

LEARNING IN (INTER)ACTION

Implicit and explicit EBM learning
processes at the GP workplace

Lisanne Welink

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PhD thesis, Utrecht University, the Netherlands

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Learning in (inter)action

Implicit and explicit EBM learning processes at the GP
workplace

Leren in (inter)actie

Impliciete en expliciete EBM leerprocessen in de huisartspraktijk
(met een samenvatting in het Nederlands)

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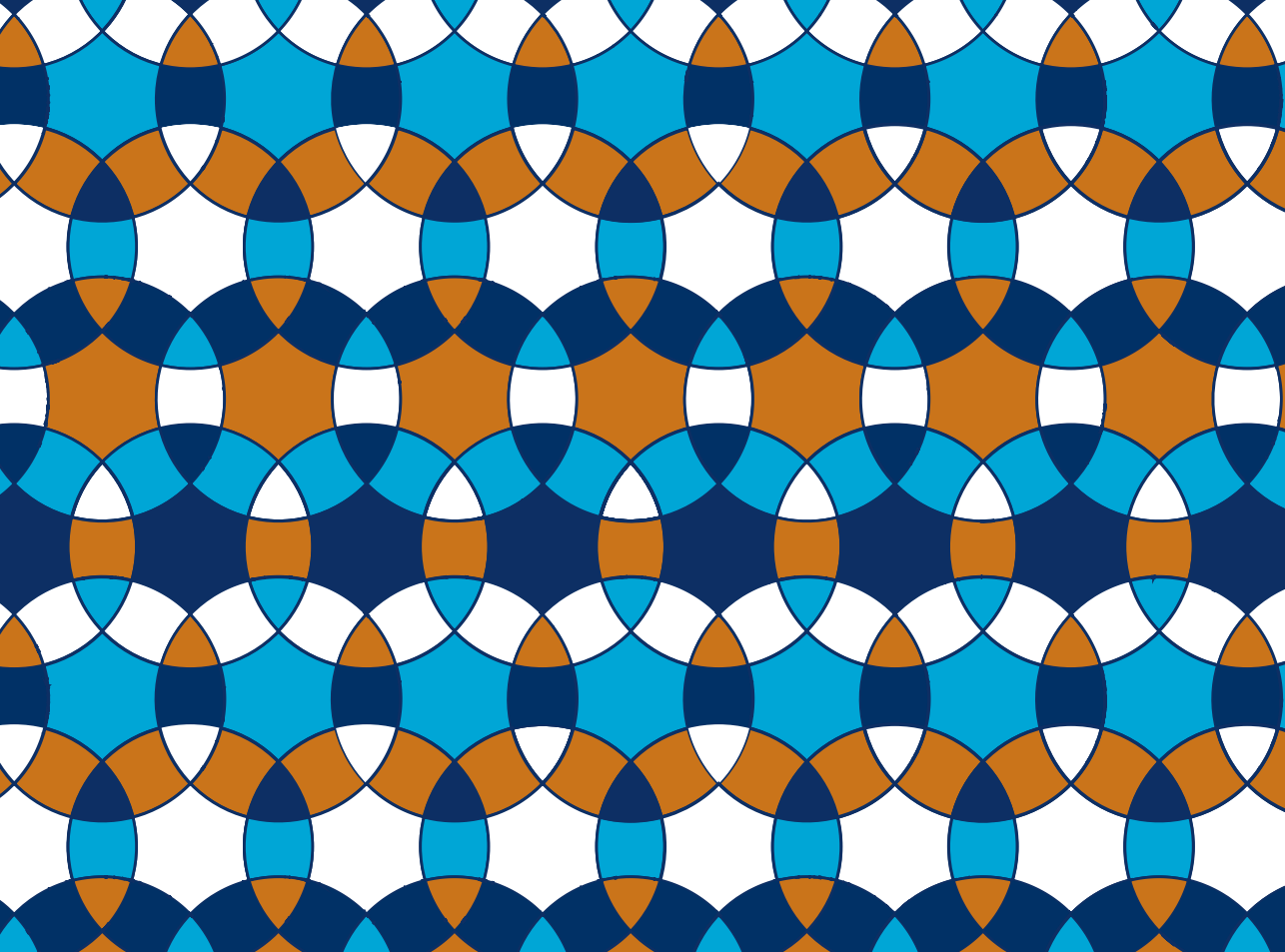
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General introduction

For years and years, medicine has relied mostly on the experience and traditions of physicians when giving care to patients. However, starting during the nineteenth century, modern medicine shifted towards quantification and objectification, in which scientific knowledge became more and more important. Especially in the period after the Second World War statistics and epidemiology slowly became accepted in the medical field. (1) However, a gap was visible between science and clinical practice. So, to make sure that this scientific knowledge was most beneficial for individual patients and led to safer and more consistent care, the so-called EBM-movement arose. This movement advocated that modern medicine should not only rely on scientific proof and the best available evidence coming from randomised controlled trials and observational studies, but also combine this with clinical expertise and the patient's preferences when making decisions for individual patients (figure 1). (2)

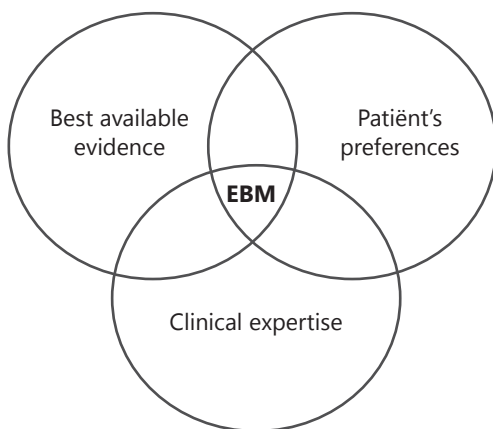


Figure 1: Evidence-based medicine

Following this scientific paradigm, also in Dutch general practice guidelines were developed to guide general practitioners (GPs) during their daily clinical practice: the Dutch Association of General Practitioners, *Nederlands Huisartsengenootschap (NHG)* in Dutch, released the first guideline on diabetes in 1989. (3) Nowadays, more than hundred guidelines exist to guide daily practice.

The definition of evidence-based medicine (EBM) that is cited most often is David Sackett's from 1996: *"EBM is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients"*. (4) Next to this nowadays almost famous line, Sackett already added in his manuscript that external evidence cannot and also should never replace clinical expertise and

should only have an informing function when combining expertise and the patient's choice in the local context. However, how to exactly apply all these elements into practice was not really described nor emphasized within the EBM movement, leading to misconceptions and terms like 'cookbook' medicine when physicians were asked on their attitude towards EBM. (5–10) A counter movement, pleading for the 'reform' of EBM, emphasized the holistic approach that physicians should take regarding EBM and the equivalent role of expertise and (the context of) the patient. (11–13) Similar thinking can be seen when looking at teaching and learning of EBM.

Learning evidence-based medicine

How to teach (and practice) EBM is defined in the Sicily Statement from 2005, in which five steps were identified: ask, acquire, appraise, apply and assess. (14) First, a clinical problem or uncertainty should be translated to an answerable question (ask). As a next step, relevant evidence from the literature should be systematically acquired and afterwards, appraised for its validity, clinical relevance and applicability. The obtained results need to be applied in practice, keeping clinical expertise and the patient's preferences in mind. Lastly, an evaluation of performance should be held to assess effect and results.

EBM-teaching and learning during undergraduate and postgraduate medical education follows these five steps. However, emphasis lies on teaching the first three steps during formal educational moments. (15–21) Results from educational research have been variable on the effects of EBM-teaching: it was demonstrated that certain skills such as searching for evidence and clinical appraisal of literature could be improved, but a change within actual EBM behaviour – judiciously weighing the three EBM-aspects while making decisions for individual patients – at the workplace was debated. (22–24) Simultaneously with general discourse that EBM should be practiced more holistically and with more focus on context and on the patient, it was advocated that teaching and learning of EBM should also focus more on the last two steps: how to apply and evaluate EBM. (12) Since applying EBM should preferably be done at the workplace, focus within formal EBM education shifted towards '*clinically integrated training*'. A range of educational concepts was rolled out, ranging from formal assignments that are closely embedded within clinical practice to using clinical examples instead of random statistics during the formal educational sessions. (16,22) To measure the effect of such educational interventions, randomised controlled trials or more observational designs have been carried out, but none of these could demonstrate big changes in actual behaviour at the workplace, due to ambiguous outcomes. (18,23–25) For instance, Kortekaas et al compared stand-alone EBM training at the GP training institute only

with integrated EBM training using a randomised controlled trial. No improvement on EBM-behaviour, attitude or knowledge was found. (26)

However, it is not clear whether these formal educational concepts are unable to teach and learn EBM-behaviour, or that the research designs that were used were inappropriate to capture the effect of an educational intervention that is probably very dependent on contextual factors such as teachers, attitude and supervisors. We expect that insight into current workplace-based learning processes, gained from qualitative research methods, is necessary to develop future educational designs that align more with the workplace and stimulate EBM-behaviour during daily clinical care.

Informal workplace-based learning

When looking at the theories and principles regarding workplace-based learning in general, a lot of the grounding for this thesis comes from the work of Michael Eraut. His typology of informal (also called non-formal) ways of learning at the workplace, distinguishing implicit learning, reactive on-the-spot learning and deliberative learning, was used most in this thesis when investigating EBM learning opportunities at general practice. (27,28) This typology can be seen at a spectrum: deliberative learning occurs when time at the workplace is specifically set aside for a learning purpose, while reactive learning happens near-spontaneous and unplanned, often in response to daily activities. Implicit learning, being the least conscious form of learning, takes place without awareness of learning at the time it takes place. Implicit learning is one of the ways in which tacit knowledge is gained. (28)

Learning tacit knowledge

Especially the role of tacit knowledge within EBM learning is interesting. Eraut elaborates on the role of tacit knowledge and concludes that tacit rules and insights can underpin intuitive decision-making of physicians. This also seems to be the case for learning how to practice and apply EBM. The rationalist view of early EBM-advocates, assuming a single, knowable reality that can be grasped using universal rules and guidelines, seems to be too simple. Ethnographic research of Gabbay and Le May revealed the role of so-called *mindlines* within practicing EBM: 'collectively reinforced, internalised, tacit guidelines' that are constructed through informal networking with colleagues, brief reading of literature or guidelines and other interactions at the workplace with for instance patients. (29) General practitioners, but also other clinicians, seem to rely more on such mindlines than on explicit evidence or conscious considerations of options and possibilities. This is in contrast with what the EBM-movement advocated, and might explain why it is so

difficult to change actual EBM-behaviour at the workplace using formal education. Wieringa and Greenhalgh (2015) reflected on this contrast and concluded: *“When considering how knowledge spreads, the concept of mindlines requires us to go beyond the constraining notions of ‘dissemination’ and ‘translation’ to study tacit knowledge and the interactive human processes by which such knowledge is created, enacted and shared.”* (30)

In this thesis, we try to grasp how both tacit and more explicit EBM knowledge is created by investigating different ways of workplace-based learning and using different research methods. We decided to focus on two ways of learning in particular: observational learning and learning through discussions during learning conversations.

Observational learning

To grasp informal and possibly implicit learning processes at the workplace, attention should be given to the role of observational learning. Learning through observation is a powerful way of learning, since it can lead to socialisation: learners observe how other persons work and execute skills or tasks, making them conclude that this is ‘how it works around here’. (28) Observational learning has in particular been investigated within cognitive psychology, focusing for instance the learning of motor skills, in which beneficial effects of observing someone else have been described. (31) Within medical education, observational learning has also mostly been described when referring to the acquisition of clinical skills. (32,33) However, here the problem regarding practicing EBM looms: since applying EBM is a skill that happens largely within the physician’s head, actual EBM behaviour is proven to be difficult to observe. (34) Following this, observational learning of EBM can also be a risk: when the correct ‘why’ of the decision cannot be constructed or recognised, the observer might infer erroneous personal constructs or knowledge, which could lead to an incorrect application of the observed EBM behaviour in the future. (35) To get a better view on the role of observational EBM learning during daily clinical practice, it is important to investigate to what extent EBM considerations of supervisors and trainees can be recognised through observation and whether there are aspects that influence this recognition.

