

Residents' readiness for out-of-hours service: a Dutch national survey

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ABSTRACT

Background: Residents play a crucial role in out-of-hours service. Their perceived readiness for out-of-hours service, however, remains underexposed. This national exploratory study assesses whether or not Dutch residents feel sufficiently prepared to provide out-of-hours service at the time of their first shift, and aims to identify factors influencing perceived readiness.

Methods: An online questionnaire focussing on residents' working conditions was accessible from 21 September to 10 November 2015. Questions targeting perceived readiness for out-of-hours service were presented to all responding medical residents actively involved in out-of-hours service. Residents who felt sufficiently prepared were compared with residents who did not, exploring both individual characteristics and environmental factors.

Results: A total of 960 residents (mean age 32.5 years \pm 3.5, 72.4% female) from over 30 different medical specialties were included. Thirty-six percent of responding residents felt insufficiently prepared to provide out-of-hours service at the time of their first shift. Current junior status ($p = 0.020$), prolonged clinical experience prior to the first shift ($p < 0.001$), targeted training ($p < 0.001$), assessment of relevant skills and competencies ($p < 0.001$), and formal consequences following negative assessment ($p = 0.001$) were positively associated with perceived readiness.

Conclusion: One-third of responding residents felt insufficiently prepared for their first out-of-hours shift. Our results emphasise the need for sufficient time to gain clinical experience as a new graduate, and underline the positive contribution of targeted training and assessment of skills and competencies relevant to out-of-hours service.

KEY WORDS

Acute care, out-of-hours service, readiness for practice, resident

INTRODUCTION

The importance of timely identification and adequate resuscitation of critically ill patients, as a means to save lives and reduce the number of intensive care admissions, has long been established.¹ Residents play a crucial role in this primary assessment, as they are often the first to see the patient.²⁻³ This is certainly the case during out-of-hours service, when bedside supervision is often not immediately available. Concerns have been raised about potential negative effects of this practice on patient safety. Especially junior residents, having limited clinical experience, may well lack the skills and competencies required to deliver out-of-hours service, and acute care in particular, at a high standard.⁴⁻⁷

Several studies have been published discussing the general transition from medical school to clinical practice.⁸⁻¹⁰ Residents' perceived readiness specifically for out-of-hours service, however, remains underexposed. Previous research demonstrates the challenges junior residents face in this context and emphasises that providing a high standard of care to critically ill patients requires more than knowledge and skills.¹¹⁻¹³

The Dutch medical curriculum¹⁴ shows much resemblance to other medical curricula.¹⁵ A three-year bachelor program consisting of mainly problem-based education is followed by a three-year master program incorporating clinical clerkships in a variety of hospital departments and general practice. Generally, clerks will experience increasing levels of responsibility during their training. After finishing their undergraduate education, most graduates will start a residency training program and work under supervision for 3-6 years before practising medicine independently. Traditionally, residents will start participating in out-of-hours service within their first months of clinical practice.

The primary goal of this national exploratory study was to assess whether or not Dutch residents feel sufficiently

prepared to provide out-of-hours service at the time of their first shift. Secondly, we aimed to identify factors influencing perceived readiness.

MATERIALS AND METHODS

This national exploratory study targeted Dutch residents of all levels of experience and different medical specialties, actively involved in out-of-hours service. Residents not involved in out-of-hours service, or not participating in the acute care setting whilst providing out-of-hours service, were excluded. Residents still within their first year of specialty training were labelled junior residents, residents in higher years of specialty training were labelled senior residents.

Data collection

In collaboration with the Dutch Federation of Young Medical Specialists, a link to an online questionnaire was made available from 21 September to 10 November 2015. All active federation members ($n = 2626$, September 2015) received an email inviting them to participate. Also, the questionnaire could be accessed by non-members through the Dutch Federation of Young Medical Specialists website, which was repeatedly announced on social media and in national medical journals.

