Young doctors' problem solving strategies on call may be improved

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ABSTRACT

INTRODUCTION: The first year following graduation from medical school is challenging as learning from books changes to workplace-based learning. Analysis and reflection on experience may ease this transition. We used Significant Event Analysis (SEA) as a tool to explore what pre-registration house officers (PRHOs) consider successful and problematic events, and to identify what problem-solving strategies they employ.

MATERIAL AND METHODS: A senior house officer systematically led the PRHO through the SEA of one successful and one problematic event following a night call. The PRHO wrote answers to questions about diagnosis, what happened, how he or she contributed and what knowledge-gaining activities the PRHO would prioritise before the next call.

RESULTS: By using an inductive, thematic data analysis, we identified five problem-solving strategies: non-analytical reasoning, analytical reasoning, communication with patients, communication with colleagues and professional behaviour. On average, 1.5 strategies were used in the successful events and 1.2 strategies in the problematic events. Most PRHOs were unable to suggest activities other than reading textbooks.

CONCLUSION: SEA was valuable for the identification of PRHOs' problem-solving strategies in a natural setting. PRHOs should be assisted in increasing their repertoire of strategies, and they should also be helped to "learn to learn" as they were largely unable to point to new learning strategies.

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The transition from medical school to the job as a physician is a challenge, but also an opportunity for personal and professional growth [1]. Many studies have reported on first-year graduates' self-assessed competence with regard to preparedness for medical practice [2-5]. In general, pre-registration house officers (PRHO) are reported to feel inadequately prepared for their job, especially with regard to clinical skills. Measures which may allow recently graduated physicians to feel better prepared for practice have involved the improvement of undergraduate medical education through induction programmes [6], preparation courses [7, 8] and have allowed medical students to shadow PRHOs [9].

One way to learn effectively from experience is to reflect on ones' practice, and activities to promote reflection are increasingly being built into medical education [10]. In an experimental study, Mamede et al even concluded that "… reflective practice may particularly improve diagnoses in situations of uncertainty and uniqueness, reducing errors" [11]. Significant Event Analysis (SEA) is well established in primary care in the United Kingdom as a collective learning method involving structured analysis and reflection on a significant event (an event thought to be significant in the care of the patient or the conduct of the patient) [12]. SEA has been reported to contribute to building self-confidence and personal esteem and to have the potential to make professional practice more satisfactory [13]. Using SEA in a hospital setting, O' Neill et al asked PRHOs to reflect on specific examples of challenging clinical events and found the SEA useful for exploring what people find difficult as well as what they find meaningful in their work [14].

We therefore decided to use the SEA method as a tool for promoting reflection and learning amongst PRHOs following night calls, because on-call duty is often considered especially challenging for the newly-graduated physician. The method was applied on an individual basis where senior house officers (SHO) led their younger colleagues, the PRHOs, through a systematic analysis of two events chosen by the PRHO.

MATERIAL AND METHODS

Context

The study was performed in a six-month period in a general internal medicine ward at a university hospital. The ward has 123 beds, and approximately 4,500 patients were admitted with an average of 25 patients per day in the study period. The team on call between 6 p.m. and 8 a.m. consisted of two PRHOs, one SHO and two consultants. The latter were on call from their homes from 9 p.m.

Study subjects

During the study period, all PRHOs in the department were invited to participate. Participation was voluntary,

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FIGURE 1

Interview guide form to be filled out by the pre-registration house officers.

1. Please select one of the successful patient cases from the night call.

Diagnosis: _____

A: What happened?
B: What made it a successful event?
C: How did you contribute to this?

2. Please select one of the problematic patient cases from the night call.

Diagnosis: _____

A: What happened?
B: What made it a problematic event?
C: What could you, in retrospect, have done differently?

3. What will you prioritise to do before your next call?

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but everybody joined. A total of 27 PRHOs (interviewees) and 22 SHOs (interviewers) participated in the SEA interviews. A PRHO is a newly graduated physician with no clinical experience, whereas a SHO has from 1-4 years' experience.

Data collection
Prior to the initiation of the study, the participants attended a training session where the SEA method was explained. Data were collected by interviews of approximately 15-20 minutes, in which the SHO interviewed the PRHO using a structured interview guide (**Figure 1**). During the interview, the interview guide form was filled out

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FIGURE 2

The diagnostic categories proposed by the pre-registration house officers in successful and problematic events.