Learning conversations in general practice

Another way of learning at the workplace is learning through dialogues between supervisor and trainee. Informal workplace-based dialogues can be held ‘on the spot’, in for instance the corridor or during coffee breaks, leading to reactive learning on specific cases or problems that occurred during daily practice. (36) However, also more intentional dialogues can be held in which informal workplace-based learning gets a deliberative character. A specific form of workplace-dialogues are the learning conversations that are common practice within GP specialty training

in the Netherlands and in Belgium. Learning conversations are regular meetings between trainee and supervisor, in which time is set aside to discuss for instance medical topics, assignments from the training institute or personal development. Supervisors and trainees get guiding instructions from the training institute on how to perform learning conversations, but the instructions leave much room to shape these deliberative learning moments in their own way. The agenda for the learning conversation is often set up by the trainee, following the principles of self-directed learning and common principles on clinical supervision. (37–39) However, when a supervisor wants to discuss knowledge gaps or decides to address a specific topic, this is also possible.

Surprisingly, this form of deliberate yet informal learning in general practice has been rarely studied, even though it is an important part of daily learning of GP trainees. Stolper looked at the way that diagnostic reasoning is discussed in what he called 'tutorial dialogues' (40), and also more theoretical research describes that learning conversations at the workplace might have a combined function in debriefing and giving feedback (41,42) , but more empirical research on what opportunities learning conversations can offer for specific learning is lacking.

Bidirectional learning

In this thesis, we choose to define the daily discussions between trainee and supervisor as 'learning conversations' instead of 'tutorial dialogues'. The term 'tutorial dialogue' implies that someone needs to be 'tutored' and that learning is one-sided. However, we hypothesize that the daily discussions can be beneficial for both supervisor and trainee regarding EBM learning, since previous research showed that workplace-based learning is not only applicable to trainees or students, but also happens in general practitioners, especially when collaborating with others. (43)

Researching teaching and learning

Research paradigm

Different approaches can be taken to investigate learning, which can be traced back to different ontological and epistemological views on how to look at the nature of reality and the nature of knowledge. One not being better or more appropriate than the other: all can be complementary to each other in order to get a more complete view on processes regarding teaching and learning. However, to interpret the results presented in this thesis properly, it is important to elaborate on the theoretical and philosophical assumptions underlying this research. (44,45)

The positivist paradigm has been dominant over the years, since this is, historically, tradition within the medical field and also in medical education research. Epistemologically, positivism looks at knowledge as something that is objective and neutral, leading to research outcomes that are generalizable and that can be measured. Research methods within a positivist paradigm are aimed at capturing learning by measuring differences in learning outcomes using tests, trials or questionnaires. (46) Previous research on the effect of EBM training and teaching is mostly done from this positivist paradigm.

However, in thesis we used a more interpretative paradigm. Both constructivist and social constructivist approaches were used to capture a deeper understanding of learning and try to incorporate the role of tacit knowledge, emphasizing that *'knowledge is not something that is mechanically acquired, but actively constructed within the constraints and offerings of the learning environment'*. (47) Using the epistemological view that knowledge is something that is subjective and constructed, we aimed to capture learning and learning opportunities using methodology that elaborates on perceptions and interpretations of participants. (46,48)

Considerations regarding methodologies

Following the above, choices on methodologies used are consciously made. Starting point is the aim for a deeper understanding of current EBM learning at the workplace, combining different methodologies that can complement each other. To obtain such understanding, going back to the actual processes happening at the workplace is an inevitable first step, which is done using video recordings of consultations and learning conversations. This cannot be seen as ethnography, since there is no participant observation involved, but by recording the current, natural situation of learning and working at general practice we try to get a view on what actually happens regarding workplace-based EBM learning. (45)

Since we expect that tacit knowledge plays an important role within EBM learning at the workplace, we use the methodology of video-stimulated interviewing. By doing so, we hope to help participants elicit and reflect on their knowledge and learning processes, get less socially desirable answers and in this way deepen the interview. (49–54) We use video-stimulated interviewing in different ways, since, as Van Braak (2018) described, video elicitation interviewing can be aimed at different goals. To gain insight into the underlying cognitive processes that take place during actual behaviour, 'recall' is what is aimed for. However, 'reflection' can also be a goal to get a better view on the interpretation or understanding of a phenomenon by the participant. (49) Within this thesis, both approaches on video stimulated interview are used.

By conducting interviews, perceptions of and reflections on learning can be investigated. However, since we identified learning opportunities during the recorded learning conversations that were not mentioned by the participants during the interviews, we decided to add a more descriptive, positivistic approach in **Chapter 5**, in order to complement the interpretative approaches from **Chapters 2-4**. The methodology of Conversation Analysis (CA) might feel somewhat contradictory to the constructivist approach that was taken in other chapters, since it aims to describe in detail what happens when people talk, on the assumption that language is a co-construction and happens according to fixed patterns. (55–58) However, by doing so, a more complete view on learning and explicit learning opportunities could be given.

Objective and outline of the thesis

In this thesis, the complex process of workplace-based learning of EBM in general practice is explored. The overarching goal is to gain a better understanding on current EBM learning processes in general practice of both trainees and supervisors, so that future educational programs can be better tailored to already existing learning processes at the workplace.

Chapter 2 focuses on the benefits and pitfalls of observational learning at the workplace by investigating the extent to which GP supervisors and trainees recognise each other's EBM behaviour through observation. Furthermore, aspects that influence such recognition are identified.

In **Chapter 3**, perceptions of GP trainees on their EBM learning processes during learning conversations are described, in order to investigate the opportunities that such conversations already offer and can give for workplace-based learning.

Chapter 4 builds onto this by looking at opportunities for bidirectional EBM learning. GP supervisors are asked to elaborate and reflect on the position that their own EBM learning takes within current learning conversations. In this way it is explored whether, and to what extent, supervisors also perceive to learn EBM from their trainees at the workplace.

Within **Chapter 5**, a different approach is taken by exploring the language used by trainees and supervisors during learning conversations. The methodology of Conversation Analysis (CA) is used in order to not only explore how EBM learning is perceived (such as in **Chapter 3** and **4**), but to also investigate how supervisors and trainees deal with knowledge asymmetries when talking with each other. By doing so, an even more complete view on bidirectional learning possibilities can be given.

Chapter 6 takes a first leap into translating the insights from previous chapters into practice. Educational strategies to improve EBM-learning and –teaching at the workplace are gathered and synthesized, using focus groups with medical stakeholders that are aware of our previous results. Moreover, these strategies are made practical and concrete by listing ideas how to actually implement this into daily practice.

These research articles are critically discussed in **Chapter 7**, containing a short summary of the main results, reflections on these results and methodologies and giving directions for future research and medical education on EBM.

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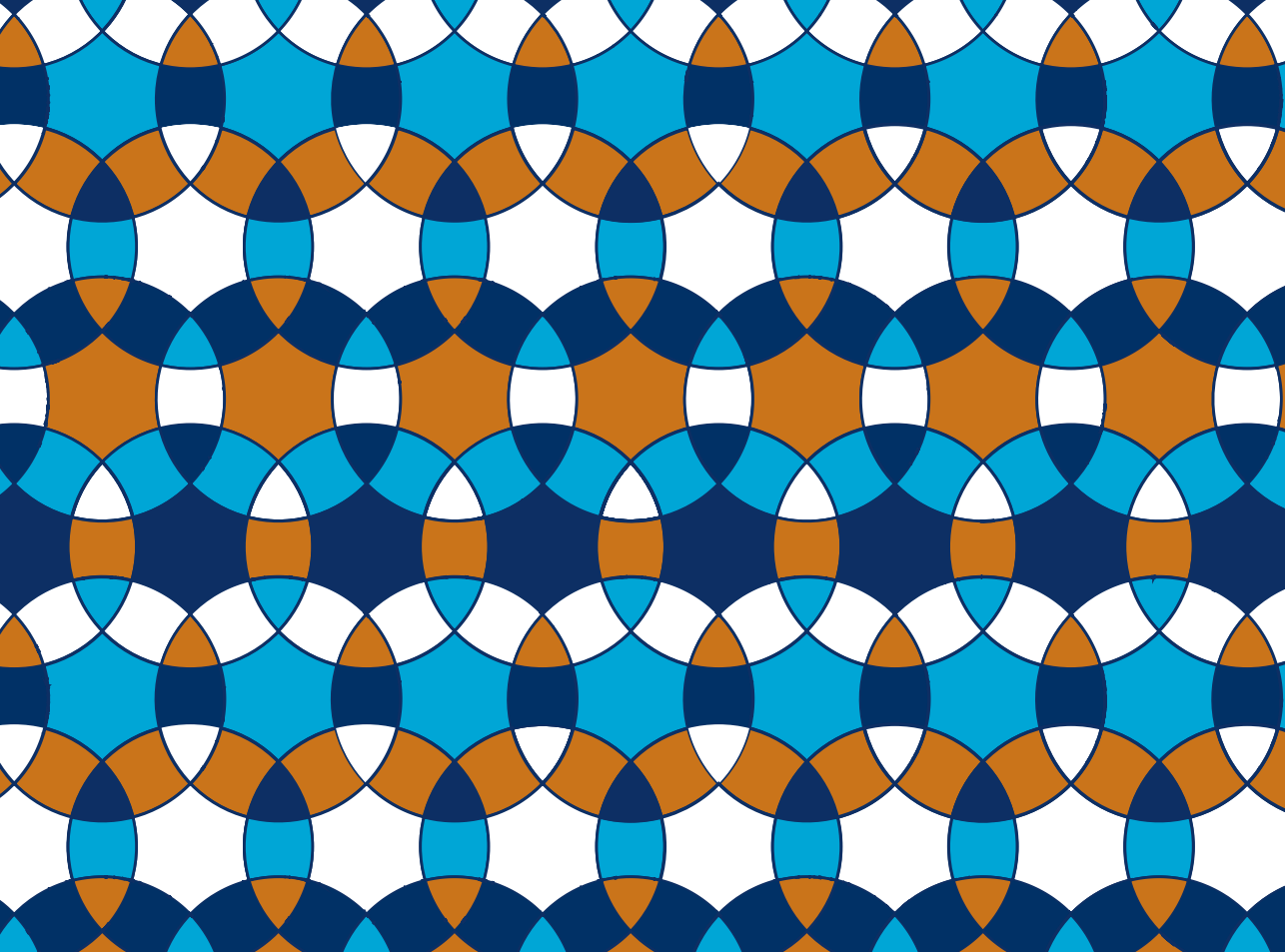
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Applying evidence-based medicine in general practice: a video-stimulated interview study on workplace-based observation

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Abstract

Background

Evidence-based medicine (EBM) in general practice involves applying a complex combination of best-available evidence, the patient's preferences and the general practitioner's (GP) clinical expertise in decision-making. GPs and GP trainees learn how to apply EBM informally by observing each other's consultations, as well as through more deliberative forms of workplace-based learning. This study aims to gain insight into workplace-based EBM learning by investigating the extent to which GP supervisors and trainees recognise each other's EBM behaviour through observation, and by identifying aspects that influence their recognition.

Methods

We conducted a qualitative multicentre study based on video-stimulated recall interviews (VSI) of paired GP supervisors and GP trainees affiliated with GP training institutes in Belgium and the Netherlands. The GP pairs (n=22) were shown fragments of their own and their partner's consultations and were asked to elucidate their own EBM considerations and the ones they recognised in their partner's actions. The interview recordings were transcribed verbatim and analysed with NVivo. By comparing pairs who recognised each other's considerations well with those who did not, we developed a model describing the aspects that influence the observer's recognition of an actor's EBM behaviour.

Results

Overall, there was moderate similarity between an actor's EBM behaviour and the observer's recognition of it. Aspects that negatively influence recognition are often observer-related. Observers tend to be judgemental, give unsolicited comments on how they would act themselves and are more concerned with the trainee-supervisor relationship than objective observation. There was less recognition when actors used implicit reasoning, such as mindlines (internalised, collectively reinforced tacit guidelines). Pair-related aspects also played a role: previous discussion of a specific topic or EBM decision-making generally enhanced recognition. Consultation-specific aspects played only a marginal role.

Conclusions

GP trainees and supervisors do not fully recognise EBM behaviour through observing each other's consultations. To improve recognition of EBM behaviour and thus benefit from informal observational learning, observers need to be aware of automatic judgements that they make. Creating explicit learning moments in which EBM decision-making is discussed, can improve shared knowledge and can also be useful to unveil tacit knowledge derived from mindlines.

