08:00 to 17:00). In response, hospitals in the UK have adopted a 'hospital at night' team comprising a multi-professional, multispecialty approach to manage patients across many disciplines in the hospital at night. These teams are often supported by a computer-based system for assigning jobs during the OOHs period. Similar computer-based systems have been reported as being successful in streamlining workflow and improving doctor productivity in New Zealand.¹³ The data from these systems can be studied retrospectively to assess the foundation doctor workload, and influence improvements in both medical education and clinical care delivery to improve healthcare efficiency, time-management and task completion.¹⁴

With the increasing workload undertaken by AHPs in the workforce, there is scope to improve the role of the foundation

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doctor as a learner and a decision-maker. This study aims to identify jobs commonly performed by foundation year-1 (FY1) doctors during the OOHs period to provide insight into the current role of the foundation doctor and areas to improve their training.

Methods

This is a retrospective analysis of existing data from the Royal Devon and Exeter Hospital (Wonford), part of the Royal Devon University Healthcare NHS Foundation Trust. This site is a 798-bed district general teaching hospital in south-west England with acute medical and surgical services using data derived from an electronic task record system.

Hospital at night

In this study, the OOHs period is defined as 17:00 to 08:00, Monday to Sunday. During this time period, medical ward cover (398 beds) is provided by one FY1 and three senior house officers (SHOs) in the evening (17:00 to 21:30). For the purposes of this article, an SHO is defined as any doctor who has completed FY1 but is not working at registrar level or higher. Medical ward cover during the night (21:30 to 09:00) is provided by one FY1 and one SHO. General surgical and urological ward cover (119 beds), including acute surgical admissions (22 beds), are covered by one FY1 and one SHO (17:00 to 08:00; handover at 20:30). Both ward teams are overseen by their respective registrars (one medical and one surgical). One clinical site practitioner (non-prescribing advanced nurse practitioner) provides assistance with completion of clinical skills, urgent reviews and facilitates task re-assignment. Not all jobs completed by the clinical site practitioner will have been reassigned to their role. A further site practitioner coordinates hospital admissions and discharges.

'Taskboard'

Data were collected from an electronic OOHs allocation system known as the 'Doctor's Taskboard' (bespoke software designed in-house by Mr Karim Kamara, application development manager, Royal Devon and Exeter Hospital, (Wonford)). It is managed by the clinical site practitioner from their dedicated office. Ward staff (nurses and daytime doctors) 'request' jobs through the Doctor's Taskboard and allocate them to the responsible clinician. The job includes the time of request and, typically, a short job description. Each job is linked to one of 12 pre-set job types: bloods (all except gentamicin), cannula, deteriorating patient review, fluids review, gentamicin bloods, non-urgent patient review, patient clerking, prescribing (all except fluids), review imaging, verification of death, weekend review and other.

Data extraction

All logged jobs between 01 August 2018 at 08:00 and 07 August 2019 at 08:00 (one rotational year of medical training) were extracted from the Doctor's Taskboard. Duplicate and blank entries were removed. Job categories for patient review were combined. Data were filtered to include jobs assigned to FY1 doctors and the clinical site practitioner between 17:00 and 08:00 from Monday to Sunday. This represents the hours in which the Doctor's Taskboard is exclusively used. Data were filtered for FY1 doctors only because foundation year-2 (FY2) doctors at this

hospital work interchangeably with more senior trainees on the SHO rota. Therefore, inclusion of jobs sent to the SHO would not exclusively represent the training of a foundation doctor as these tasks are performed by any doctor working between FY1 and registrar grades, such as core trainees as well as FY2 doctors.

Jobs labelled as 'other' were re-assigned to the remaining job categories using three keyword searches. A hierarchical redistribution structure was employed to correctly re-assign jobs involving multiple step tasks. They were assigned in this order: verification of death, patient clerking, review imaging, bloods (all except gentamicin), gentamicin bloods, fluids review, cannula, prescribing (all except fluids) and then patient review; for example, 'Please check X-ray and prescribe antibiotics if necessary' would be assigned to 'review imaging' rather than 'prescribing (all except fluids)'. All other jobs remained in their originally assigned job category, irrespective if they contained one or more tasks.

