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Chapter 5

Integrated and implicit: How residents learn CanMEDS roles by participating in practice.

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Abstract

Context
Learning outcomes for residency training are defined in competency frameworks such as the CanMEDS framework, which ultimately aim to better prepare residents for their future tasks. Although residents’ training relies heavily on learning through participation in the workplace under the supervision of a specialist, it remains unclear how the CanMEDS framework informs practice-based learning and daily interactions between residents and supervisors.

Objectives
This study aimed to explore how the CanMEDS framework informs residents’ practice-based training and interactions with supervisors.

Methods
Constructivist grounded theory guided iterative data collection and analyses. Data were collected by direct observations of residents and supervisors, combined with formal and field interviews. We progressively arrived at an explanatory theory by coding and interpreting the data, building provisional theories and through continuous conversations. Data analysis drew on sensitising insights from communities of practice theory, which provided this study with a social learning perspective.

Results
CanMEDS roles occurred in an integrated fashion and usually remained implicit during interactions. The language of CanMEDS was not adopted in clinical practice, which seemed to impede explicit learning interactions. The CanMEDS framework seemed only one of many factors of influence in practice-based training: patient records and other documents were highly influential in daily activities and did not always correspond with CanMEDS roles. Additionally, the position of residents seemed too peripheral to allow them to learn certain aspects of the Health Advocate and Leader roles.

Conclusions
The CanMEDS framework did not really guide supervisors’ and residents’ practice or interactions. It was not explicitly used as a common language in which to talk about resident performance and roles. Therefore, the extent to which CanMEDS actually helps improve residents’ learning trajectories and conversations between residents and supervisors about residents’ progress remains questionable. This study highlights the fact that the reification of competency frameworks into the complexity of practice-based learning is not a straightforward exercise.
Introduction

Medical specialists help residents learn the roles and behaviours of their specialty during postgraduate training by allowing them to participate in their patient care practice. In order to direct residents’ learning in this complex setting, professional roles are defined in competency frameworks such as the CanMEDS framework.1,2 By focusing on the ultimate outcomes of physician performance, competency-based medical education aims to produce professionals who are more responsive to the needs of society.3-5 The CanMEDS slogan ‘Better standards. Better physicians. Better care’ illustrates its implicit assumption that assessing competencies will improve physician performance.2 Within an increasingly influential paradigm in which training programmes are considered to be accountable to society, competency frameworks are commonly advocated as assessment standards for professional performance.6-9 On the understanding that assessment drives learning,10 a great deal of valuable effort has been directed towards the development of instruments to assess the performance of residents. How residents are expected to learn to take on the CanMEDS roles, however, is not specified in the framework. Little is currently known about how residents actually learn CanMEDS roles in practice-based training.

There is a well-established understanding of the significance of practice-based learning for residents. Residents gradually take on increasingly important roles in a patient care practice, with support from their supervisors.11,12 Many CanMEDS roles, such as those of Health Advocate, Leader, Communicator and Collaborator, are considered roles that can be learned only by participating in the workplace.13,14 A growing body of literature about practice-based learning is beginning to unravel important, often tacit, learning processes.15-17 Teunissen et al. describe how clinical activities are the starting point for residents’ learning, followed by processes of ‘interpretation’ and ‘construction of meaning’, during which interactions with supervisors and others are important.18 Social theories of learning, particularly that of communities of practice, provide us with an understanding of the significance of social participation for practice-based learning.19 Communities of practice theory holds that in practice-based learning, the practice itself has the most influence on what is learned, rather than any outside definition of competence. The way CanMEDS roles are enacted in practice would therefore be of major importance to how residents learn them. Whether competency frameworks such as that of CanMEDS actually add anything to practice-based learning may therefore largely depend on how they are adopted in clinical practice by residents and their supervisors.
Although we were unable to find any studies that have explored specifically how the CanMEDS roles and the behaviours they promote come to life in practice-based learning outside assessment situations, some studies have revealed certain conceptual issues regarding assessment that may be transferred to daily practice-based learning. Despite intensive efforts, the development of quantified, standardised measures of all aspects of physician performance has turned out to be difficult to realise.20-23 Assessment instruments often remain unreliable, are unable to distinguish between the roles and fail to achieve a balanced representation of the competency framework.5, 24 A possible explanation for these struggles is that supervisors have different, more complex conceptions of competence than those described in competency frameworks. In a previous study, we found that supervisors defined CanMEDS roles more in terms of their socio-historical backgrounds, personal experiences and beliefs than in terms of how the roles are described on paper.25 Another study showed that supervisors have a complex and holistic view of competence, in which individual CanMEDS roles cannot be distinguished from one another.22 Supervisors view residents’ competence in more complex ways than the ‘simple linear addition’ of performance in different CanMEDS roles.23 It is possible that these differences in conceptions of competence affect residents’ practice-based learning, although it remains unclear how.