Keywords

Evidence-based medicine, general practice, family medicine, workplace-based learning, observational learning, video-stimulated elicitation interviews

Background

Applying evidence-based medicine (EBM) in practice – defined as combining clinical expertise, patient preferences and the best-available evidence when making decisions for individual patients – is important but hard to do. (1–3) EBM is taught according to the five steps defined in the Sicily Statement: ask, acquire, appraise, apply and evaluate. (4) General practice (GP) specialty training focuses on the first three steps: asking the right questions, searching for evidence and appraising that evidence. (4–6) However, to provide best care for individual patients, EBM training should also focus on EBM behaviour: learning to judiciously weigh the best available evidence in combination with the patient’s preferences, and one’s own clinical expertise, leading to an individual decision that is well-grounded. (3,4,7–10) Currently, the best way to learn EBM behaviour in the workplace is unknown. One study in GP specialty training showed that an intervention involving clinically integrated EBM training for trainees and supervisors did not lead to improved EBM behaviour among trainees in the workplace. (11) To optimise workplace-based EBM learning, we need greater insight into the learning processes in the workplace.

GP supervisors and trainees learn informally from each other while working together in the practice. (12) Presumably, EBM behaviour is also learned this way. Observation is a part of informal learning as the observer, either the supervisor or trainee, learns from viewing the other person execute a certain skill or task. (12) Medical education and cognitive psychology literature theorises that observation leads to learning by stimulating reflective and prospective deliberation: the observer reflects on the effectiveness of various strategies and thinks about this in light of their own goals and future actions. (13–16) Observational, opportunistic learning can be seen as complementary to deliberative learning strategies in the workplace, such as discussing a topic or a skill. (12,17,18) One study suggests that informal learning may be even more powerful than formal learning since it leads to socialisation and tacit knowledge, which can overrule explicit knowledge. (19) Delving deeper into the role of observational EBM learning is an essential component of acquiring insight into current learning processes in the workplace.

However, during consultations with patients, GPs and GP trainees alike take many decisions without making all their considerations explicit, which can make EBM behaviour hard to observe. (20) Recognising the argument behind a certain decision is important to enable the observer to reflect and thus actually learn from the observation. When the correct ‘why’ of the decision cannot be constructed or recognised, the observer might infer erroneous personal constructs or knowledge, which could lead to an incorrect application of the observed EBM behaviour in the future. (19,21) However, the actual quality of such a decision is subordinate at that

point: as long as an observer is able to recognise the actor's use of the three EBM-elements, reflection is possible and learning can take place.

This study aimed to obtain deeper insight into observational learning of EBM behaviour. We investigated the extent to which GPs and GP trainees recognise each other's EBM behaviour through observation, and identified the aspects that influence recognition. It is explicitly not our aim to judge good or poor EBM behaviour, but to investigate whether observers were able to recognise argumentation for decision-making, leading to learning possibilities. Our findings may provide a greater understanding of how observational learning of EBM behaviour takes place in the workplace.

Method

Study setting

This study was conducted in several general practices in the Netherlands and in Flanders, Belgium. In each practice, a GP trainee works alongside a GP supervisor, both of whom participated in this study as a pair. GP specialty training in the Netherlands and in Flanders is comparable postgraduate medical training.

However, most trainees in the Netherlands gain some working experience before starting GP specialty training, whereas most Belgian trainees start postgraduate training following their undergraduate track.

In both countries, training includes two years of working alongside a GP: Dutch trainees stay one year at most in the same practice. Belgian trainees can choose to work with the same GP for two years. Formal education in both countries is done at training institutes in small-group classes; EBM training is a common topic in these classes. Supervisors receive formal training (including EBM) in teach-the-teacher sessions.

Study design and participant recruitment

A qualitative multicentre study was conducted using video-stimulated elicitation interviews (VSI) of pairs of GPs and GP trainees affiliated with GP training institutes in Antwerp or Ghent, Belgium or Utrecht, the Netherlands. Potential participants were approached between September 2016 and April 2017. We presented information about the study on a website, handed out flyers and gave promotional speeches at the training institutes. In Flanders, we could use purposeful sampling to maximise variation. (22) Recruitment in the Netherlands was harder, which meant we had to switch to convenience sampling there. Following recruitment, participants filled out a short questionnaire on baseline characteristics.

Data collection

Data collection took place between November 2016 and August 2017. We recorded an average of ten random daily practice consultations per participant. One author (LW) selected two suitable consultation fragments per participant to be shown at the VSI. Fragments were considered suitable when decision-making of the participant was observed. The medical content of a consultation was never a selection criterion. To enhance recall, the semi-structured VSI were scheduled to take place within two weeks of the recordings. (23–26) The interviews followed a guide developed and iteratively revised by the research team (Additional file 1). Interviews were held individually and consecutively to ensure that the members of the pair could not influence each other. The interview consisted of two parts. In the first, the participant (either a supervisor or trainee) was shown two fragments of their own consultations and was asked to recall all their considerations for the decision(s) observed. They were asked to reveal the role that each of the three pillars of EBM (best evidence, patient values, and clinical expertise) had played in their decision-making and to mention any other factors that may have influenced the decision. In the second part, the participant was shown two fragments of decision-making by the other member of the pair (supervisor or trainee). They were asked to explicate the EBM considerations they recognised their supervisor or trainee making. Recognition of argumentation within all three pillars of EBM was questioned and extensively discussed. In the follow-up interview the other member was shown the same fragments to enable comparative within-case analysis. Interviews lasted approximately 45 to 60 minutes and took place in private at the GP's surgery.

Analysis

All interviews were audio-recorded. The audio recordings were transcribed verbatim. To facilitate analysis, a template was developed (Figure 1) to structure the findings. Each filled-in template contained background information and important remarks on the fragment and listed the considerations the acting supervisor/trainee ('actor') expressed during the interview as well as the elements the observing supervisor/trainee ('observer') mentioned while observing the same fragment. Put together, the video fragment information, the comments by both actor and observer, and the researcher's remarks were considered one 'case', which enabled within-case comparison. Templates for each fragment were filled in separately by pairs of researchers. To enhance reflexivity, the composition of the researcher pairs rotated (LW, KVR, HS, EdG and MLB). All individual coding was extensively discussed within these pairs until consensus was reached. In the last step, the researcher pairs judged the degree of similarity between the actor and observer's arguments according to a five-point Likert scale. Four templates were filled in per GP pair (two for the trainee as actor and two for the supervisor as actor).

Next, comparative case analysis was performed using NVivo 11 Pro software. To create a model describing aspects that influence the recognition of the actor's EBM behaviour

by the observer, we selected outlying pairs, i.e. those in which the actor's and observer's considerations were clearly similar or different. A pair was defined as 'high in similarity' (HS) when at least three out of four of their cases were labelled completely similar (++) or mostly similar (+). Inversely, a pair was defined as 'low in similarity' (LS) when at least three out of four of their cases were labelled as barely similar (-) or not similar (--). In the final step of analysis, we identified aspects related to observer, actor, pair or consultation that were strikingly different between the two groups (HS and LS pairs). We decided to set the cut-off point at aspects coded at least 20% more often for one group than the other, because this difference seemed to be practically relevant. (27)

Description of the consultation	
Brief account of the consultation (decision-making moment) shown in the video fragment	
Considerations mentioned by the actor	Elements mentioned by the observer
Description of considerations that the actor mentioned as important to their decision, while watching a fragment of themselves, illustrated with relevant quotes.	Description of the actor's considerations that the observer recognised while watching a fragment of the actor making a decision, illustrated with relevant quotes.
Researcher's remarks	
Striking aspects of the observer, actor, pair or consultation that might play a role in the similarity between the actor's considerations and the elements mentioned by the observer. For example, 'observer expresses a clear opinion of the actor's conduct' or 'the patient makes a visible impact on decision-making during the consultation'	
Degree of similarity between actor's considerations and observer's recognitions/expectations	
Five-point Likert scale:	
++	<i>similar</i>
+	<i>mostly similar</i>
+/-	<i>partially similar</i>
-	<i>barely similar</i>
--	<i>not similar</i>

Figure 1: Structured template for analysis

Ethical considerations

Approval was granted by the Ethical Board of the NVMO (Dutch Society of Medical Education) under case number 706. All GPs and GP trainees gave written informed consent to record their consultations and the interviews. At each consultation the GP supervisor or trainee asked the patient for their permission to be audio-recorded; during the video-recording only the physician was visible. The videos were uploaded via a secure connection to a secure electronic environment. Transcripts were

anonymised and each pair was given a code number that still enabled participants to be identified as Dutch or Flemish and as trainee or supervisor.

Results

The participants were thirteen Flemish and nine Dutch pairs who differed in supervising experience, experience in general practice, training stage and practice type (Table 1). The Flemish and Dutch pairs were comparable on these characteristics except on age.

Table 1: Characteristics of participants

	The Netherlands		Belgium	
	GP supervisors n=9	GP trainees n=9	GP supervisors n=13	GP trainees n=13
Female	3 *	6	8	11
Age (average in years (range))	56 (48-67)	30 (28-35)	47 (36-57)	26 (25-30)
PhD trajectory (finished or ongoing)	1	2	1	0
Trainee in first year of training	5		8	
Trainee in last year of training	4		5	
GP supervisor's experience as GP (average in years (range))	26 (20-38)		21 (12-33)	
GP's experience as supervisor (average in years (range))	11 (2-20)		10 (2-25)	
Duration of collaboration between supervisor and trainee (average in months (range))	6 (4-9)		9 (3-18)	
Practice type				
Solo	0		2	
Duo	7		2	
Health centre	2		9	
Location of training institute				
Utrecht	9			
Antwerp	3			
Ghent	10			

* Results are numbers, unless stated otherwise

In total 44 individual interviews were held with 22 supervisor-trainee pairs. Within-case analyses were done on 85 cases in total, since four video fragments per pair were usually discussed in the interviews. Three pairs discussed only three video fragments during the interviews due to lack of time. Within-case analysis showed moderate similarity overall between the actor's EBM behaviour and the observer's recognition of this behaviour (Table 2), showing the same distribution on degree of similarity between Dutch and Belgian cases.

Table 2: Final judgement on degree of similarity, based on consensus by at least two researchers

Degree of similarity	Total number of cases (n=85)	Dutch cases (n=34)	Belgian cases (n=51)
Similar (++)	4	1	3
Mostly similar (+)	13	5	8
Partially similar (+/-)	36	14	22
Barely similar (-)	26	12	14
Not similar (--)	6	2	4

Figure 2 presents a model describing the aspects influencing similarity between the actor's EBM behaviour and the observer's recognition of this behaviour. The four main aspects are divided in major themes that positively (green) or negatively (red) influence the degree of similarity.

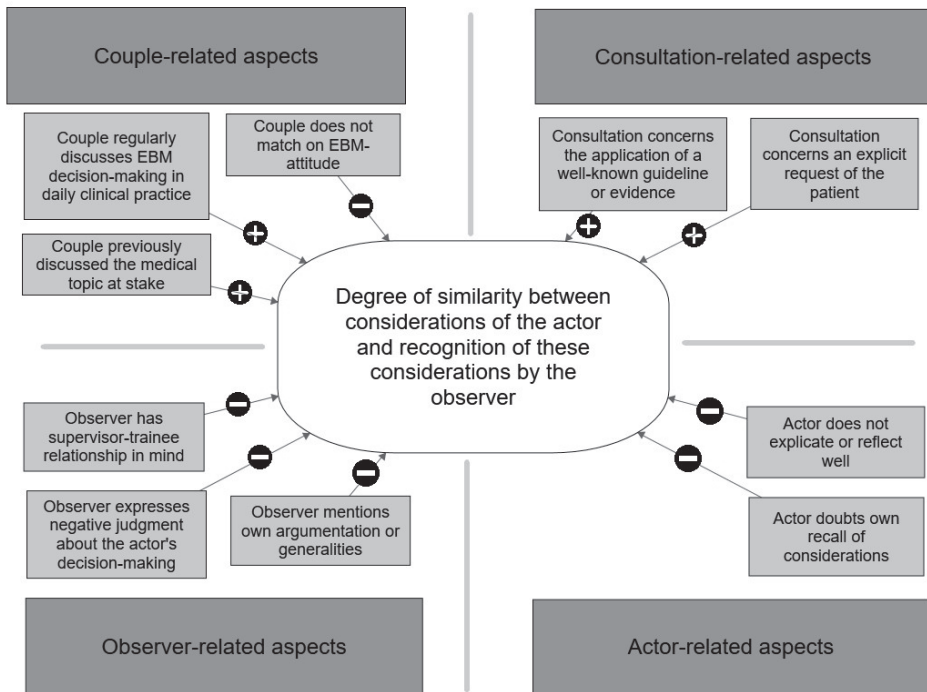


Figure 2: Aspects influencing similarity between the actor's EBM behaviour and recognitions of the observer when observing consultations

Legend:

- + = negatively influencing degree of similarity
- = positively influencing degree of similarity

Pair-related aspects

In pairs low on similarity, the supervisor and trainee often had different attitudes to EBM. This was most apparent when a trainee felt it was important to follow the latest evidence or guidelines, whereas the supervisor preferred to rely on their experience. As a result, EBM-minded trainees could not recognise the experience-based considerations of their supervisors, and vice versa, supervisors relying on experience had difficulty recognising their trainee's considerations that were based on the latest evidence.