Data analysis

The most common type of jobs requested were identified. A keyword search on the job description described five of the job categories: prescribing, patient review, bloods (all except gentamicin), gentamicin bloods and cannula. Keywords for 'prescribing (all except fluids)' were based upon a list of the 100 most commonly prescribed medications.¹⁵ Keywords for 'patient review' were based upon a manual search of the job description and identified 13 key themes. Search terms included commonly used abbreviations and misspellings. If a job contained two or more keyword hits, each individual hit was included in the analysis provided it fell into a new search theme.

This project was approved as a service evaluation study by the Clinical Audit Department at the Royal Devon and Exeter NHS Foundation Trust (DATIX Reference: 19-4530), now known as the Royal Devon University Healthcare NHS Foundation Trust.

Results

During 1 year of foundation training (371-day study period), 32,260 jobs were requested between the hours of 17:00 and 08:00 from Monday to Sunday. FY1 doctors covering the wards and the clinical site practitioner were assigned 21,816 jobs (67.6%; Fig 1). The remaining 10,444 jobs (32.4%) were assigned to the SHO. Jobs were distributed with 12,044 (55.2%) for FY1 medicine, 5,739 (26.3%) for FY1 surgery and 4,033 (18.5%) for the clinical site practitioner (72.5% medicine and 27.5% surgery).

On an average OOHs shift, the FY1 doctor in medicine or surgery would have a mean of 32 jobs (range 11–56) and 15 jobs (range 2–33), respectively, while the clinical site practitioner would have a mean of eight jobs (range 0–18) and three jobs (range 0–13) for medicine and surgery, respectively. Procedural jobs, those involving only the taking of bloods, cannulation, re-writing drug charts or verification of death, represent 22.2% of all jobs (Table 1). Of these, 55.6% were performed by the clinical site practitioner.

Prescribing was the most commonly encountered job (n=6,790 (31.1%); Fig 1). From 5,878 (86.6%) prescription jobs, 6,862 specific tasks were identified and assigned to one of 11 prescription categories (Fig 2). Medication needed re-writing in 1,429 prescribing jobs, of which, 370 (5.4%) specified no prescription category. For 542 (8.0%) prescribing jobs, no specific tasks were identified, indicating that these jobs will have required clarification by the completing clinician.

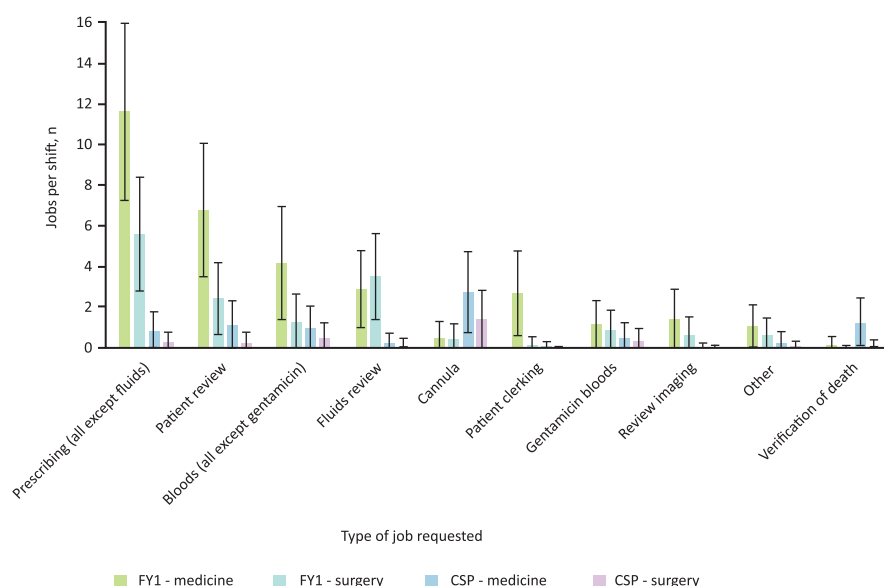


Fig 1. Jobs per shift during the out-of-hours period, mean (standard deviation).