This grounded theory study aimed to develop an explanatory theory of how competency frameworks, such as CanMEDS, influence daily practice-based learning.

**Methods**

**Conceptual Orientation**

This study approached practice-based learning from a socio-cultural perspective, which acknowledges learning as the outcome of social processes.26,27 Wenger’s theory of communities of practice applies well to the complex setting of residents’ practice-based learning as judged by researchers’ increasing use of it in this domain.19, 27-30 In communities of practice theory,19 learning is described as a result of social participation in a professional community’s practice. A community of practice is described as a group of people who have developed a shared practice over time by working and learning together.

Communities of practice theory19 provided sensitising insights for the constructivist grounded theory methodology adopted for this study. These related to identity formation, negotiation of meaning and the shared regime of competence of a community of practice. The courses of learning followed by residents in their participation in different departments and hospitals shape their identities as medical specialists and give meaning to medical practice and procedures. This shared practice is embodied in a regime of competence that usually remain tacit. A competency framework that defines professional
roles can be considered as a formal description of the ‘ideal’ regime of competence of a clinical community. Although this formal description is not part of the socio-cultural history of that community, it is a potentially influential artefact. How CanMEDS roles are given expression in a clinical workplace depends on a process called negotiation of meaning, through which community members make sense of an artefact of the community for their specific context.

**Study design**

For this grounded theory study, data were collected and analysed iteratively. Qualitative data were collected through direct observations of daily interactions between supervisors and residents, brief field interviews and in-depth formal interviews. These methods align particularly well with communities of practice theory, given that it was developed on ethnographic and anthropological foundations.

**Context**

Data for this study were collected at internal medicine residency programmes in the Netherlands. In 2009, the Dutch Internists Association initiated the use of CanMEDS as a foundation for training programmes on a national level. This was an important shift from a focus that concentrated solely on knowledge about diseases to one that incorporates generic competencies into the training programme. The association expected this innovation to ease the transition from graduate training and to better prepare internal medicine residents for their future careers. Learning goals, teaching methods and assessments are prescribed for each CanMEDS role.

This study was performed in the internal medicine departments of three hospitals: a university medical centre, and two affiliated teaching hospitals. Patients were treated by residents under the supervision of attending internists on medical wards, medium care units, emergency rooms and in out-patient clinics. Around 20–25 patients in a ward were allocated to two or three residents under the supervision of one attending physician.

The boundary of a community of practice, which defines who is a member and who is not, is typically dynamic and implicit. For this study, a community of practice was described as a team of clinical supervisors, residents, interns, nurses and patients on a ward or unit, who collaborated together in the practice of patient care. Clinical supervisors represented the core group in communities in which residents were active participants. Interns and nurses were more peripheral participants. Patients, who came and went frequently, had a more transactional relationship with these communities of practice.
Research team

The team comprised medical education researchers (NR, ANJR, MAvdW, ADCJ, TD), internal medicine specialists with extensive experience in supervising residents (ROBG, JCCB, TD) and a social learning theorist (EW-T). ROBG, JCCB and ADCJ have all been closely involved in the design and implementation of CanMEDS-based curricula. ROBG and JCCB were two of the designers of the CanMEDS-based postgraduate internal medicine training programme that was the context of this study. TD had a more critical stance towards the utility and necessity of competency frameworks in the team’s scholarly discussions. The founder of communities of practice theory, EW-T, used his expertise in social learning and his relative unfamiliarity with clinical workplace settings to discuss the meaning of our data critically. The observers comprised an educationalist (NR) and a psychologist (MAvdW), both of whom were PhD students in the field of medical education, which supported an open-minded approach towards the clinical workplace and particular attentiveness to situations influential in residents’ learning.