Trainee: “[...] The supervisor and older doctors, they have really lots of experiential knowledge which is definitely good, but I think [...] we graduated with lots of confidence in evidence-based medicine. It’s been pumped into us that it’s really important. So I’d rather follow the guideline than [...].”

Pair 16. All cases labelled ‘barely similar’, supervisor with >30 years of experience as GP

When the supervisor and trainee had previously discussed the medical topic related to the observed consultation, the observer generally recognised the actor’s considerations better. Consistent with this finding, our analysis showed that when the working environment in the GP’s surgery is focused on regular discussions of EBM decisions, observers recognised the actor’s considerations more often.

Observing supervisor: “Again, I think it’s because we’ve already [...]. So yes, children with fever is something you’d naturally discuss with the trainee. We’ve also gone through the guideline together. [...] I think she does it on that basis.”

Supervisor pair 21. Case labelled ‘mostly similar’

Consultation-related aspects

The medical content of a decision made in a consultation seems to play only a marginal role in the recognition of another person’s EBM behaviour. A wide range of medical cases was shown during the interviews and no connection could be found between specific medical topics and the degree of recognition of the other person’s considerations about these topics.

The only content-related factor that seems to enhance recognition of EBM behaviour in consultations is when someone applies a well-established guideline or evidence. Pairs who individually or collaboratively obtained the same background information, such as knowledge from the common guideline on pain management, were able to recognise the other person’s use of this knowledge, even when it was applied implicitly. Previously discussed ‘common practices’, such as referrals to a certain hospital, were also easily recognised. Probably shared background knowledge makes recognition of considerations easier.

Acting trainee: *"I got it from the guideline, that many children respond to viral infections with wheezing. That the airways contract a bit and then the treatment for that is a puffer, especially Ventolin. That's what the guideline says, [you should prescribe Ventolin] from once up to four times a day."*

Observing supervisor: *"She decides on the basis of clinical research when to regard wheezing as the first symptom and then follows the guideline to prescribe Ventolin."*

Pair 19. Case labelled 'completely similar'

2

A patient asking for more information during the consultation leads to better recognition by the observer. Probably the explicit request forces the actor to explain (aspects of) their considerations, which not only improves shared decision-making but also leads to more correct interpretations of EBM behaviour.

[Conversation between trainee and patient's father during consultation]

Acting trainee (to patient): *"So yes, if we're going to follow the guideline, I'd give you antibiotics again."*

Patient's father: *"No. No, that doesn't seem right. In my opinion we can still suppress it with paracetamol."*

Observing supervisor: *"So, with some reservation, she advises antibiotics but then the father says, let's wait a bit longer [...] So yes, that leads to us doing what the father wants."*

Pair 5. Case labelled 'partially similar'

Observer-related aspects

Our analysis showed that observer-related aspects influence recognition of EBM behaviour the most, no matter whether the trainee or the supervisor was observing. The act of observing and recognising the line of reasoning behind what is observed seems difficult for many observers. We can conclude this because observers not only appear to 'observe' different elements and reasoning from what the actors name, but often seem to engage in other activities than observation. Observers quickly became judgemental, gave unsolicited comments on how they would act in similar situations or

spoke of how such decisions should be made in general. Others expressed confusion at having to explain someone else's argument. Overall, in all cases with little or no similarity, the observer gave a negative opinion of the actor's decision.

Observing trainee: *"I don't know why he [the acting supervisor] said 'week'. [...] You'd expect to see some hyper-reactivity six weeks after a respiratory tract infection, and that man [the patient] confirmed that, of course. I don't think I'd mention a time period. I'd say, well yes, I expect it [the symptoms] will ease and fade away eventually and I'd give some tips. But I don't know why he [actor] said one week."*

Pair 3. Case labelled 'partially similar'

Although both supervisors and trainees tended to express judgements and their own arguments instead of the considerations of the other physician, specific difficulties could be seen between trainee-observers and supervisor-observers. It seemed that supervisors often observe with their supervisor-trainee relationship in mind and appeared to see their main task as giving feedback on the trainee's decisions and performance. Moreover, supervisors seem to interpret the trainee's decision-making as driven by the trainee's lack of knowledge or skills, even if the trainee sometimes appeared to have clear motives for their decision.

Observing supervisor: *"She also says, I find it too soon for an injection. I think it's still something [...] she's not up to doing an injection yet, not independently, not without involving me. That's still a bit [...] She can do it already but just, yes, under supervision. So I think that also plays a role."*

Acting trainee: *"I thought yes, he just needs a week of NSAIDs, and if that doesn't work, then maybe keep him on NSAIDs a bit longer, and if that still doesn't work, get him some support from the physio and then if that still doesn't work well, then the injection. Those are the standard steps."*

Pair 2. Case labelled 'not similar'

On the other hand, trainees seemed to find it hard to recognise their supervisor's considerations if they thought their supervisor was not working according to the latest evidence. In this case trainees quickly formed a negative judgement on the actor's decisions and felt obliged to elucidate their own reasoning.

Observing trainee: *"In this case I find it harder to understand the decisions he makes. [...] Switching to antibiotics after only three days without a fever, without an objective [check of] the infection parameters, actually I don't find that... No, I wouldn't do that."*

Interviewer: *"Why do you think he did it? What did he base [his decision] on?"*

Trainee: *"No idea."*

Pair 8. Case labelled 'not similar'

2

Actor-related aspects

Another striking phenomenon revealed in the interviews was that when actors were watching their own fragments, they were often unable to repeat or reflect on their EBM behaviour during decision-making, even when explicitly asked to do so. Related to this, the actors also doubted their recollection of their own considerations and were unsure of their argumentation. The EBM behaviour of actors who had problems recalling their own substantiations was harder to distinguish and consequently there was less similarity between the actor's considerations and the recognitions of the observer.

Interviewer: *"Why did you say, I recommend a nasal spray?"*

Acting supervisor: *"Perhaps... ah yes, I don't really know why. Perhaps because the side effect of that medicine is drowsiness and he gets rather tired during the day, perhaps that's why. Ah yes, no idea. I no longer know why I said that."*

Observing trainee: *"So I think the decision [to prescribe] a nasal spray and those pills is based on experience. But it's also mentioned in the allergy guidelines. Yes. It's hard to say."*

Pair 21. Case labelled 'barely similar'

Discussion

Summary of main findings

In this study we investigated the extent to which GP supervisors and GP trainees recognise each other's EBM behaviour through observation, and we identified aspects that influence recognition. Our main finding is that the actor's considerations

are often not the same as what the observers recognises, and consequently EBM behaviour cannot be fully recognised by observation alone. Our analysis revealed several aspects connected to the observer, actor, consultation or pair that may enhance or hinder recognition of EBM behaviour through observation. These aspects are described in a model (Figure 2). There were no specific differences between Dutch and Belgian pairs.

Strengths and limitations

Strengths

To our knowledge, this study is unique in its approach to investigating informal workplace-based learning of EBM. The few previous studies on this topic looked at clinically integrated EBM training, which tries to adapt formal, explicit learning in such a way that it is applicable in the workplace. (11,28,29) In contrast, we studied observations in daily clinical practice, where it is assumed implicit learning takes place. A better understanding of these learning processes will allow us to tailor future educational interventions in GP practice.

Secondly, this study used VSI to collect data on thought processes during decision-making. This method encourages reflection, deepens the interview and can overcome recall bias. (23–25,30) VSI is a very efficient way to discuss concrete considerations, thoughts and perceptions linked to a specific moment and thus minimise socially desirable answers that might be given if we had taken a more general or abstract approach to the topic. Thirdly, we conducted a rigorous analysis of the results, with rotating pairs of researchers from different professional backgrounds coding and labelling all cases. The vast number of cases (n=85) enabled data saturation. The multicentre approach deepened the results and enhances transferability.

Limitations

Our results could be influenced by the participant sampling method. Given that the study bears a focus on EBM, GPs and trainees with a pronounced interest in EBM may have been more inclined to participate. Furthermore, the difficulties recruiting Dutch participants forced us to switch to convenience sampling. However, as the results show a wide range of attitudes to EBM among participants and the composition of the Dutch and Flemish group was comparable, we believe that self-selection bias and the convenience sampling in the Netherlands has had no significant impact on the results.

Selection bias may have played a role in the sampling of video-taped consultations, as participants may have chosen consultations which they expected would show off their 'better' EBM behaviour. To avoid this, we asked participants to record at

least ten consultations, whereas we selected only two fragments for the interviews. This also minimised the risk of camera-related socially desirable behaviour, since previous research has shown that awareness of being filmed fades when the recording continues for a longer period of time. (30,31)

Secondly, the supervisor-trainee relationship might have prevented trainees from commenting on their supervisor's behaviour in full honesty. We tried to prevent this by guaranteeing not to share the information given in the interviews with their supervisor, but we cannot be completely sure of the respondents' perception of this.

Implications of the findings in context of existing research

Our study showed that supervisors and trainees often have problems recognising EBM behaviour when they observe each other's consultations. To our knowledge, this study is the first to use recognition of EBM considerations as a prerequisite for learning and thus sheds light on informal observational learning of EBM behaviour. Nevertheless, the aspects we identified can be linked to previous research.

Consultation-related aspects: recognition does not always require making EBM behaviour explicit during the consultation

Previous research on observational learning in the workplace reasoned that considerations should be made explicit to improve observational learning. When this is done, the observer will be able to 'look into the actor's head'. (19) Finding few explicitly visible signs of EBM behaviour, Zwolsman (2013) suggested that making the decision-making process explicit would help observers recognise EBM behaviour and inform further learning. (20) Based on our findings, we question whether this is always the case. On the one hand, we observed that when a patient gives explicit input to the decision-making process, compelling the actor to make their considerations more explicit, the observer recognised this aspect of judicious decision-making more easily. This is in line with current thinking and findings on shared decision-making (SDM), which can be well observed and assessed by observing. (32)

On the other hand, explicating during the consultation does not seem to be crucial for recognition of one another's considerations: the observer sometimes missed the explicit cues or phrases mentioned by the actor during the consultation. However, implicit EBM behaviour was often recognised when the actor and observer had previously discussed the topic or shared the same knowledge. It can be concluded that although it is important to make considerations explicit to enhance SDM, it is not essential to improve the observer's recognition of EBM behaviour. (33) Within-pair factors related to context, attitude or knowledge seem to have a greater influence on recognition.

Pair-related aspects: aligning attitudes and knowledge through discussion is crucial

Obtaining shared knowledge and having a shared attitude to EBM were important for both GP supervisor and trainee and led to recognition even without explicit mention of the actor's argumentation during the consultation. Previous thinking on the role of background knowledge in observational learning by Csibra (2006) confirms the importance of having shared background knowledge. Csibra states that even basic skills, such as tool use, cannot be learned correctly through observation without adequate background knowledge. He explains, "*A behaviour can always be generated and explained by an infinite number of different mental state combinations, representing diverse goals and/or different types of background knowledge.*" (34) This means that observational learning of EBM behaviour cannot occur optimally without consensus on or insight into the knowledge that was used in the observed action. When straightforward topics (such as medical topics for which there are basic guidelines) play a crucial role in the consultation, individual achievement of this knowledge might be enough for adequate recognition of the considerations. However, since EBM behaviour often demands more complex skills and also relies partly on tacit knowledge, most of such shared knowledge probably needs to be constructed in social processes and through discourse. (35) Moreover, besides obtaining new, shared background knowledge, such dialogue gives a better understanding of the actor's knowledge and attitude, leading to better recognition of implicit EBM behaviour during the consultation. Our results indicate that social and deliberative learning activities, such as dialogue, lead to better recognition of each other's considerations, and are therefore essential for workplace-based learning of EBM behaviour.