■ Successful events   ■ Problematic events

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by the participants. The form consisted of two major categories relating to the two significant events that were exclusively chosen by the PRHO. In addition, the interviewees were asked: What actions should you prioritise before your next call? The interviews were held immediately following a night call, but with no extra time reserved for the activity. This meant that some interviews were cancelled due to work load and others were interrupted due to either the PRHO or the SHO being called away. When the latter happened, the interview forms were finished by the PRHO after the shift had ended.

Data analysis
Three researchers (BE, JM & AMM) categorized the significant events chosen by the PRHOs. The diagnoses proposed by the PRHOs were chosen as a basis for this categorization process.

Three researchers (BE, JM & KA) reviewed the forms and used an inductive approach to develop categories that accounted for the problem-solving strategies applied by the PRHOs.

Finally, the categories describing what the PRHOs would prioritise before the next call were identified.
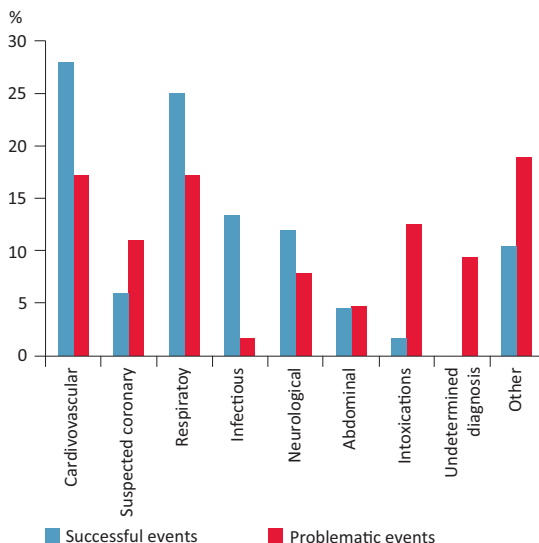
Trial registration: not relevant.

RESULTS
The 27 PRHOs (19 females, eight males) participated in 70 interviews addressing 68 successful events and 64 problematic events. The PRHO, on average, participated in 2.5 interviews (range: 1-7). This represents approximately 40% of the total number of possible interviews.

Figure 2 shows the distribution of successful and problematic events, respectively, across nine diagnostic groups. Cardiovascular, respiratory, infectious and neurological diseases were more frequent among the successful events, while suspected coronary disease, intoxications and undetermined diagnoses were more frequent among the problematic events.

We identified five problem-solving strategies used by the PRHOs: Non-analytical reasoning, analytical reasoning, communication with patients and relatives, communication with colleagues, nurses and other health staff, and professional behaviour. Non-analytical reasoning was an almost immediate understanding of the clinical problem leading to a quick diagnosis. Analytical reasoning, on the other hand, was based on a slower diagnostic approach, using algorithms or following some other systematic strategy. The PRHOs often associated good history taking and thorough patient information with successful patient encounters: "Good communication with the patient. At the end I made a good summary of the result of my investigations – I think he un-

derstood". Poor communication gave rise to problematic events. This was often associated with poor history taking due to e.g. impaired consciousness or language barriers: "Poor contact. The patient was seriously ill and had bad eyesight and hearing. Poor communication. I was uncertain of the correct treatment". Successful events were also ascribed to good communication with co-workers or to situations where the PRHO could take on the role of teacher for a medical student. Similarly, problematic events were attributed to poor communication with colleagues from other departments or nurses "The nurse was not convinced by the plan. Maybe I should have asked for her opinion". Finally, professional behaviour included aspects of how the PRHOs handled an event successfully and included elements such as self-confidence, responsibility and emotions.

The distribution of the five strategies are shown in **Figure 3**, and in **Table 1** we have unfolded the problem-solving strategies further to exemplify each of the strategies in terms of contents and distribution. On average, PRHOs used 1.5 strategies per successful event (range 1-3) and 1.2 strategies per problematic event (range 1-2).

When asked what knowledge-gaining activities in relation to the problematic event to prioritise before the next call, 40% of the PRHOs had no suggestions, 40% would study text books, 8% would follow up on the patient involved in the critical event and 12% had various suggestions such as discussions with senior colleagues.

DISCUSSION

This study showed that the PRHOs apply different problem-solving strategies when they face significant clinical events. We identified five such strategies in the PRHOs' descriptions of their own contributions to solving problems in chosen events. Two of these, the non-analytical and analytical reasoning strategies, are often described in the literature under various labels [15]. Non-analytical reasoning (often called pattern recognition) is described as a quick, effortless strategy as opposed to the slower and more conscious analytical reasoning strategy. The participants in this study actually had words for both types of reasoning processes that resemble the descriptions in the literature. For non-analytical reasoning, they used words such as "immediately recognised" and "exactly like the books".