Recruitment of participants

The study was introduced to residents and supervisors with an email and a short presentation informing them about the study. Participants were asked to volunteer. Additional participants were recruited by follow-up contact with the wards. Initially, supervisors who were indicated by residents as having special influence on their learning were approached to participate. Participants who were likely to offer a contrasting perspective to preceding participants were purposely selected by theoretical sampling until the sample was judged to be sufficient. For instance, the initial group of participating supervisors were relatively unfamiliar with the CanMEDS framework; therefore, supervisors who were more aware of CanMEDS were actively recruited. To establish a balanced participant group, supervisors and residents from various internal medicine-based specialties, such as nephrology and endocrinology, and with different levels of experience were recruited.

Data collection

**Direct Observations**

Participants were observed on duty in their wards, emergency rooms and out-patient clinics. The observers dressed in hospital uniform. The observers used the marginal-participant technique, which meant they tried to blend in and to avoid influencing the social setting as much as possible. They made detailed notes of the following to facilitate inductive analysis: actions; outlines of conversations; positioning and set-up of rooms; body language; facial expressions, and emotions. These detailed notes allowed for the analysis of, for instance, participants’ verbal messages in conjunction with their
body language, tone of voice and facial expressions. The observers did not know the residents or supervisors they observed. NR and MAvdW started by individually observing different wards and discussing their findings. In the course of sharing their notes after several days of observations and reflecting on their impressions, they found enough similarity in what they had observed for just one observer (NR) to continue the study. The iterative process of discussing notes and collecting data helped to identify preconceptions reflexively and to put the findings in a broad context, and informed further data collection.

**Field interviews**
At suitable moments during the direct observations, the observers conducted field interviews by asking clarifying questions (e.g. about what a certain procedure meant), reasoning questions (e.g. about why a supervisor intervened in a conversation), and circumstantial questions (e.g. about how the researcher’s presence influenced the situation). They made notes about field interviews during or shortly after the interviews. The researchers were careful not to interfere with social processes by only asking questions during field interviews in quiet one-on-one situations, such as when walking with a participant to a meeting or another ward.

**Formal interviews**
An intensive interview technique was used for the formal interviews with residents and supervisors. During the first half of the interview, the researcher asked broad, open questions to allow the participant to speak freely (e.g. ‘How do you experience your combined tasks of working as a physician and learning as a resident?’ and ‘How are your supervisory tasks facilitated?’). More directed questions about CanMEDS and practice-based learning were asked during the second half of the interview (e.g. ‘What, if anything, do you know about CanMEDS?’ and ‘How do you use CanMEDS when you are supervising residents?’). The researchers brought examples of the observational data into the interview (e.g. ‘Could you reflect upon what happened during rounds, when your two supervisors told you to be more concise?’). The interviews lasted approximately 60 minutes. Interviews were audio-recorded and transcribed verbatim.

**Analysis**
Data analysis started during the first fieldwork period and continued up to the writing of the results section. An inductive approach to data analysis was adopted in three successive steps: familiarisation with the data; open coding to identify domains, and axial coding to identify connections between the domains and themes within them. Once the coding scheme had been refined, the complete dataset was analysed for relationships between themes and to explore the reasons for discrepant data. This study benefited from the research team’s varied backgrounds in the analysis of the rich data and
in the process of making sense of the cultural characteristics of the clinical workplace. Discussions about what recurring patterns in the data meant, whether there were any tensions or interconnections between interpretations of situations, and how they related to previous understandings took place among team members. These discussions were informed by the research team’s professional experiences and insights from communities of practice theory into residents’ identity formation, the clinical workplace community’s shared regime of competence and how, mostly supervisors, negotiated about the meaning of CanMEDS. We sought to improve the study’s rigour through constant comparison of our interpretations and coding. An explanatory theory was developed gradually through these continuous discussions.

Results

Participants

The practice-based training setting was observed for a total of 136 hours. Twelve residents and 14 supervisors were included in the study. Their subspecialties, experience and years spent in training are presented in Table 1.

Table 1. Participant Characteristics

<table>
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<tr>
<th>RESIDENTS</th>
<th>Gender</th>
<th>Experience</th>
<th>Observed</th>
<th>Field interview</th>
<th>Formal interview</th>
<th>Specialty</th>
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Presentation of results

We identified three main aspects in our dataset: residents’ activities; interactions, and organisational structures. We now describe and illustrate these with extracts from the interviews and field notes.