CSP = clinical site practitioner; FY1 = foundation year-1 doctors.

Review of patients was the second most common job ($n=3,915$ (17.9%); Fig 1). From 3,522 (90.0%) patient review jobs, 4,988 specific tasks were identified and assigned to one of 13 review categories (Fig 3). No patient review tasks were identified for 393 (10.0%) patient review jobs.

Analysis of venepuncture and cannulation jobs shows most venepuncture jobs involve checking results, while most cannulas during this period were needed for antibiotics or fluids (Table 2).

Discussion

A foundation doctor's OOHs time is predominately spent prescribing, utilising clinical judgement and communicating with patients or colleagues.^{2,16} Our study describes the nature of these interactions and identifies jobs performed by AHPs. While the results provide insight into the jobs on which teaching can be focused at both undergraduate and postgraduate level, nearly a quarter are procedural and could be absorbed into the role of the AHP. Further research should explore the benefit that these jobs have in the training of a doctor, particularly given that these jobs represent a large proportion of the OOHs workload; time that could be spent developing competencies identified in the Shape of Training review.¹

Similar studies have qualitatively described the role of the foundation doctor through interviews, diaries and shadowing

clinicians during their shift. Studies frequently separated performed tasks into clinical, administrative and communication categories.

Example tasks included patient reviews, practical procedures (such as blood taking or cannulation), making referrals, responding to frequent pager calls, writing inpatient notes or prescribing.^{2,16–20}

The observed role is reported to have changed little over the past 30 years.^{17–19} Continuation of the status quo indicates the role of a foundation doctor in the OOHs period is unchanged. This should be considered alongside the reduction in weekly hours worked as part of the European Working Time Directive, thus reducing the relative training time available. On the other hand, a continuation of the status quo could reflect the educational value the variety of jobs during the OOHs period brings; for example, foundation doctors are performing many prescribing and acute patient reviews, areas that have previously been identified as requiring further education and training.^{21–24} Our study provides a breakdown of these jobs, helping educators to tailor their teaching to the commonly performed prescribing and patient review jobs.

It is recognised that prescribing by newly qualified doctors requires improvement.^{21,23–24} Many of the commonly prescribed medications identified in this study also feature in the most common prescribing errors list (including opioids, anticoagulation and insulin).²⁵ While these are areas to focus medical education in improving the accuracy of prescribing, further research could assess whether foundation doctors are able to interpret the

Table 1. Distribution of procedural jobs during the out-of-hours period

	Foundation year-1 doctor, n=2,152 (44.4%)	Clinical site practitioner, n=2,699 (55.6%)	Total, n=4,851 (100%)
Cannula, n (%)	350 (18.6)	1,536 (81.4)	1,886 (100)
Re-prescribing, n (%)	1,359 (95.1)	70 (4.9)	1,429 (100)
Take bloods only, n (%)	244 (40.4)	360 (59.6)	604 (100)
Verification of death, n (%)	60 (10.5)	509 (89.5)	569 (100)
Take gentamicin blood only, n (%)	139 (38.3)	224 (61.7)	363 (100)

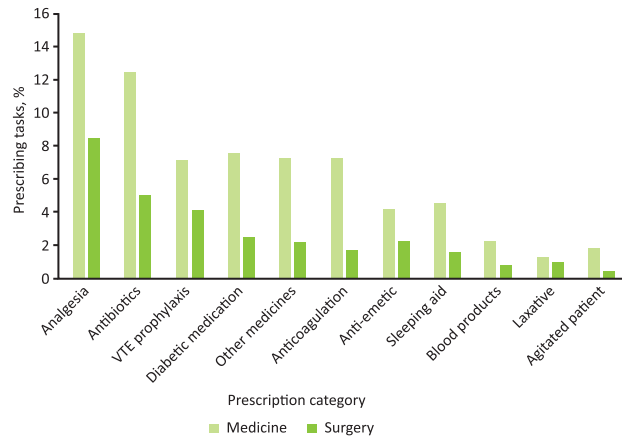


Fig 2. Prescribing tasks during the out-of-hours period. Tasks performed by foundation year-1 doctors and the clinical site practitioner. VTE = venous thromboembolism.