Actor-related aspects: mindlines hamper correct observation

The ethnographers Gabbay and Le May stated that GPs and other clinicians often rely on internalised and collectively reinforced tacit guidelines during clinical reasoning and decision-making. Implicit guidelines, termed 'mindlines', are acquired in daily practice, in discussion with (expert) colleagues and reflection on own experiences. Exact elucidation of such tacit knowledge following decision-making is difficult. (35,36) The concept of mindlines also arose in our study. Many participants found it difficult to recall their underlying considerations when asked to elaborate on them during the VSI. This occurred more often with experienced, older GP supervisors. Observers generally had problems recognising the EBM behaviour of clinicians who relied heavily on their mindlines, which led to no or erroneous recognition. It can be concluded that observational learning is less effective when GP supervisors and trainees overuse implicit, tacit knowledge such as mindlines. In this case, deliberative learning, such as follow-up discussions after observations, are needed even more to benefit from observing. Another advantage of deliberative dialogue is that it not only leads to a learning effect for the observer, who asks

why the acting clinician showed certain EBM behaviour, but it can also foster the actor's reflection on and explication of their own tacit knowledge and thus enhance evidence-based decision-making in both parties. (37) More research needs to be done on the best ways to train and educate both supervisor and trainee to be engaged in such dialogues in an optimal manner.

Observer-related aspects: observers do not observe objectively

As extensively investigated within social and cognitive psychology, 'observing' involves far more than just watching and imitating. (16) Research shows that observation is influenced by someone's own views and opinions on the observed actions. (14) In epidemiological research, this is known as 'observation bias' and relates to the phenomenon that an observer sees what he or she expects or wants to see. (38) This is in line with our results: observers draw quick conclusions, based on their own cognitive framework, and also easily judge the acting clinician, based on their own opinions and preferences. This mechanism prevents them from objectively observing and recognising EBM behaviour and from learning outside of their own framework of knowledge. It is not surprising that GP supervisors and trainees observe like this: clinicians are trained to synthesise, deduce and filter information they obtain through observation during daily clinical practice. This is well explained by Wieringa, GP and researcher on EBM and mindlines: *"What we observe as clinicians is not reality itself but the reality exposed to our method of reducing or filtering the various potentially relevant streams of knowledge of which we are consciously or unconsciously aware and from those, constructing a picture of current reality."* (35) This applies to the work of a clinician, but our results show that this also occurs when observing each other in a learning situation. Thus, simply recognising a decision and supposing the considerations that preceded this decision is not enough for adequate learning. When looking for adequate ways to address workplace-based EBM learning, the role of the observer should be carefully considered.

Implications for workplace-based EBM learning

Our results show that it is incorrect to assume that EBM behaviour is learned in the GP apprenticeship simply by observing and other implicit learning processes. To best benefit from informal observation in workplace-based EBM learning, our results suggest focussing on improving observation skills as well as making room for explicit follow-up discussions between supervisor and trainee. Observation skills may be improved by making both GP supervisor and trainee aware of the fact that automatic judgements, based on their own cognitive framework, can hamper their observations. For supervisors it could be useful to draw a distinction between their 'assessment' role in direct observation and the informal, non-judgemental way of observing needed to recognise and jointly learn EBM behaviour.

Secondly, the role of taking the time to discuss and elaborate on evidence-based decision-making should be emphasised. It could be helpful to create explicit learning moments where both GP and trainee can learn from each other's approaches through discussion and reflection. This would have a twofold goal: conversations on medical topics would not only enhance direct learning but also usefully support efficient informal observational learning in later phases, since it leads to shared background knowledge and attitude alignment. Lastly, such discussions can also be useful to unveil tacit knowledge derived from mindlines, which may benefit both supervisor and trainee. However, more research needs to be done on how best to structure such informal and formal discussion moments.

Conclusion

GP trainees and supervisors do not fully recognise EBM behaviour through observing each other's consultations. Factors influencing recognition are related to the observer, actor, consultation or pair. To improve recognition of EBM behaviour and thus benefit from informal observational learning at the workplace, trainees and supervisors need to be made aware of the automatic judgements that they make, based on their own cognitive framework. Creating explicit learning moments in which EBM decision-making can be discussed can be beneficial, since such moments can lead to shared background knowledge. Furthermore, such discussions can also be useful to unveil tacit knowledge derived from mindlines, which may benefit both supervisor and trainee. However, more research needs to be done on how best to structure such informal and formal discussion moments, taking into account existing theories on medical education and professional development.

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Chapter 2

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Appendix: Interview guide

Overview of the interview guide used during the video-stimulated elicitation interviews

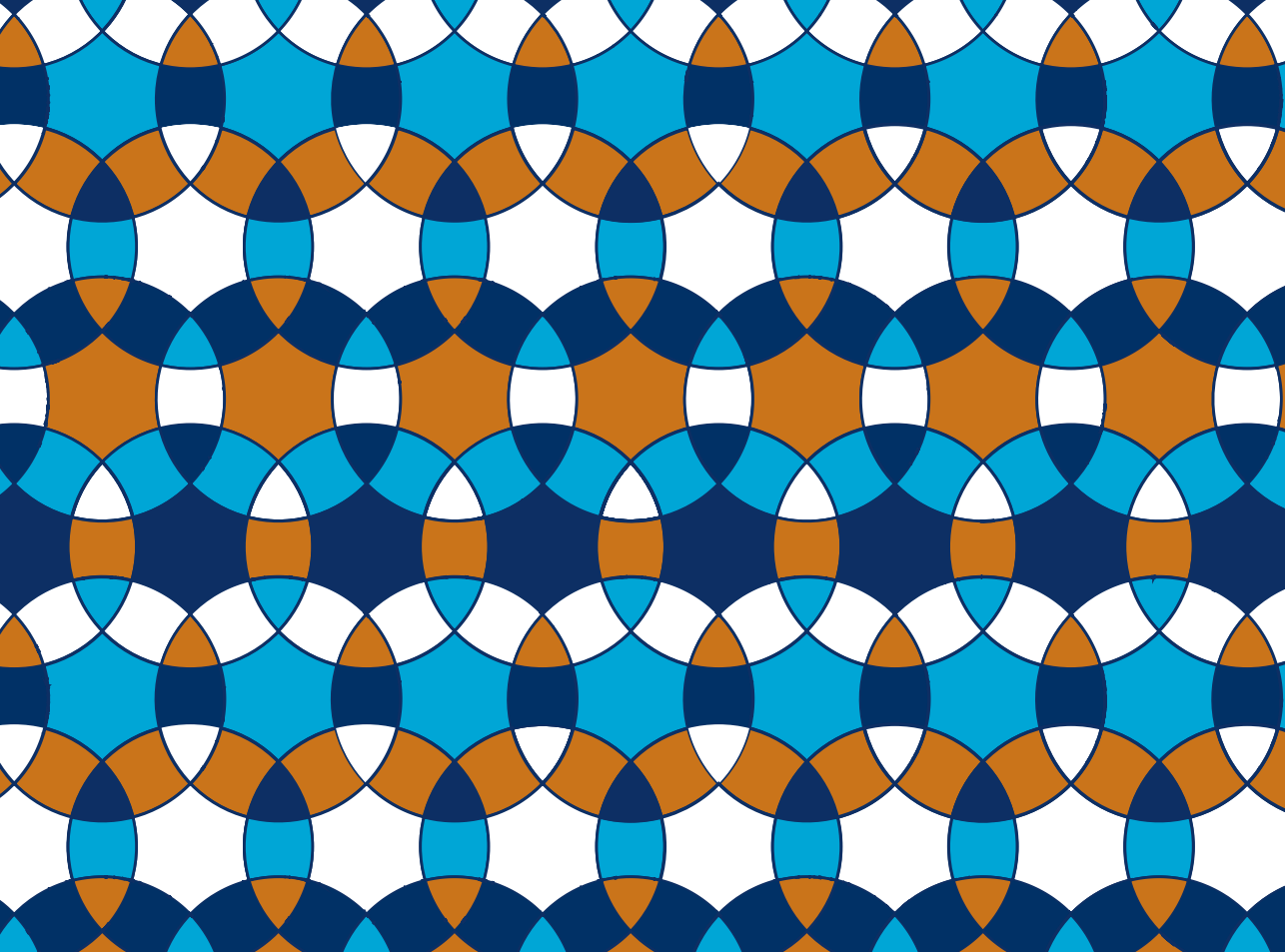
Main aims of the study

To explore how GP supervisors and trainees think they explicitly and implicitly apply and evaluate EBM during consultations

To investigate how GP supervisors and trainees recognise and interpret each other's use of EBM during observations of consultations

Leading questions	Probing
This study concerns the way you make decisions in practice. To make such decisions, you need medical knowledge. But what do you do when your ready knowledge is falling short? Which choices or decisions do you make?	- How important are different sources of information for you? How do you weigh their importance?
You will now see a video fragment of one of your own consultations, which we selected because we think you made or discussed a decision. Please think back of this specific consultation when answering the next questions.	- Why did you make this decision? - Which information did you use that led to this decision? - What role did the patient's preference play? - In what way did you incorporate evidence or guidelines?
1. Can you guide me through your decision-making process during this consultation?	- How did your own clinical experience play a role during this consultation?
2. How do you decide which of these considerations you actually make explicit (to your patient)?	- Would your decision-making have been differently with a different patient? Why?

Leading questions	Probing
<p>(After watching a fragment of their supervisor/trainee)</p> <ol style="list-style-type: none">1. Do you see moments of decision-making during this consultation, and if so, how did you identify such a moment?2. What are your thoughts on why the other physician acted this way?	<ul style="list-style-type: none">- How do you see that he/she is making a decision here?- Which elements played a role during this decision-making process, do you reckon?- Why were these elements important to the acting physician, do you think?
<p>Imagine that you watched this fragment together with your supervisor/trainee during a learning conversation.</p>	
<ol style="list-style-type: none">3. What would you like to discuss with each other, based on what you just saw? Why?	





GP trainees' perceptions on learning EBM using conversations in the workplace: a video-stimulated interview study

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Abstract

Background

To be able to practice evidence-based medicine (EBM) when making decisions for individual patients, it is important to learn how to combine the best available evidence with the patient's preferences and the physician's clinical expertise. In general practice training, these skills can be learned at the workplace using learning conversations: meetings between the supervising general practitioner (GP) and GP trainee to discuss medical practice, selected topics or professional performance. This study aimed to give insight into the perceptions of GP trainees on their EBM learning processes during learning conversations.

Methods

We held semi-structured video-stimulated elicitation interviews (n=22) with GP trainees affiliated to GP training institutes in the Netherlands and Belgium. GP trainees were shown fragments of their learning conversations, enabling reflection during the interview. Taking an inductive approach, interview recordings were transcribed verbatim and analysed with NVivo software.

Results

GP trainees perceived learning conversations as useful for learning and discussing EBM. Multiple EBM learning activities were identified, such as discussing evidence together, relating evidence to cases in daily practice and discussing the supervisor's experience and the specific local context in the light of what the evidence recommends. However, for learning to occur, trainees need and expect specific behaviour, both from their supervisors and themselves. Supervisors should supply well-substantiated answers that are applicable in practice and give the trainee confirmation. In turn, the trainee needs to prepare well in order to ask focused, in-depth questions. A safe space allowing equal and open discussion between trainee and supervisor is perceived as an essential context for optimal EBM learning.

Conclusions

Our findings show that trainees find learning conversations useful for EBM learning in general practice. To bring EBM learning to its full potential, attention should be paid to optimising the behavioural and contextual factors found relevant to enhancing EBM learning.

Keywords

Evidence-based medicine, general practice, family medicine, workplace-based learning, video-stimulated elicitation interviews, learning conversations

Background

Teaching and learning evidence-based medicine (EBM) in general practice, defined as combining current best evidence with the general practitioner's (GP) own clinical expertise and the patient's preferences, is important but complicated. (1,2) According to the Sicily Statement, EBM involves five steps: ask a question, search for evidence, appraise that evidence for validity and clinical importance, apply the appraised evidence to practice and evaluate the result. (3) To provide best care for individual patients, clinicians and scientists advocate focussing on the last two steps of EBM. (2,4–6) However, a recent review by Albarqouni (2018) showed that most educational interventions deal mainly with the first three steps. (7) Other reviews on EBM learning confirm these findings: although most educational programmes seek collaboration with clinical practice, their efficacy is unclear and incorporating all five steps is hard to achieve in the workplace. (8–13) To improve workplace-based teaching and EBM in general practice, it is important to look closely at how current teaching and learning takes place.