Questionnaire

The questionnaire contained a total of 194 questions (a combination of previously validated questionnaires and newly composed questions), focussing on residents' working conditions. Fourteen newly composed questions were relevant to this study (*table 1*). Question formats were multiple choice, numerical response, yes or no, or free text. Ethical approval for this study was obtained from the Dutch Society for Medical Education Ethical Review Board (file number: 342).

Data analysis

Current medical specialty was categorised into *surgical*, *non-surgical*, *supporting* and *other specialties*. The total number of months of clinical experience prior to the first out-of-hours shift was categorised into 0 to < 3 months, 3 to < 6 months, 6 to < 9 months, 9 to < 12 months and > 12 months, which corresponds to the quarterly assessment of junior residents, as is common in most first year residency training programs. Using SPSS 22 descriptive statistics, overall baseline characteristics were collected. Residents who felt sufficiently prepared were compared with residents who did not, exploring both individual characteristics and environmental factors. Chi square tests and independent samples T-tests were performed as appropriate. A p-value < 0.05 was considered statistically significant.

Table 1. Questions regarding baseline characteristics and residents' readiness for out-of-hours service

1. What is your year of birth?
2. What is your gender?
3. In what year did you graduate from medical school?
4. Where are you currently employed?
5. Which university medical centre is your hospital affiliated with?
6. What is your current training specialty?
7. What is your current year of specialty training?
8. Do you participate in out-of-hours service?
9. 'As part of the out-of-hours service I provide, I work in the emergency department and/or care for critically ill patients.'
10. At the time of your first shift, did you feel sufficiently prepared to provide out-of-hours service?
11. How many months of clinical experience had you gained as a medical resident, at the time of your first out-of-hours shift?
12. Did you attend a course targeting out-of-hours service prior to your first out-of-hours shift?
13. Were basic skills and competencies assessed prior to your first out-of-hours shift?
14. Were measures taken when residents failed to meet the requirements for providing out-of-hours service?

RESULTS

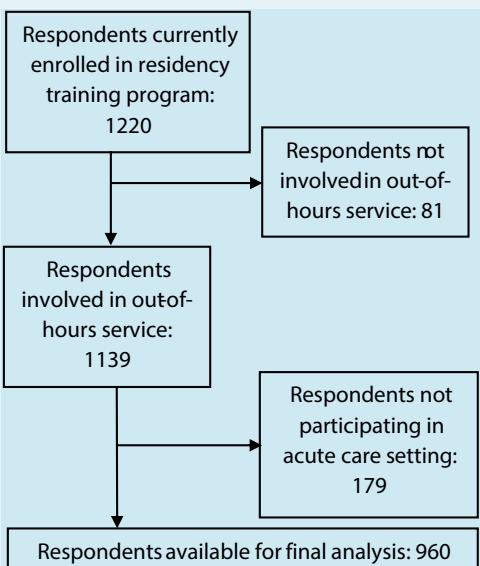
A total of 1220 residents from over 30 different medical specialties responded. After excluding residents who were not involved in out-of-hours service ($n = 81$) or who did not actively participate in the acute care setting whilst providing out-of-hours service ($n = 179$), a total of 960 residents remained for final analysis (*figure 1*).

Baseline characteristics

The 960 residents had a mean age of 32.5 years ($SD \pm 3.5$); 695 residents were female (72.4%, *table 2*). On average, residents had completed their undergraduate medical education 6.7 years earlier ($SD \pm 3.0$). Residents had chosen a surgical specialty in 28.5%, a non-surgical specialty in 57.6%, and a supporting specialty in 9.1%. The remaining 4.8% selected 'other'. Eighteen percent of responding residents were labelled junior residents. Overall, 42.6% currently worked in a university medical centre, 47.3% in a district general hospital, and 10.1% worked elsewhere.