For analytical reasoning, they used terms such as "followed the guidelines meticulously". Although the sources of our behaviour are described as being largely unknown to us [16], the PRHOs were able to describe their problem-solving strategies in a recognisable way. Two of the remaining three strategies were categorized as communication and one as professional behaviour. The extent to which these strategies were used could be

FIGURE 3

Problem-solving strategies applied by the pre-registration house officers in successful and problematic events.
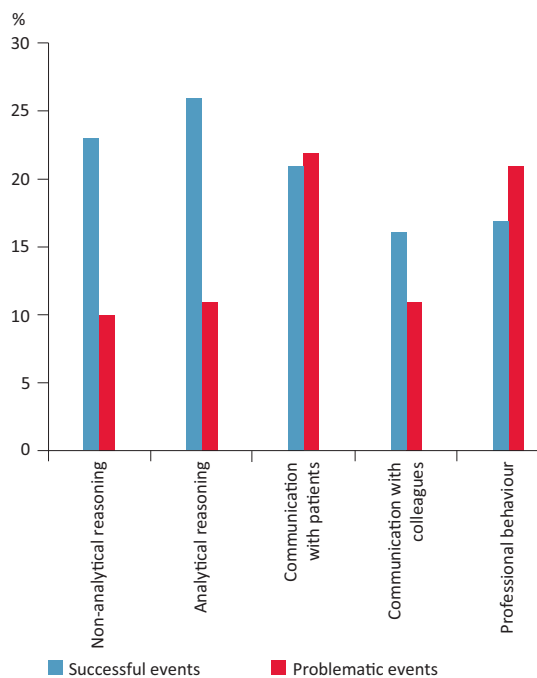
explained by the naturalistic nature of our study. In the real world, as opposed to the laboratory, reasoning and decision-making are made in contexts involving a large number of factors, such as the doctor's relationship with the patient, the patients' relatives and other healthcare professionals, and each has an important influence on both the decisions that are made and how they are carried out [17].

When communication with patients was problematic, the most frequent cause was either a patient with impaired consciousness (11 cases), or cases in which the patient or his relatives were perceived as having negative attitudes (six cases). This calls for attention to how communication is trained. Our data suggest that the curriculum should not only include training in communication with the cooperative, well-educated patient, but also the angry, combative, psychotic or delirious patient, as well as diagnosing and treating unresponsive patients when verbal communication is not possible.

Poor communication with co-workers was reported in a number of problematic events. None of these events involved colleagues from the PRHOs' own department. This may be due to the fact that the interviewer in our setting was the SHO who had been on the same duty and belonged to the same department. While this intimacy is essential for learning and debriefing, it makes the SEA unsuitable for resolving inter-collegial conflicts

within a department as anonymity is not possible. The reported conflicts with doctors from other departments involved lack of help (intensive care) or disagreement about diagnosis. It may be inappropriate to let the youngest doctor communicate with consultants in other departments because of their lack of clinical experience.

Our data also raises concern about the tendency to see a patient as "mine" or "yours", instead of adopting a more team-oriented approach between different departments.

Good communication between the PRHO and nurses was often associated with successful patient en-

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📋 | **TABLE 1**

Problem-solving strategies in successful and problematic events: descriptions of subcategories (with number of events).