CanMEDS and residents’ activities

The professional attitudes and behaviours advocated in the CanMEDS framework were ubiquitous in clinical practice. Residents typically combined aspects of multiple CanMEDS roles in their clinical activities. Consistent with the caveat noted by the initiators of CanMEDS that the roles are intertwined with one another, the roles were always closely integrated with one another. Health Advocate rarely occurred without Communicator and Medical Expert. Collaborator, Leader and Professional were generally intertwined with the Scholar and Medical Expert roles.

When residents encountered problems that fell within the roles of Leader (formerly Manager) and Health Advocate, their practice did not usually go beyond identifying the problem. More advanced aspects of these roles, such as ‘initiating improvement and responding to needs of patients beyond the clinical environment’,

1 seemed to be beyond their reach. This is illustrated by the fragment below, in which the resident notes an issue in the Health Advocate role that her supervisor also seems unable to resolve:

A patient, released from the ward, explained that she had to walk back to the refugee camp she lived in, about 10 kilometres away, because she did not have money for a taxi. The resident reasoned that this was potentially harmful for the patient. She asked her supervisor whether the hospital could facilitate her return home. They reckoned there was no general arrangement for this.

Residents’, and possibly even supervisors’, positions within the hospital structure seemed too peripheral to allow them to take actions representing advanced aspects of the Leader role. The following fragment shows how a resident was required to draw on such an aspect of the Leader role:

A weekly multidisciplinary meeting was scheduled at the ward. A resident noticed that it was inconvenient that the nurses were not present because they had the most recent knowledge of the patients’ status, and policy was being set based upon outdated information. He discussed this with the nurses, but they said they were too busy to attend. Later, during a formal interview, his supervisor stated that he had also tried to solve this problem, but had not succeeded so far.
CanMEDS and interactions

Interactions with other members of the community of practice, especially peers and supervisors, helped residents to define what they had learned from the activities in which they participated. These interactions did not explicitly reflect the CanMEDS roles, but generally aligned well with the attitudes and behaviours advocated in them.

*During a patient encounter, a patient told lively stories about herself. Afterwards, in the hallway, the resident said: ‘Interesting stories... Why didn’t you interrupt her?’*

*Supervisor: ‘Did you notice she told me about school in 1904 and how she met her husband in 1911? That was before she was born. Many residents ask patients to tell them where they are to test whether they are confused. But that can be uncomfortable for patients. Just letting patients tell their stories is often very revealing.’*

As this example illustrates, CanMEDS roles usually remained implicit during supervisory interactions, even when the interactions were explicitly aimed at educating residents. The names of CanMEDS roles were rarely mentioned outside formal assessment situations: we heard a role being named only twice during the 136 hours of observations. In the fragment below, a supervisor discusses behaviours underlying multiple CanMEDS roles (Collaborator, Leader, Medical Expert) without mentioning them:

*A standard test indicated a bacterial infection. Further tests were needed to identify whether they had caused an infection. The resident said he wanted to admit the patient and treat the bacteria before the results returned. He asked a microbiologist for advice.*

*Supervisor: ‘The patient’s urogenital system looks fine, but the microbiologist does not know that, and you obliged him to advise. These bacteria are everywhere, and the patient is feeling well. At this stage, you should not request help from microbiologists or pharmacists; that just needlessly increases the care costs. You have to make an educated guess based on the patient’s status. They are not in charge of the patient; you are!’*

Neither did the supervisors use the CanMEDS roles to discuss the residents’ performance with one another. Supervision was often handed over from one supervisor to the next in rather general language (e.g. ‘She will not create a lot of work for you’ or ‘She really needs to know her facts better’). Other forms of discourse, such as evidence-based medicine and shared decision making, were, by contrast with the CanMEDS roles, part of the shared language and seemed more influential in practice-based learning.
CanMEDS and organisational structure

The residents’ practice-based learning took place in an environment that was primarily focused on patient care. This focus at times caused friction between the various CanMEDS roles. For example, schedules seemed to be arranged mostly to serve the hospitals’ personnel planning, but impacted on practice-based learning. When residents were scheduled to attend at a ward for longer periods, the residents’ studies and conversations with their supervisors were in-depth and concerned aspects of the various CanMEDS roles. However, when residents moved from one department to the next more quickly, attention shifted to what was most necessary and was often limited to the role of Medical Expert, discarding the others.