GP trainees learn by working together with GPs. (14,15) Collaborative workplace-based learning happens in several ways, including deliberative learning. Deliberative learning occurs when time is set aside for learning activities at the workplace, leading to informal but yet planned forms of learning. (16,17) It can be seen as a focused effort to improve performance, by organising moments of critical reflection individually or together with other health care professionals. (18–20) In the GP practice, learning conversations are commonly used as a form of deliberative learning. Learning conversations are regular meetings between GPs and trainees to discuss daily medical practice, selected topics or professional performance. (21,22) These learning conversations, in which trainees actively nominate the topics or questions, are not often described in the literature. Performance assessment in the workplace often involves observation, evaluation and feedback, unilaterally from the supervisor's point-of-view. (23,24) However, recent work by Tavares and colleagues shows that it is possible to combine unilateral feedback with bidirectional processes such as debriefing and discussion, leading to learning conversations in daily practice. (22) We argue that a learning conversation might be a good EBM learning opportunity. For instance, GP trainees could learn EBM through reflective discussions with their supervisor about medical topics.

Not much is known about how learning conversations teach EBM learning. Applying EBM in daily clinical practice is often implicit and rarely a visible process, which might hamper any useful evaluation of EBM considerations. (25,26) While EBM intends to help physicians make decisions by deliberately reviewing all the information needed, the literature on the concept of mindlines shows that explicitly weighing all available knowledge and information cannot always be achieved. In

clinical reasoning and decision-making physicians seem to rely on internalised, collectively reinforced tacit knowledge that might be evidence-based but is hard to elucidate after the decision is made. (27–29) Using tacit knowledge may also hamper insightful discussions between supervisor and trainee, since supervisors and trainees might not be able to reflect or elucidate on EBM decision-making.

Since learning can be seen as a social and subjective process in which each learner constructs meaning, it is important to investigate the way that learners, in this case GP trainees, treat the evidence in learning conversations. (30) Trainees may perceive aspects that facilitate optimal EBM learning processes during learning conversations and other aspects which do not. This study sought to gain insight into the perceptions of GP trainees on EBM learning processes during learning conversations with the aim of obtaining a better understanding of workplace-based EBM learning and developing recommendations on how to optimise learning conversations.

Method

Study setting

This study was conducted in GP practices in the Netherlands and in Flanders, Belgium. General practice specialty training in the Netherlands and Flanders is comparable as in both countries, postgraduate medical training involves the trainee working alongside a GP for two years. Dutch trainees stay one year in a practice, while Belgian trainees can choose to stay with the same GP for both years. Formal education in both countries takes place at the training institute in small group classes; EBM training is a common aspect of these classes. Supervisors receive formal training (including EBM) in teach-the-teacher sessions. In both countries, supervisor and trainee hold regular workplace-based learning conversations during which GP trainees are expected to be responsible for their own learning process.

Study design and participant recruitment

Using video-stimulated elicitation interviews (VSI) we conducted a qualitative multicentre study of 22 GP trainees affiliated with GP training institutes in Antwerp and Ghent (Belgium) or Utrecht (the Netherlands). Since we wanted to film active learning conversations between trainees and supervisors, we recruited established pairs of GP supervisors and GP trainees. We approached potential participants between September 2016 and April 2017, distributing flyers and giving promotional speeches at the training institutes and giving information on the study on a website. In Flanders, we used purposeful sampling to maximise variation. (31) Since recruitment in the Netherlands was more complicated due to unknown reasons we

had to switch to convenience sampling here. After recruitment, participants filled out a short questionnaire on baseline characteristics (Table 1).

Data collection

Data collection took place between November 2016 and August 2017. Trainees were asked to video-record three regular learning conversations during their daily practice. Since learning conversations are a regular part of their workplace-based training, trainees and supervisors are accustomed to carry out these conversations, during which they together reflect on topics that occurred during daily practice or are relevant for daily practice. During their regular training at the institute, no specific instructions are given on how to carry out such learning conversations. For the collection of recordings for this study, we gave a few additional instructions. We asked the pairs to make video recordings of dialogues on a medical topic or question, since we expected that comments on personal development or communication skills, which participants might mention as well, would contain less useful EBM-related material. The three learning conversations were recorded over four months, a period long enough to take into account the development of the relationship between GP and GP trainee.

Afterwards, the first author (LW) selected two video fragments per trainee, not from the same recording. Fragments were considered suitable when the trainee asked the supervisor a medical question that led to a discussion between them. During the semi-structured interviews, held approximately within two weeks of the last video recording, trainees were first asked to talk in general on how they spoke about EBM with their supervisors and which aspects of EBM they found important in such conversations. Subsequently, the participants were shown the selected video fragments to deepen the interview and encourage reflection on these real situations. Socially desirable answers were minimised using this video-stimulated interviewing (VSI) technique. (32–35) Interviews followed the topic guide developed and iteratively revised by the research team. They lasted approximately 45 to 60 minutes and took place in private rooms at the GP practices.

Analysis

All interviews were audio-recorded, transcribed verbatim and analysed using NVivo 11 software. An inductive approach was chosen to analyse the interviews. (36) To obtain a better view on the data and enhance reflexivity, the first two interviews were analysed separately by five researchers (LW, IvdW, EdG, MLB and KVR). The outcomes and different views were discussed and a provisory code tree was formed by identifying the main interview categories. Then three researchers (LW, IvdW and KVR) began coding interviews in rotating pairs, discussing the coding until consensus was reached. The last 12 interviews were coded individually by the same three researchers. Each individually coded interview was discussed by the rotating

pairs and any queries were discussed at meetings of the full research team. After analysing all 22 interviews, we concluded that no new themes had emerged in the final interviews and that saturation was reached. Subsequently, using axial coding, we formed categories to present an overview of GP trainees' perceptions of the EBM learning processes using learning conversations. We analysed the trainees' general comments on their EBM learning process during a learning conversation, as well as their reflections on being confronted with the video of their own real-life learning conversations.

Results

Thirteen Flemish and nine Dutch trainees were selected to participate. The group was heterogeneous: participants differed in their stage of training, practice type, their supervisor's experience and the duration of collaboration with their supervisor (Table 1).

Table 1: Characteristics of participants

	GP trainees (n=22)
Female	17 *
Age (average in years (range))	28 (25–35)
PhD trajectory (finished or ongoing)	2
Trainee in first year of training	13
Trainee in last year of training	9
Experience of supervisor as GP (average in years (range))	23 (12–38)
Supervising experience of supervisor (average in years (range))	10 (1.5–25)
Duration of collaboration between supervisor and trainee (average in months, collected when starting the video-recordings (range))	8 (3–18)
Practice type	
Solo	2
Duo	9
Health centre	11
Training institute	
Utrecht	9
Antwerp	3
Ghent	10

*: Results are numbers, unless stated otherwise

Interview analysis reveals that trainees perceived learning conversations as useful moments to learn and discuss EBM. Multiple EBM learning activities could be identified in the learning conversations. However, for learning to occur, trainees need and expect specific behaviour from their supervisor and themselves (Tables 2 and 3; see below).

EBM learning activities

Various EBM learning activities occurred during the conversations (Table 2). To acquire more knowledge, some pairs prepared for the learning conversation by reading evidence or guidelines in advance. During the conversation, trainee and supervisor discussed newly acquired knowledge and their views on what they had read, allowing for collaborative learning.

Trainee 16

Interviewer: *"Do you discuss such an article during the conversation, or how do you handle that evidence?"*

Trainee: *"Yes, we discuss that during [...]. We often know beforehand what we're going to read: this guideline, that article. We'll email them in advance and then we'll discuss what we've noticed, what we've learned for ourselves about something and how we're going to apply it in this case. Because usually we'll both tell each other, oh we didn't know that, or that's special."*

Trainees stated that as they gained familiarity with the guidelines, the focus of the learning conversation shifted from purely acquiring guideline-based knowledge to trying to anticipate how they would put this knowledge into practice. We identified several ways of learning how to put evidence-based knowledge into practice. To begin with, trainees suggest cases from daily practice, using such examples in two ways. First, referring to exemplary cases helps trainees interpret the general advice given in the guidelines. Trainees noted that looking at different cases and discussing why their more experienced supervisor took a certain decision helped them interpret knowledge from the evidence.

Trainee 11

"For example, hypertension. Recently I looked up the guideline again. I had my own cases and my colleagues had cases too so I reviewed [my colleagues' cases] to check if I'd done anything differently, based on the guideline, or [to ask] why did you do it like that? So that's actually very interesting."

Secondly, the pairs used exemplary cases as a starting point in the search for evidence. During the learning conversation, they looked for evidence when the trainee encountered a problem or dilemma in daily practice. They sought explicit answers to a clinical question, searching in easily accessible guidelines and websites where much of the evidence is pre-appraised; primary evidence was only very scarcely taken into account.

Trainee 14

Interviewer: *“Ok so you told me that you discuss the guideline together. How exactly do you do that? What kind of aspects do you discuss together?”*

Trainee: *“Gosh, it is goal-oriented: for example looking up [information] about medication and which medicine [to prescribe]. Yes, actually it’s usually case-oriented, so we’ll we look up how to do it for that patient or, yes, we’ll read through that together and then if there are things in it that, ah, we didn’t know, then we’d say so.”*

Another EBM learning activity trainees use in learning conversations is brainstorming and discussing with their supervisor. Brainstorming mainly concerns the interpretation of guidelines. For instance, trainees state that they struggle with specific recommendations for cut-off points or the practical interpretation of advice. Brainstorming starts when trainees bring their evidence-based knowledge to the table, whereupon supervisors interpret this information using their experience. Incorporating the local context is often useful in guiding the trainee’s interpretation.

Trainee 3

“Yes, look, what they’re trying to do in the guidelines is [...] set the cut-off values. [For] longer than a week, you do a faecal culture. Yes, do you do that after six days, or do you not do it after six days but after eight or seven days? You know, of course, they’ve chosen the cut-off values [for] the NHG standard. But in a learning conversation I’m trying to find out when I actually have to do something, and when not. [...] The standard isn’t always exactly clear on the cut-off value, I’ll say. I think that in a learning conversation you’re looking for those cut-off values for yourself, to get a grip on them, and you do that by sparring [with your supervisor] because then you get a reciprocal conversation.”

Table 2: EBM learning activities that GPs trainees perceive as useful during learning conversations

Useful EBM learning activities during learning conversations
<ul style="list-style-type: none"> · Reading evidence prior to the conversation and discussing it together · Looking up cases to illustrate the prepared evidence · Looking up evidence on the spot to answer a clinical question · Brainstorming and mutual discussion, applying the supervisor's experience and advice gleaned from the evidence

The supervisor's behaviour

To facilitate optimal EBM learning, trainees need and expect specific behaviour from their supervisors (Table 3). First of all, supervisors should give well-substantiated, explicit answers to the trainee's questions. A well-substantiated answer is not necessarily based on evidence. It can also be based on experience, on logical, pathophysiological reasoning or on patient- or context-related factors, as long as the answer is explicit and enables the trainee to reflect on the considerations that are used. The trainee needs to be able to decide whether they will use the argumentation in their own daily practice afterwards.

Trainee 17

"In this situation, I take it on because he's not forcing me, like [telling me] you have to do it like this because it's really recommended that we do it that way. He frames it as look, I do it for this reason [but] I can still do what I want with it. He doesn't force it on me. He does explain his viewpoint and why he does it."

Besides well-substantiated, the supervisor's answers need to be to the point, practical and applicable in daily clinical practice to be useful for trainees. Trainees want straightforward answers to direct them in difficult cases, possibly due to time constraints or for convenience, since the learning conversation has a practical function in daily clinical practice: it gives trainees an easy way to gain information when time is running short and when they need clear answer on how to proceed in specific cases.

Trainee 20

"Sometimes just from – okay these are the patients I definitely should discuss, the ones I want to see if I've treated correctly or the ones I know will call me back. Then I must have an answer to my question."

The need for direction can be related to something else the trainees mentioned needing: 'confirmation', which was perceived as an important element that could facilitate EBM learning. Confirmation that the supervisor, given their extensive experience, would do the same in the discussed situation is important for trainees to learn how to make clinical decisions in general practice.