Residents' readiness for out-of-hours service

Of the residents, 614 (64.0%) felt sufficiently prepared for their first out-of-hours shift, 346 residents (36.0%)

Figure 1. Respondents available for final analysis**Table 2.** Baseline characteristics ($n = 960$)^a

Age (mean \pm SD)	32.5 ± 3.5
Gender	
Female	695 (72.4%)
Male	265 (27.6%)
Number of years since graduation (mean \pm SD)	6.7 ± 3.0
Current specialty ^b	
Surgical	274 (28.5%)
Non-surgical	553 (57.6%)
Supporting	87 (9.1%)
Other	46 (4.8%)
Current year of specialty training (mean \pm SD)	3.1 ± 1.5
Junior versus senior ^c	
Junior	173 (18.0%)
Senior	787 (82.0%)
Current site of employment	
University Medical Centre	409 (42.6%)
District General Hospital	454 (47.3%)
Other ^d	97 (10.1%)

^a Data are represented as number of respondents (percentage) unless otherwise indicated.

^b Respondents chose their current specialty from a list of acknowledged medical specialties. Responses were subsequently categorised. Surgical: cardiothoracic surgery, general surgery, ear, nose and throat surgery, neurosurgery, ophthalmology, orthopaedics, plastic surgery, urology, gynaecology/obstetrics. Non-surgical: cardiology, dermatology, internal medicine, paediatrics, geriatrics, pulmonology, gastroenterology, neurology, psychiatry, rheumatology, rehabilitation medicine, emergency medicine, general hospital medicine. Supporting: anaesthesiology, clinical chemistry, clinical physics, clinical genetics, medical microbiology, nuclear medicine, pathology, radiology, radiotherapy, hospital pharmacy. Other: all remaining, not previously specified specialties.

^c Residents within first year of specialty training: junior residents. Residents in higher years of specialty training: senior residents.

^d E.g. rehabilitation centre, mental health institute.

did not (table 3). The two groups were subsequently compared, exploring both individual characteristics and environmental factors. The difference in mean age (32.3 and 32.8 years, respectively), although statistically significant ($p = 0.030$), was minimal. No influence of gender ($p = 0.328$) or chosen medical specialty ($p = 0.139$) was observed. The percentage of junior residents was significantly higher amongst residents who felt sufficiently prepared (20.2%) compared with residents who did not (14.2%, $p = 0.020$). A total of 631 residents (65.7%) were enrolled in out-of-hours service within their first three months of clinical practice. Prolonged clinical experience prior to the first out-of-hours shift, however, was associated with an increased sense of readiness ($p < 0.001$). Furthermore, the percentage of residents who had received additional training targeting out-of-hours service was higher amongst residents who felt sufficiently prepared (46.3%) compared with residents who did not (30.3%). Attending targeted training was associated with a significant increase in perceived readiness ($p < 0.001$). The majority of residents who felt sufficiently prepared had undergone some form of assessment of relevant skills and competencies prior to their first shift (70.7%). This percentage was lower amongst residents who felt insufficiently prepared (52.3%). Overall, assessment was associated with an increased sense of readiness ($p < 0.001$). Finally, formal consequences following negative assessment also showed a positive association with perceived readiness ($p = 0.001$).

DISCUSSION

This study reviewed residents' readiness for out-of-hours service as perceived by 960 Dutch medical residents. While 64% of residents felt sufficiently prepared for their first out-of-hours shift, a disturbing 36% did not. This lack of perceived readiness in acute care amongst junior residents was also noted by Tallentire et al. in a systemic literature review following the implementation of Tomorrow's Doctors in the United Kingdom.^{16,17} Although hardly an ideal surrogate for actual preparedness, perceived preparedness in acute care is known to impact junior residents' behaviour and therefore warrants further consideration.¹¹ We found several factors possibly attributing to the primary outcome in our study population.