clinical situation and make appropriate prescribing decisions. Clinical safety may also be improved by ensuring that these tasks, including re-writing prescriptions, are performed during the daytime by clinicians familiar with the patient and without the on-call task burden. Indeed, many prescription tasks performed OOHs involve transcribing other doctors' orders.²⁶

The Shape of Training review describes a need for clinicians who can make difficult judgements in complex and complicated situations outside of recognised protocols.¹ The *Foundation Programme Curriculum 2016* emphasises the need for clinical acumen, decision making, team working, professionalism and self-development.²⁷ With the expanding role of AHPs, the foundation doctors' workload may change.^{1,3,8,9} This study demonstrates that jobs can be successfully handed over to

the clinical site practitioner (such as venepuncture, cannulation and verification of death). Expanding the role of the AHPs could enable doctors to focus on developing their role as a decision-maker with more time spent in areas of complex prescribing, patient reviews, patient clerking and imaging interpretation, albeit at the expense of experience in the fundamentals of clinical care delivery. Exploring the benefit that procedural tasks have on the training of a doctor is necessary before fully transitioning to an increased role of the foundation doctor as a decision-maker. Further research should explore holistic care delivery with the overlapping roles of foundation doctors and AHPs through establishing shared competencies and acknowledging the evolving professional identities. Delineating the roles of the doctor and AHP may help foundation doctors achieve the dual goal of education and service provision as set out in official publications, while ensuring appropriate acquisition of skills in suitable roles.^{1,19,24}

We propose that there are three broad categories in which our recommendations fall. First, improving the preparedness of new graduates, determined by the quality of their training. Second, monitoring the appropriateness of tasks that foundation doctors are required to complete. Third, ensuring the evolving roles of AHPs and foundation doctors are clearly understood in relation to one another. The recommendations we make, and any changes they produce, should be assessed to ensure the quality of foundation training and the service provided to patients continues to improve. At a national level, medical schools could incorporate the commonly identified jobs into teaching for students in their final weeks of training. They should specifically focus on the different types of patient reviews identified as well as the commonly encountered prescription categories. Alternatively, these lessons could be incorporated into the orientation weeks provided by foundation trusts for new doctors or the weekly education sessions provided to foundation doctors. Similarly, the national Prescribing Safety Assessment could use this study to guide their question base and ensure that their exam reflects the practice requirements

Table 2. Reasons identified for jobs requesting bloods, gentamicin bloods and cannulation during the out-of-hours period

Bloods except gentamicin, n=2,539 (11.6%); 2,805 reasons identified from 2,461 jobs; no reasons identified for 78 jobs

	Take	Check	Other ^a
Medicine	20.1 %	48.8 %	6.1 %
Surgery	10.2 %	13.2 %	1.5 %
Total	30.3 %	62.1 %	7.7 %

Gentamicin bloods, n=1,047 (4.8%); 1,138 reasons identified from 1,000 jobs; no reasons identified for 47 jobs

	Take	Check	Other
Medicine	22.6 %	31.0 %	4.6 %
Surgery	18.3 %	22.1 %	1.5 %
Total	40.9 %	53.1 %	6.1 %

Cannula, n=1,886 (8.6%); 2,413 reasons identified from 1,814 jobs; no reasons identified for 72 jobs

	Fluids	Antibiotics	Other
Medicine	23.9 %	28.5 %	10.8 %
Surgery	12.4 %	17.4 %	7.0 %
Total	36.3 %	45.9 %	17.8 %

^aArterial blood gas = 2.6 %; monitoring bloods = 2.0 %; not categorised = 2.0 %; blood cultures = 1.0 %.