During a field interview, a resident said:

‘I am scheduled at this ward for only one week. I am in survival mode right now. I barely have time to read up the patient records, let alone do any other work besides seeing patients. I just hope I will not make any serious mistakes in my diagnoses or treatments.’

Certain organisational artefacts seemed to impact on practice-based training. Electronic patient records were of particularly significant influence in terms of which CanMEDS roles were discussed. During daily supervisory interactions, residents and supervisors would typically sit at a computer and go through patient records. The design of these records guided these conversations and thus implicitly defined which roles were discussed. The three hospitals in the study used different patient record systems, and hence the conversations between supervisors and residents were structured differently at each hospital. Certain patient record systems appeared to narrow the conversations strictly to Medical Expert, whereas others led to the incorporation of a wider range of roles. Checklists for certain procedures or meetings also influenced these specific interactions. In one of the hospitals, all meeting rooms had a checklist on the table. This checklist listed topics to be discussed for each patient (e.g. diagnosis, home situation, whether or not cardiopulmonary resuscitation was necessary). Meetings (i.e. multidisciplinary meetings, handovers) at which this checklist was used generally covered more CanMEDS roles than meetings without such a checklist.
Discussion

Principal findings and meaning

This study has shown that, in the settings studied, the CanMEDS framework did not really inform residents’ practice-based learning outside formal evaluation moments. In line with theory and previous studies, residents learned to take on professional roles through participating in activities and interactions with members of the community of practice.\textsuperscript{18,19} During these activities and interactions, CanMEDS roles were carried out in an integrated way and were not addressed explicitly. This is an important finding because being explicit about what is expected of learners is considered to facilitate learning.\textsuperscript{28,36} Furthermore, the language of the CanMEDS roles was not adopted in the clinical workplace. At the same time, considerable differences between what types of behaviour individual supervisors expected from residents were ubiquitous. The lack of a shared language seemed to hamper the development of a regime of competence for resident performance, which is one of the key features of a community of practice.\textsuperscript{19} This is an interesting finding as providing supervisors with a common language in order to reduce their cognitive load during teaching obligations is considered a major possible benefit of competency frameworks.\textsuperscript{37} In addition, this study has shown that although the clinical workplace is a very rich learning environment, certain organisational aspects, such as personnel planning and scheduling of meetings, occasionally interfere with residents’ learning as it is described in the CanMEDS framework.

Theoretical interpretation

The CanMEDS framework can be regarded as a social artefact developed in its creators’ community of practice, which has travelled to other communities around the world. How the framework informs residents’ practice-based training seems largely to depend on how it is adopted in the community. By negotiating the meaning of the CanMEDS roles, members of the community position it within their shared regime of competence. The extent to which the CanMEDS roles informed comprehensive practice-based training seemed rather limited within the communities of practice observed. The CanMEDS framework did not appear to guide the residents’ activities or supervisory interactions outside formal assessment situations.

The names of the CanMEDS roles did not provide members of the community with a shared language in which to discuss resident performance, which may make the roles less useful than expected. This may be because the processes of negotiation of meaning could be facilitated better, but it may also relate to the intertwined nature of the roles. Even in the simple and brief activities we observed, residents were required to draw upon aspects of multiple roles at the same time. This makes
determining where a certain role ends and where others begin rather unclear, which may make them less useful for explicit teaching.

CanMEDS roles sometimes seemed to represent descriptions of roles within an ideal world, which did not align well with the reality of clinical practice. Although most activities and interactions were in line with the practice described in the CanMEDS framework, the residents’, and perhaps even the supervisors’, roles within the hospital organisation seemed too peripheral to allow actions that reflect advanced behaviours falling within, especially, the Leader and Health Advocate roles. The physicians’ agency seemed to be more limited by hospital structure in those roles, compared with what is described in the framework. Furthermore, this ‘ideal’ practice described by the CanMEDS framework seemed to contradict other informative, organisational elements within the community. CanMEDS roles were only one of many factors that influence practice-based training.

**Strengths and limitations**

The data for this study were collected through a rigorous combination of direct observation and in-depth participant interviews. Observational research is, however, often criticised for being prone to observer effects. There is a risk that the researchers’ presence may have affected the behaviour of our participants. By investing in the relationship with our participants while interfering with the social situation as little as possible, the researchers aimed to mitigate effects on participants’ behaviour.38

Communities of practice theory provided a useful analytical lens for this study. The concepts of identity, regime of competence and negotiation of meaning helped us to study reflexively how CanMEDS informs residents’ practice-based learning. A boundary of communities of practice theory in this study may be that it does not explicitly signify assessment as being highly influential for practice-based learning, whereas within the medical education domain assessment is generally accepted as one of the most powerful learning tools. The interpretation of practice-based learning would have been more assessment-oriented if we had taken on a more behaviouristic orientation. The use of sensitising insights from communities of practice theory directed us towards meaningful interactions between residents, supervisors and residents, and patients and residents, which are considered highly influential for residents’ learning.