The percentage of junior residents was higher amongst residents who felt sufficiently prepared compared with residents who did not. Recent revision of the Dutch medical curriculum could partially explain this observation, similar to how the introduction of *Tomorrow's Doctors* changed perceived readiness for practice in the United Kingdom.^{9,16,17} Studies evaluating the impact of

Table 3. Residents' readiness for out-of-hours service ($n = 960$)^a

Characteristic	Sufficiently prepared (n = 614)	Insufficiently prepared (n = 346)	p-value
Age (mean ± SD)	32.3 ± 3.5	32.8 ± 3.3	$p = 0.030$
Gender			$p = 0.328$
Female	438 (71.3%)	257 (74.3%)	
Male	176 (28.7%)	89 (25.7%)	
Current specialty			$p = 0.139$
Surgical	181 (29.5%)	93 (26.9%)	
Non-surgical	340 (55.4%)	213 (61.6%)	
Supporting	64 (10.4%)	23 (6.6%)	
Other	29 (4.7%)	17 (4.9%)	
Current year of specialty training (mean ± SD)	3.0 ± 1.5	3.4 ± 1.5	$p = 0.001$
Junior versus senior			$p = 0.020$
Junior	124 (20.2%)	49 (14.2%)	
Senior	490 (79.8%)	297 (85.8%)	
Months of clinical experience prior to first shift^b (mean ± SD)	8.1 ± 13.1	2.8 ± 4.7	$p < 0.001$
Categorisation clinical experience prior to first shift			$p < 0.001$
$0 \leq x < 3$ months	357 (63.9%)	274 (86.7%)	
$3 \leq x < 6$ months	53 (9.5%)	23 (7.3%)	
$6 \leq x < 9$ months	11 (2.0%)	1 (0.3%)	
$9 \leq x < 12$ months	30 (5.4%)	8 (2.5%)	
> 12 months	108 (19.3%)	10 (3.2%)	
Targeted training^c			$p < 0.001$
Yes	284 (46.3%)	105 (30.3%)	
No	330 (53.7%)	241 (69.7%)	
Assessment of skills and competencies^d			$p < 0.001$
Yes	434 (70.7%)	181 (52.3%)	
No	180 (29.3%)	165 (47.7%)	
Consequences following negative assessment^e			$p = 0.001$
Yes	537 (87.5%)	274 (79.2%)	
No	77 (12.5%)	72 (20.8%)	

^a Data are represented as number of respondents (percentage) unless otherwise indicated, comparing residents who felt sufficiently prepared (n = 614) to residents who did not (n = 346).

^b The large number of respondents in the ' > 12 months' category amongst residents who felt sufficiently prepared is likely to explain the striking difference in mean and SD.

^c Both nationally and internationally acknowledged courses, as well as local initiatives.

^d E.g. written/scenario exams, clinical observation and/or completion of the Dutch Federation of Young Medical Specialists checklist (checklist addressing skills and competencies required to provide out-of-hours service).

^e E.g. postponement of first shift, additional training, intensified supervision.

Tomorrow's Doctors suggest that recent changes in UK undergraduate training, while improving readiness in some areas, may have neglected acute care.¹⁶ On the other hand, having gained more clinical experience, senior residents could have become increasingly aware of their shortcomings, retrospectively influencing their personal assessment.

Most residents in our study population had their first shift well within their first three months of clinical practice. From an educational perspective, however, prolonging the time to gain clinical experience before engaging in out-of-hours service was associated with an increased sense of readiness. Our results suggest a tipping point somewhere around three months. To the best of our

knowledge, no consensus exists regarding the minimally required number of months of clinical experience for new graduates prior to engaging in out-of-hours service, nor has this topic been previously explored. This subject therefore deserves further attention in the future.

The attendance of courses targeting aspects of out-of-hours care, although hardly common practice in either group, was associated with a higher sense of readiness as well, in accordance with previous findings.^{18,19} Unfortunately, these courses are often optional and/or not easily accessible, due to time-investment issues and costs. Also, courses vary considerably with regards to quality and content, mostly focussing on a specific subset of technical skills. The educational effects of handling the

increased responsibility and 'learning on the job' during out-of-hours service, however, could be a valid reason for continuing current practice^{20,21} incorporating several, if not all, of the CanMEDS competencies²² in one complex task. The ideal timing, content and design of a course targeting out-of-hours service, remain to be determined.