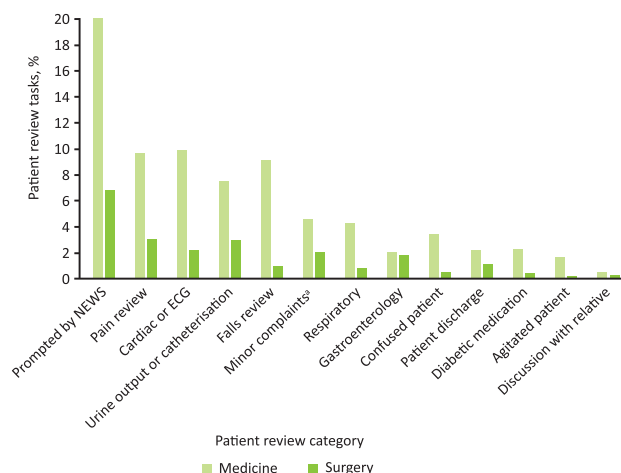


Fig 3. Patient review tasks during the out-of-hours period. Tasks performed by foundation year-1 doctors and the clinical site practitioner.^aRash, itch, swelling, numbness, redness, epistaxis, phlebitis or thrush. ECG = electrocardiography; NEWS = National Early Warning Score.

of a foundation doctor OOHs work. There should also be attempts to establish the right balance between increasing the role of AHPs while understanding the impact that this has on the delivery of clinical care and the quality of training that new doctors receive. At a local level, the appropriateness of tasks could be assessed and adjusted through quality improvement projects focused on reducing the burden of inappropriate tasks during OOHs.

While this is a single centre retrospective study, it is informed by a complete year of data from a large district teaching hospital. The findings may, therefore, be transferable to other teaching hospitals. The study timeframe controls for inter-rotational and seasonal variation. The data do not capture jobs from pagers, referrals in person, cardiac arrest calls or medical emergency team calls, nor does it inform us on the time spent on individual job types. Future research would benefit from exploring the nature of tasks received through these communication channels and could be expanded to include the commonly performed jobs in hours. Additional areas to consider include exploring how FY1 doctors prioritise tasks and the appropriateness of requested tasks.

Conclusion

This study describes the OOHs workload of a foundation doctor from a large district general teaching hospital. It identifies areas to focus medical education at both undergraduate and postgraduate levels, including specific areas within patient review and prescribing jobs. The described workload differs little from research over the past 30 years despite significant changes to the working environment.^{17–19} Following a reduction in doctoral working hours, changes to their working patterns and the increasing workload undertaken by AHPs, there is scope to improve the role of the foundation doctor as a learner and a decision-maker. Delineating the roles of AHPs and foundation doctors within the OOHs period may alter the composition of jobs performed and promote the acquisition of skills required from a training doctor. Prioritising a deeper understanding of patient management and clinical decision making would be more in line with GMC recommendations for training of generalist clinicians. ■

Summary

What is known?

The observed role of the foundation doctor is reported to have changed little over the last 30 years despite recommendations for change to improve their overall workload, training and time for patient contact.

What is the question?

- > What jobs are commonly performed out of hours?
- > How do clinical site practitioners alter the task burden?
- > How can we improve foundation doctor training?

What was found?

- > Foundation doctors commonly performed prescribing, patient reviews and blood-related tasks during the out-of-hours period.
- > Procedural jobs accounted for 22.2% of all jobs, of which, over half were performed by a clinical site practitioner.

What is the implication for practice now?

This article offers insights into specific areas for medical educators to focus their teaching by identifying jobs commonly encountered by foundation doctors working out of hours. Consideration could be given to increasing the role of allied health professionals in supporting with procedural jobs.

Acknowledgements

We would like to thank Mr Ian Daniels for their inspiration and advice in the creation of this manuscript. We would also like to thank Mr Karim Kamara for his help in obtaining the dataset.

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