Trainee 5

Interviewer: *"What does a learning conversation add for you?"*

Trainee: *"Well, if I'm wondering if something [I do] would be good medical treatment, then I check if it's good and often they'll say yes and then I feel reassured. So then it's more to see that I don't overlook anything and don't make a mistake."*

Trainees expected their supervisors to point out new points of view related to diverse aspects. Supervisors may point out new knowledge-based evidence, topics or guidelines which the trainee may not have been aware of, but it can also concern more case-related knowledge, such as discussing alternative diagnoses or noticing the trainee's blind spots in clinical reasoning. Trainees perceived it as very useful when their supervisor did not answer their questions immediately but first makes them think for themselves. They valued it when the supervisor asked counter questions to clarify and specify their question or when the supervisor tested their line of reasoning.

Trainee 22

Interviewer: *"When do you feel that you've learned something from the conversation?"*

Trainee: *"Well, usually when XXX [supervisor] has a certain view of my case or she's thinking in a certain direction. Sometimes XXX can switch your direction completely so that makes me think, ah yes I hadn't looked at it that way or I should definitely think about it."*

Finally, trainees felt that their supervisor's help, in knowing and discussing the patient's wishes, was important in enabling their EBM learning. This can concern discussing patients in general, such as how to deal with patients who ask for non-evidence-based medical treatment. Advice on how to deal with such patients is often based on their supervisor's experience of working in a practice for a long time, which has led to deeper knowledge of 'typical' patients. However, learning

conversations on the wishes of the patient are more often patient-specific: the supervisor and trainee discuss those patients with whom the supervisor often has a longer history. In this way, supervisors can help trainees to develop a broader outlook than just the medical problem of a specific patient by also taking context-related factors into account. This helps trainees make decisions which can at times judiciously diverge from the guidelines, in this way enhancing the application and evaluation of EBM.

Trainee 7

Interviewer: *"Imagine that there is a case and you have doubts between treatment A and B. The diagnosis is quite clear to you but you don't know how to proceed. How do you discuss such a question and how, what, when... do you learn from her (your supervisor's, LW) answer?"*

Trainee: *"Yes, then XXX [supervisor] comes up with the arguments. Then she says, well in this situation, that patient lives like this or that, [and she gives me] a little more of her background knowledge and experience [...] of that particular patient in this situation. [...] Yes. I really think that she's good at pointing out patient-specific things and that's also her argumentation."*

Reflecting on the videos of their learning conversations, most trainees said they were content with their supervisor's behaviour. However, supervisors seemed to find giving an explicit, well-substantiated answer the hardest thing to do in practice. Trainees felt that this might be partly their own 'fault', since they might be too easily satisfied if their supervisor gave what sounded like a convincing answer. This seemed to happen more often when trainees had no other starting points on what to do or how to proceed: in this case the non-substantiated answer of their supervisor gave them at least some direction.

Trainee 12

Interviewer: *"You tell me that, overall, when he (supervisor, LW) explains something well using good argumentation, that you follow his advices. But what kind of argumentation do you find important to hear?"*

Trainee: *"So it's based on [his] experience but frankly if I really have no idea and he's quite convincing then I just say, well okay then."*

The trainee's behaviour

Trainees acknowledged that their own behaviour and activities before, during and after learning conversations plays an important role in the effectiveness of the EBM learning process and that they too can be expected to behave in a certain way during the conversation (Table 3). They should be asking focused questions and keep on asking if and when the answer is not clear to them. The trainees mentioned that good preparation is essential for the learning conversation. Afterwards, they should make an effort to search the literature for solutions to unanswered questions and should try out and evaluate the themes and advice to form their own considerations. However, on seeing the video of their own behaviour during the learning conversations, trainees reflected that they often settle for unclear answers. On top of that, they said that the questions that they want to ask are often not focused enough due to lack of preparation. This meant they obtained less useful information or help from their supervisor.

Trainee 14

Interviewer: *"And, in the end, looking back at this, are you satisfied with the results of such a learning conversation?"*

Trainee: *"Then perhaps we should prepare even more. I should read the guideline in advance and write down my questions so that I can ask concrete questions that we can go over. Because now it's chaotic at times [...] You lose sight of the overview. Yes. Then I'd also get more concrete answers."*

Trainees felt that looking up additional evidence on their own to fill the knowledge gaps that the learning conversation revealed was an important way of learning EBM. However, trainees said that they did not often do this in practice, mostly due to a lack of time. Furthermore, trainees said that they usually did not try to gain further evidence-based knowledge after the learning conversation, since the supervisor's suggestions and advice often gave them enough tools to proceed in daily practice. Thus additional information-gathering for the goal of EBM learning had no priority. Instead, the trainees did try out and evaluate their new knowledge during daily practice after the learning conversations.

Trainee 6

Trainee: *"I should really have got stuck into the literature, which I didn't do by the way"*

Interviewer: *"No. But why do you think you didn't?"*

Trainee: *"Actually, based on what I'd seen, I was satisfied. Yes, I thought it was just a local problem that should be treated locally. But if she came back with it I'd probably do [a literature search]."*

Context: equal, open and safe discussion between trainee and supervisor

Trainees stated that a safe space is essential for optimal EBM learning, so that the trainee can dare to question the advice of the supervisor and conflicting views and evidence can be openly discussed. Trainees value it when the supervisor gives advice but does not force the trainee to follow this advice. A discussion on equal footing helps trainees to make their own considerations and judicious decisions. However, trainees said that their current learning conversations are not always equal discussions. When reflecting on their behaviour on the video-recordings, trainees said that they sometimes feel obstacles preventing them from asking in-depth questions and creating an open discussion. The obstacles can be related to their own behaviour, since they feel that they should look up the answers on their own and not ask their supervisor. On the other hand, trainees do not want their supervisor to feel tested or embarrassed when they sense that the supervisor does not know the answer.

Trainee 11

Interviewer: *"Is there a reason that you don't ask such a follow-up question during the conversation?"*

Trainee: *"Yes, I'm not really thinking about asking [a follow-up question] because I think I could have looked it up for myself. Or yes [...] because I feel a bit like I'm testing my supervisor's knowledge of the guidelines."*

Table 3: What the GP trainee needs and expects from learning conversations to enhance EBM learning

Supervisor's behaviour	Trainee's behaviour
<ul style="list-style-type: none"> · Substantiate answers with explicit argumentation · Give to-the-point answers that can be applied in practice · Give confirmation and reassurance · Ask counter questions · Point out new viewpoints · Elaborate on own approach or experience · Discuss patient's preferences 	<ul style="list-style-type: none"> · Ask focused questions · Keep on questioning if an answer is unclear · Prepare for the learning conversation in advance · Look up additional evidence afterwards to fill knowledge gaps · Try out and evaluate the new knowledge in daily practice
In a context of:	
<ul style="list-style-type: none"> · Equal, open and safe discussion between trainee and supervisor 	

Discussion

This study aimed to gain insight into the perceptions of GP trainees on EBM learning processes during workplace-based learning conversations. GP trainees perceive learning conversations as useful to learn and discuss EBM. Multiple EBM learning activities were identified, such as discussing evidence together, relating evidence to cases in daily practice and discussing the supervisor's experience and the local context in the light of the evidence. However, for these learning activities to occur, trainees need and expect certain behaviour of their supervisor, such as giving well-substantiated answers that are practically applicable and that give the trainee confirmation. On the other hand, the trainee needs to prepare well in order to be able to ask specific, in-depth questions. Furthermore, only in a context of open, interactive discussion between trainee and supervisor, unfolding all EBM learning processes is possible.

The role of tacit knowledge

We assumed that using tacit knowledge and mindlines would hinder optimal EBM learning because it would make supervisors and trainees unable to reflect or elucidate on EBM decision-making during their learning conversations. Our results show that supervisors did not always give well-substantiated answers based on argumentation to their trainees. The concept of mindlines might play a role here, making supervisors unable to explicitly substantiate their answers or elucidate the reasons for certain advice. Theories on the stages of adult learning

show that experts, such as supervisors, rely more on tacit knowledge and intuitive, non-analytical decision-making, while novice learners depend more on analytical reasoning. (37–39) However, to improve performance in clinical practice, both explicit and implicit reasoning are important. As previous research suggests, gaining extensive experience through deliberate practice is important to obtain non-analytical, implicit ways of reasoning. (39) Learning conversations can facilitate deliberate practice, where trainees have the space to reflect on their actions and supervisors are able to give constructive underpinning to their advice, which trainees can take back to practice. However, our results show that providing exact elucidation of substantiations may be difficult and impossible at times due to the nature of mindlines and implicit knowledge. To solve this, supervisors should be made aware of the importance of elucidating their exact reasoning, and encouraged to make as much of their reasoning explicit as possible. Furthermore, trainees should be encouraged to ask in-depth questions and ask follow-up questions if when the answer is still unclear to them. This could help turn the supervisor's tacit knowledge into a discussable topic during the learning conversation.

Threshold concepts

Our results showed that trainees consider having a fruitful discussion and brainstorming with their supervisor useful EBM learning activities, but they also want straightforward, to-the-point answers that can be applied in daily practice. This apparent contradiction could be explained by looking at learning to apply EBM as a threshold concept. In 2003, Meyer and Land first described and developed threshold concepts in higher education. They can be defined as core ideas, essential to the mastery of a specific field, that need to be grasped. (40) Grasping the core idea leads to an 'aha' moment through integration of different learning elements, and marks an irreversible transformational shift in the identity of the learner. Learning and dealing with threshold concepts can often be troublesome: learners want to apply certain difficult skills, but fear making mistakes or that their knowledge is incomplete. (41)

Looking at the skill of applying EBM, previous research states that dealing with the nature of evidence or uncertainty can be seen as threshold concepts that need to be mastered in medical education, particularly in general practice. (42–44) Specifically, Sokol and colleagues showed that formal classes on evidence-based medicine can lead to transformative learning when the learner masters such threshold concepts as 'uncertainty is an aspect of medical decisions, but steps can be taken to proceed confidently'. (45)

Our results show similar effects, since in the learning conversations we observed trainees trying to master threshold concepts related to using EBM in daily clinical practice. Troublesome signs were apparent, since trainees described their need

for help if they felt unsure or were unable to apply evidence in a straightforward manner. This explains the trainees' paradox: on the one hand wanting to discuss EBM and be supported in forming their own considerations, but on the other hand wanting direction and confirmation from their supervisor. Trainees use learning conversations as educational moments that help them master these concepts.

We would like to suggest that supervisors should help trainees master EBM-related threshold concepts even more during learning conversations. For instance, they could encourage trainees to let go of the idea that there are absolute answers in medicine and accept the fact that decision-making in general practice comes with uncertainty. EBM is not just only about searching and appraising evidence. It must be applied in practice, in combination with the patient's preferences and the clinician's own clinical expertise.

Equal, safe and interactive discussion

An important outcome of our research was that optimal EBM learning depends on creating a safe, equal and interactive space in which conflicting views and new information can be openly shared and discussed. The literature on professional learning conversations finds this an important prerequisite as well. Earl and Timperley state that *"the basis of learning conversations is the mutual understanding of each contributor's claims and the values, together with the reasoning and data on which they are based"*. (46) Other research also emphasises the need for open, safe discussion with learner participation and an educator who actively engages the learner in interactive discussion as both factors are important for giving feedback or debriefing. (22,47,48) However, the role of this open environment has not been clearly described specifically for EBM learning in workplace-based learning conversations. Research does acknowledge the important role of a safe environment for EBM learning in general, and has even led to an instrument that characterises the EBM learning environment. (49) Another study with surgical residents, on barriers to the use of EBM, also describes the residents' fear of confronting supervisors with new evidence, implicitly saying that their current practice is outdated and possibly embarrassing them. (50) The review by Van Dijk et al. on barriers for trainees to practice EBM also mentions the role of the learning climate as important to the EBM behaviour of trainees. (51) Specifically, a climate with hierarchical dependence hinders EBM learning and expressing information needs, making *'safe communication and shared learning across career stages perceived as the most prominent facilitator for EBM'*. (52) This is in line with our findings in this study, as trainees stated that they find an equal and safe environment is not only important for EBM learning and practice in general, but it is also important for EBM learning during learning conversations in particular.

Strengths and limitations

Strengths

To our knowledge, this study is the first to look specifically at how trainees perceive workplace-based EBM learning during learning conversations in general practice. By shedding light on how trainees experience these conversations and which EBM learning activities they execute, this study can start filling the current gap on how best to teach and learn the full spectrum of EBM in the workplace.