Strategy	Successful patient events	Problematic patient events
Related to non-analytical reasoning	*Recognized immediately:* Correct diagnosis (n = 11) Correct treatment (n = 10) Both correct diagnosis and correct treatment (n = 2)	*Unable to recognize* The correct diagnosis (n = 9) The seriousness of the illness picture (n = 1)
Related to analytical reasoning	*Good*: History taking and physical examination (n = 13) Continuous evaluation of patients (n = 10) Knowledge about departmental procedures (n = 3)	*Insufficient* History taking (n = 2) Clinical skills (n = 4) Knowledge about departmental procedures (n = 3) Knowledge about treatment procedures (n = 2)
Communication with patients and relatives	*Good relationship and communication with:* Patient (n = 15) Relatives (n = 3) Patient and relatives (n = 3)	*Breakdown in communication with patient due to* Impaired consciousness Confusion (n = 2) Dementia (n = 1) Alcohol and/or drug abuse (n = 4) Psychosis (n = 1) Unresponsiveness (n = 3) *Negative attitudes* Dissatisfaction with prior treatment (n = 1) Rejecting help (n = 2) Aggressive behaviour or anger (n = 3) *Others* Immigrant background (n = 1) Hearing deficiency (n = 1) Unclear picture of symptoms (n = 1) *Breakdown in communication with relatives who* Exert pressure for more action (n = 1) Take over communication for the patient (n = 1)
Communication with colleagues	*Good relationship, communication and cooperation with:* Nurse staff (n = 4) Senior doctors from same department (n = 8) Doctors from other departments (n = 2) Students (n = 2)	*Breakdown in communication with* Nurses who: Did not agree with plan (n = 1) Did not want to assist a junior doctor (n = 2) Exerted pressure for action (n = 1) Radiograph (n = 1) Ambulance personnel (n = 1) Doctors from: Same department: lack of involvement (n = 2) Other departments: angry (n = 1), disagreeable (n = 1), unwilling to help (n = 1)
Related to professional behaviour	*The patient situation was handled professionally because:* There was enough time to handle patient situation sufficiently (n = 8) The junior physician assumed the responsibility (n = 5) The junior physician was able to adopt a "bird's-eye view" (n = 4)	*Unprepared to handle emotions related to* Dying patient (n = 2) Patient refusing help (n = 1) Patient who did not recover (n = 1) Unable to prioritise, think ahead, handle overload, take on leadership or adopt a "birds view" (n = 9) Insufficient knowledge about organisation (n = 2) Blocking or hesitating when action was required (n = 2) Did not trust own dispositions or insecurity (n = 4) Lack of sleep (n = 1)

counters, whereas the number of problematic events attributed to poor communication with nurses was low. It is striking that none of the PRHOs identified nurses as a possible source for learning. Nurses probably constitute a potential source of learning for the PRHO that could be improved and exploited more systematically.

In the present study, we found an uneven distribution of diagnoses belonging to the successful and problematic events, respectively. Bearing in mind that the diagnoses were attributed to the cases by the PRHOs themselves, several possible explanations for this difference exist. The fact that diagnoses relating to the cardiovascular, respiratory and neurological system were more frequent in successful events may be owed to recent emergency care skill training which the PRHO group had undertaken as prior studies had showed that such skills were lacking. Clinical medicine textbooks tend to present disease entities as being simpler than real-life presentations. In combination with the contextual presentation of real-world problems as described above, this could argue further for the necessity to train PRHOs for handling patients with more complex symptom presentations.

Interestingly, the PRHOs had few suggestions for how to learn from their experiences apart from additional reading. Book-reading is the most important strategy for succeeding in medical school and likely comes to mind first when asked. At best, reading books will supply the PRHO with more declarative knowledge. Because they have just left medical school, what PRHOs probably need more is procedural knowledge. Overall, what they likely need most is help in "learning to learn" through practice. Learning was, indeed, one of the most important secondary features sought after when SEA was planned for this study. Our aim was to stimulate learning among the PRHOs by involving them in systematic and critical analysis and getting them to reflect on their experiences.

We also think that the emotional component of an event could be favourably incorporated into the SEA as emotional issues concerning the handling of difficult patients (Table 1) were often mentioned. This would be in accordance with many recommendations on reflective activities in medical education [10]. Our use of SEA involved very low costs (little time used and no additional personnel resources). Nor did it require system changes (it was integrated into the on-call job). The method, however, could be improved by allowing "protected time". Although the SHO's received theoretical training in SEA, they received no supervision by trained interviewers and were therefore probably not fully able to challenge the PRHO by posing good questions or by providing alternative perspectives on the learning strategies.

SEA was valuable for the identification of PRHOs' problem-solving strategies in a natural setting.

There were several possible biases in the study. We studied learning strategies by looking at the written explanations of the PRHOs. This resulted in diagnoses as suggested by the PRHO and not in official diagnoses. We also specifically asked for two events that the PRHO found to be significant and therefore received a selective picture of the panorama of decision-making involving PRHOs during the period of study. The inclusion of all 27 PRHOs who were employed in the department allowed us to study the use of SEA by a large number of participants, but it also limited our ability to follow changes over time or to identify more consistent patterns in individual problem-solving. Also the number of interviews with the PRHOs varied from one to seven.

CONCLUSION

The SEA was a valuable tool for gaining insight into PRHOs' problem-solving strategies in a natural setting, and we identified five such strategies. Patients with "undetermined diagnoses" as found by the PRHOs were more often associated with a problematic event. This suggests that more attention should be given in the future to prepare the PRHOs for handling of patients with more complex symptom presentations. More emphasis should also be put on helping PRHOs to "learn to learn" as they were largely unable to point to new learning when faced with a problematic event.

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