Overall, assessment of relevant skills and competencies was associated with an increased sense of readiness. The checklist for new graduates, as mentioned in *table 3*, was first developed in 2011 and addresses skills and competencies required to provide high-standard care during out-of-hours service. Formal guidelines on how to acquire these skills and competencies to a certain predetermined level, however, are lacking, and the overall familiarity with the checklist seems low.

Finally, consequences following negative assessment, of which the necessity with regards to patient safety should seem self-evident to everyone involved, were associated with an increase in perceived readiness. It is plausible that residents felt reassured, knowing they would not be enrolled in out-of-hours service if their supervising attendants did not judge them competent. This would support the need for a competency-based approach to the timing of the first out-of-hours shift, rather than the now commonly used time-based approach.

There are several limitations to our study. First of all, although all residents in training could participate, only members of the Dutch Federation of Young Medical Specialists were actively approached, possibly introducing bias. Looking at the baseline characteristics, chosen medical specialties, and current site of employment though, our study population appears to be a reliable reflection of the current distribution of medical residents in our country. This survey targeted current working conditions rather than working conditions at the time of the first out-of-hours shift. Organisational aspects of acute care, such as 24/7 coverage of the emergency department by emergency physicians, could therefore not be assessed as contributing factors. Furthermore, asking participants retrospectively about their experiences as a junior resident may introduce recall bias. The tool we used for distribution of our questionnaire and the fact that this study was part of a much larger national questionnaire targeting residents' working conditions, limited the number of questions we could present to our respondents and impacted the question formats we could use. As a result, we did not generate the level of detail needed for more in-depth analysis. Also, considering that this study was carried out within the Dutch health care system, results may not be totally applicable in other contexts. Finally, most literature focuses on acute care in particular, rather than out-of-hours service in general. Although caring for critically ill patients is a substantial part of the out-of-hours

service, this made a comparison between our results and previous literature difficult.

In conclusion, 36% of responding residents felt insufficiently prepared for out-of-hours service at the time of their first shift. Our results emphasise the need for sufficient time to gain clinical experience as a new graduate, and underline the positive contribution of targeted training and assessment of skills and competencies relevant to out-of-hours service. For future research, we recommend conducting a prospective longitudinal study, following new graduates through their first year of clinical practice, with special focus on the first out-of-hours shift. Aside from identifying further challenges junior residents face in this context, this longitudinal study could also shed light on learning processes that occur during out-of-hours shifts, explore the optimal form and duration of clinical preparation for this complex task, and determine the best form of guidance during the first out-of-hours shift. Finally, considering our findings regarding training and assessment, we propose designing an educational program incorporating training and subsequent assessment of all skills and competencies relevant to out-of-hours service.

ACKNOWLEDGEMENTS

We would like to thank Geert Bouwmans for his contribution to the statistical analysis section. Also, we would like to thank the responding residents for their willingness to invest their time to help us explore this important topic.

DISCLOSURES

Conflicts of interest: none declared.

Source of funding: a research grant was made available to the corresponding author by the Department of Research in Learning and Education, Radboud university medical center Health Academy, Nijmegen, the Netherlands. This contribution is the result of a collaboration between the Radboud university medical center and *De Jonge Specialist* (the Dutch Federation of Young Medical Specialists).