The professional but non-medical background of the observers helped them to approach practice-based learning with open minds and to ask questions about aspects that others might have taken for granted. By profiting from our various professional backgrounds and perspectives on the data during interpretations, we feel it is reasonable to draw the conclusions we have arrived at based on the data obtained. Rather than presenting generalisable results, we aim to present professional situations that
others will recognise and we believe our critical interpretations will contribute meaningfully to the ongoing debate about outcomes-based residency training.

Although the findings presented in this paper apply to all three of the contexts observed, there is no guarantee that they are transferable to other settings. We aimed to increase the study’s rigour by incorporating multiple sites. This was limited, however, to internal medicine departments in a Dutch context. It is therefore up to the reader to assess how the theoretical constructs arrived at might apply to his or her specific setting. It is conceivable that some of the findings are typical of all clinical settings, but our experience indicates that the organisational context, a very local factor, is of major importance in practice-based learning.

**Implications for practice and future research**

In order that the possible benefits of competency frameworks can be maximised, they must be aligned better with comprehensive clinical practice. It appears that the terms of the CanMEDS framework need to better reflect the reality of clinical practice. At the level of interactions between supervisors and residents, this means that the adoption of CanMEDS roles as the basis for a common language in which to discuss competence may make tacit messages more explicit. At the level of supervisors’ discussions amongst themselves, a common language might facilitate negotiation of meaning and deliberate supervisory handovers, and therefore increase continuity in residents’ learning. At the hospital level, the impact that organisational aspects such as schedules and patient records have on resident learning should not be underestimated. Aligning these organisational aspects with the CanMEDS framework may allow more beneficial effects to be derived from competency-based training. In the context of the CanMEDS roles being used as an educational innovation, careful observation of the clinical practice of a specific context and associated adjustments of the names of the roles may be beneficial. Furthermore, this study’s findings regarding the integration of CanMEDS roles in clinical practice may contribute to the empirical underpinnings of the implementation of entrustable professional activities.39 The use of a comprehensive clinical activity as the basis for assessment, rather than a combination of multiple CanMEDS roles, might indeed better align with the reality of practice-based learning.
Conclusion

A competency framework, in this case CanMEDS, seems to be only one of many artefacts that influence how residents learn in a community of practice. Although many supervisory interactions were in line with the presumed intentions of the initiators of CanMEDS, the framework does not appear to guide supervisors or residents. It is therefore questionable whether the implementation of CanMEDS-based training has caused a shift in practice, or whether the CanMEDS framework simply fitted a practice that was already changing in that direction. Although CanMEDS may be an appropriate tool for the assessment of residents’ professional performance, it seems less useful to guide comprehensive practice-based training.

Contributors

NR led the design of the study, the collection and analysis of data and the writing of the paper. ANJR contributed significantly to the design of this work, the gaining of ethical approval, the analysis and interpretation of data and to the drafting of the paper. TD contributed to the study design, provided solid methodological and theoretical insights, and contributed to the interpretation of data as they were translated into English. EW-T provided important theoretical insights in the designing of the study and the interpretation of data. MAvdW contributed to the study design, the gaining of ethical approval, and to the collection and analysis of data. JCCB contributed to the methodological design of the study and the interpretation of data. ROBG provided the context in which this study was performed and contributed to its methodological design, and to the analysis and interpretation of data. ADCJ supervised the first author throughout the entire process, contributed to the design of the study and the obtaining of ethical approval, and provided feedback during the iterative process of data collection and analysis. All authors contributed to the critical revision of the paper and approved the final manuscript for publication. All authors have agreed to be accountable for this work.

Ethical Approval

This study was approved by the ethical review board of the Netherlands Association for Medical Education [2015/502]. Informed consent was obtained from all participating and observed residents, supervisors, nurses and patients, and confidentiality was guaranteed.

Conflict of interest

The authors report not conflict of interest.
References