REFERENCES

1. McQuillan P, Pilkington S, Allan A, et al. Confidential inquiry into quality of care before admission to intensive care. *BMJ*. 1998;316:1853-8.
2. Tallentire VR, Smith SE, Skinner J, Cameron HS. Exploring patterns of error in acute care using framework analysis. *BMC Med Educ*. 2015;15:3.
3. Van Asbroeck PJ, Heiser J, Leto R, Capizzi M, Mohrhardt C, Carenzo L. Emergency Medicine training and working conditions in Europe: a joint

- EuSEM young doctors – European Junior Doctors Survey. *Eur J Emerg Med.* 2015;22:445-7.
4. Smith GB, Poplett N. Knowledge of aspects of acute care in trainee doctors. *Postgrad Med J.* 2002;78:335-8.
 5. Frost PJ, Wise MP. Early management of acutely ill ward patients. *BMJ.* 2012;345:e5677.
 6. Richardson LC, Lehnboim EC, Baysari MT, Walter SR, Day RO, Westbrook JI. A time and motion study of junior doctor work patterns on the weekend: a potential contributor to the weekend effect? *Intern Med J.* 2016;46:819-25.
 7. Contri E, Bonomo MC, Costantini G, et al. Are final year medical students ready to save lives in Italy? Not yet. *Emerg Med J.* 2017;34:556. Epub 2017 Jun 21.
 8. Prince K, Van de Wiel M, Van der Vleuten C, Boshuizen H, Scherpbier A. Junior doctors' opinions about the transition from medical school to clinical practice: a change of environment. *Educ Health (Abingdon).* 2004;17:323-31.
 9. Cave J, Woolf K, Jones A, Dacre J. Easing the transition from student to doctor: how can medical schools help prepare their graduates for starting work? *Med Teach.* 2009;31:403-8.
 10. Cameron A, Millar J, Szmidt N, Hanlon K, Cleland J. Can new doctors be prepared for practice? A review. *Clin Teach.* 2014;11:188-92.
 11. Tallentire VR, Smith SE, Skinner J, Cameron HS. Understanding the behaviour of newly qualified doctors in acute care contexts. *Med Educ.* 2011;45:995-1005.
 12. Mache S, Bernburg M, Baresi L, Groneberg D. Mental health promotion for junior physicians working in emergency medicine: evaluation of a pilot study. *Eur J Emerg Med.* 2016 Nov 22.
 13. Monrouxe LV, Grundy L, Mann M, et al. How prepared are UK medical graduates for practice? A rapid review of the literature 2009-2014. *BMJ Open.* 2017;7:e013656.
 14. Ten Cate O. Medical education in The Netherlands. *Med Teach.* 2007;29:752-7.
 15. Wijnen-Meijer M, Burdick W, Alofs L, Burgers C, ten Cate O. Stages and transitions in medical education around the world: clarifying structures and terminology. *Med Teach.* 2013;35:301-7.
 16. Tallentire VR, Smith SE, Skinner J, Cameron HS. The preparedness of UK graduates in acute care: a systematic literature review. *Postgrad Med J.* 2012;88:365-71.
 17. General Medical Council. Tomorrow's Doctors – Outcomes and standards for undergraduate medical education. 2009.
 18. Min AA, Stoneking LR, Grall KH, Spear-Ellinwood K. Implementation of the Introductory Clinician Development Series: an optional boot camp for Emergency Medicine interns. *Adv Med Educ Pract.* 2014;5:275-9.
 19. Rogers GD, McConnell HW, de Rooy NJ, Ellem F, Lombard M. A randomised controlled trial of extended immersion in multi-method continuing simulation to prepare senior medical students for practice as junior doctors. *BMC Med Educ.* 2014;14:90.
 20. Hanson JT, Pierce RG, Dhaliwal G. The new education frontier: clinical teaching at night. *Acad Med.* 2014;89:215-8.
 21. Illing JC, Morrow GM, Rothwell nee Kergon CR, et al. Perceptions of UK medical graduates' preparedness for practice: a multi-centre qualitative study reflecting the importance of learning on the job. *BMC Med Educ.* 2013;13:34.
 22. Frank JR (Ed). 2005. The CanMEDS 2005 Physician Competency Framework. Better standards. Better physicians. Better care. Ottawa: The Royal College of Physicians and Surgeons of Canada.