Our VSI methodology is a strength because the video recordings not only allowed us to shed light on how GP trainees handle and discuss evidence, it gave the trainees the opportunity to reflect on daily practice. This technique can identify more specific points of improvement.

Finally, when looking at learning and knowledge as social constructs, these interviews are the right approach to unfolding current learning processes. (30) Learning is a process of interaction and can best be examined by asking learners themselves what they have learned. Moreover, it can reveal implicit learning processes that might occur during the conversations but are not clearly visible, or elucidate the learning that occurs before or after the actual encounter that the learning conversation has initiated.

Limitations

The participant sampling method may have influenced our results, since we had to switch to convenience sampling in the Netherlands. In theory, this might have led to less rich results due to reduced variation in the characteristics of participants, or selecting only trainees with a pronounced interest in EBM. However, when we look at the characteristics and composition of the Belgian and Dutch groups of trainees, we do not expect the sampling method to have had any significant impact on our results, since variation within both national groups was similar.

Secondly, our videos of learning conversations could have shown socially desirable EBM behaviour, since the participants were aware of the EBM-oriented goal of this study. To avoid this problem, however, we asked participants to record three learning conversations in full length (20–60 minutes), since research shows that awareness of being filmed fades when the recording continues for a longer period of time. (53,54) Furthermore, we used the video fragments only as a starting point to talk about the way participants perceived EBM learning during the learning conversations. The fragments were used solely to deepen the interview and enable reflection.

Conclusion and recommendations

This study demonstrates that learning conversations can be a useful way to improve and enhance EBM learning in general practice. To bring EBM learning in these conversations to its full potential, attention should be given to optimising the described behavioural and contextual factors that help EBM learning activities to take place. This includes encouraging trainees to prepare for their learning conversations thoroughly, so that they can ask specific, in-depth questions that stimulate supervisors to substantiate their answers and advice. Finally, creating an equal, safe and open space that allows room for discussion and brainstorming can improve EBM learning activities.

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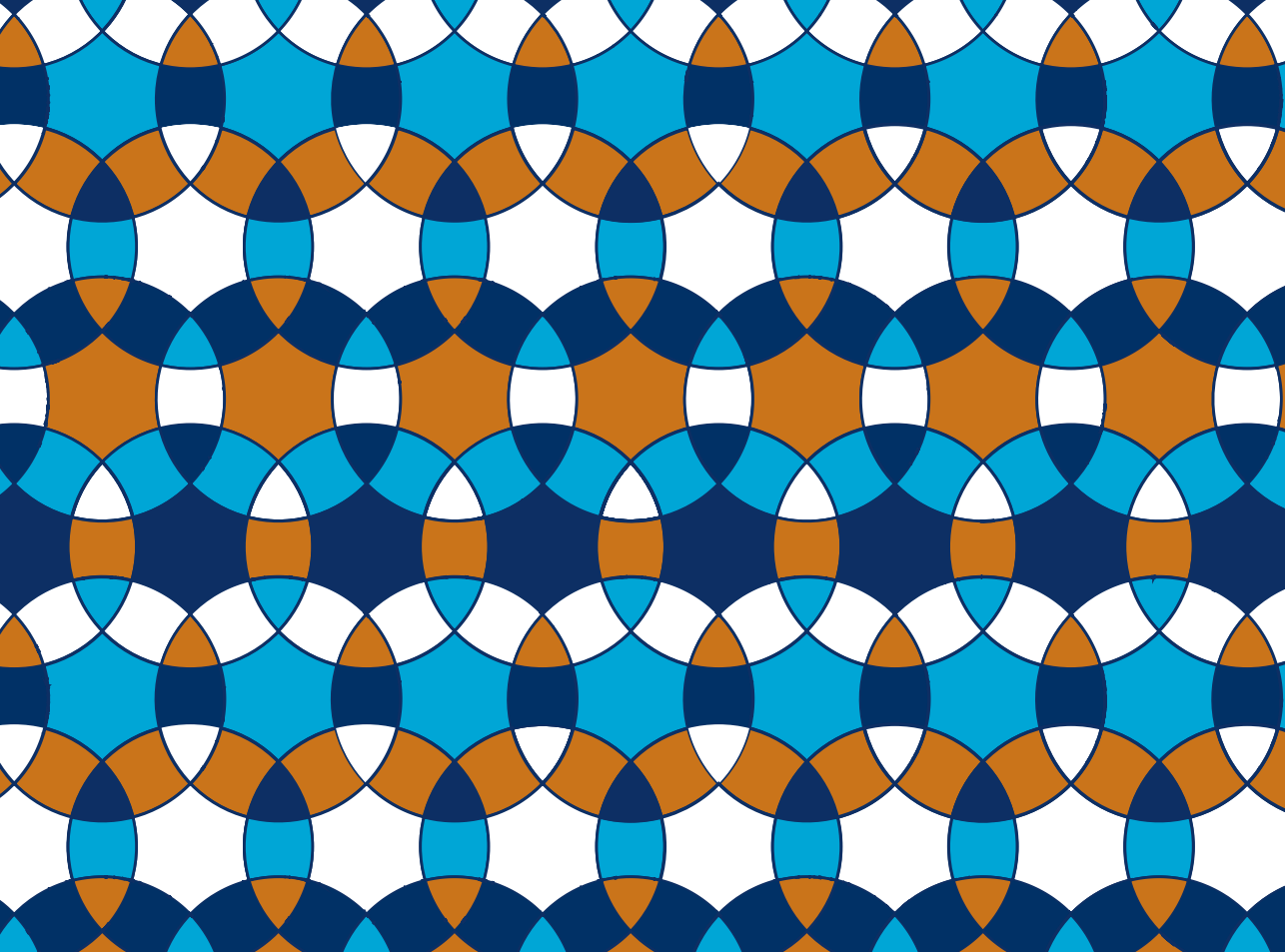
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Chapter 3

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Learning Conversations with Trainees: An Undervalued but Useful EBM Learning Opportunity for Clinical Supervisors

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Abstract

Phenomenon

Supervisors and trainees can learn skills related to evidence-based medicine from each other in the workplace by collaborating and interacting, in this way benefiting from each other's strengths. This study explores supervisors' perceptions of how they currently learn evidence-based medicine by engaging in learning conversations with their trainee.

Approach

Semi-structured, video-stimulated elicitation interviews were held with twenty-two Dutch and Belgian supervisors in general practice. Supervisors were shown fragments of their video-recorded learning conversations, allowing them to reflect. Recorded interviews were analysed using a grounded theory-based approach.

Findings

Supervisors did not immediately perceive workplace learning conversations as an opportunity to learn evidence-based medicine from their trainee. They mostly saw these conversations as a learning opportunity for trainees and a chance to maintain the quality of care within their practice. Nevertheless, during the interviews, supervisors did acknowledge that learning conversations help them to gain up-to-date knowledge and search skills or more awareness of their own knowledge or gaps in their knowledge. Not identified as a learning outcome was how to apply evidence-based medicine within a clinical practice by combining evidence with clinical expertise and the patient's preferences.

Insights

Supervisors acknowledged that they learn elements of the three aspects of evidence-based medicine by having learning conversations with their trainee, but they currently see this as secondary to the trainee's learning process. Emphasizing opportunities for bidirectional learning could improve learning of evidence-based medicine during workplace learning conversations.

Keywords

Evidence-based medicine; general practice; workplace-based learning; bidirectional learning; video-stimulated elicitation interviews; learning conversations

Introduction

Combining the three aspects of evidence-based medicine (EBM) – i.e., the best available evidence, the patient’s wishes and preferences, and the physician’s clinical expertise – is important in making medical decisions for individual patient care. Nevertheless, incorporating these three aspects into practice is not without its difficulties.(1,2) Teaching EBM involves five steps: ask a clinical question, acquire relevant evidence, appraise this evidence for its relevance, apply the relevant evidence in practice, and evaluate the result.(3) To integrate EBM into local clinical practice and combine all three aspects of EBM, the focus must be on the latter two steps, which should be learned in the clinical workplace.(2,4) Researchers have studied how best to incorporate EBM learning and teaching into daily clinical practice, but attempts so far have been without great success.(5–12) It is crucial to obtain a better view of current workplace-based practices so that support for EBM learning can be better tailored to the workplace.

Most postgraduate, general practice specialty training occurs in the workplace. Trainees work closely with their clinical supervisor, who serves as a role model, for example for how to apply and evaluate EBM.(13) Supervisors themselves experience barriers to practicing EBM, however, generally because they lack literature search skills.(14,15) They might benefit from the knowledge of their trainees, who may have more up-to-date skills when it comes to searching for and appraising evidence. Supervisors, on the other hand, may have more insight into the patient’s perspective and can help trainees gain clinical expertise. It is useful to look for ways in which supervisors and trainees can optimize bidirectional learning and can benefit from each other’s strengths.

A suitable moment for bidirectional learning could be the “learning conversations” that are a standard part of general practice specialty training in the Netherlands and Flanders, Belgium. Learning conversations are regularly scheduled meetings during daily clinical practice in which supervisor and trainee discuss medical questions, selected topics or professional performance, in this way integrating feedback and debriefing at dedicated times.(16,17) The format provides opportunities for non-formal, deliberative workplace-based learning.(18)

Learning conversations are currently viewed primarily as a learning opportunity for trainees in which they are meant to show self-directed learning and to set learning goals. A previous study (part of the larger research project to which this study belongs) showed that trainees indeed see these conversations as an opportunity for EBM learning in which they might discuss the supervisor’s experience and the specific local context in light of what the evidence recommends.(19) However, it is unclear whether supervisors see these conversations as an opportunity to learn EBM

from their trainee as well. This study explores how supervisors currently perceive their own EBM learning in learning conversations with their trainee.

Method

Design

We performed a qualitative, grounded theory-based interview study because our research aimed to explain a process involving social interactions or experiences. (20) To evoke reflection during the interviews and elicit the tacit knowledge that informs professional practice, we made use of the video-stimulated interviewing (VSI) technique.(21–23)

Setting

This study was conducted in general practices in the Netherlands and Flanders, Belgium, which have comparable general practitioner (GP) specialty training. Supervisor and trainee worked independently in the GP practice, but the supervisor was always available for questions and back-up. Both trainees and supervisors underwent formal training in EBM, but regular workplace-based learning conversations were also customary in both countries and part of daily clinical routine. These conversations were aimed at the trainee's learning process but had an informal character in which all topics could be discussed.

Participants and sampling

Within the broader research project to which this study belongs,(19,24) we selected 22 supervisors and their trainees for maximum variation between September 2016 and April 2017 by giving promotional talks and distributing information leaflets during formal educational sessions at the GP training institutes in Antwerp and Ghent (Belgium) and Utrecht (the Netherlands).(25) Since recruitment was more difficult in the Netherlands, convenience sampling was used there. Participants completed a short questionnaire about their baseline characteristics (Table 1), with maximum variation being maintained in both the Dutch and Flemish group.

Data collection

Data collection took place between November 2016 and August 2017. All pairs of supervisors and trainees were asked to video three random learning conversations over a period of at least four months to take the developing relationship between supervisor and trainee into account. We only asked participants to record conversations addressing a medical topic or question and gave them no further instructions.

After recording the conversations, LW selected two video fragments per supervisor, from different recordings. A fragment was considered suitable when it showed the trainee asking the supervisor a medical question that was then followed by a discussion; this made the fragment appropriate as a starting point for reflection on all three aspects of EBM. The semi-structured video-stimulated elicitation interviews, conducted in the workplace, were held within two weeks of the final recording. Supervisors were asked to elaborate on their goals during the learning conversations and the role that all three aspects of EBM played during these conversations. Subsequently, participants were shown the selected video fragments, allowing them to elaborate on their own EBM learning during the conversation. During the data collection process, the interviewers read transcripts of previous interviews to allow earlier analytic insights and concepts to shape the elicitation interview when necessary, for example to make questions more to-the-point and understandable for the interviewees.

Data analysis and credibility

All interviews were audio-recorded, transcribed verbatim, and analysed using NVivo 12 software. Analysing and coding were performed by six researchers with different backgrounds (LW, KVR, MLB, EdG, HS and DB) to enhance trustworthiness and reflexivity during coding discussions. The first interviews were coded separately and discussed afterwards, leading to a provisional code tree that identified the main categories. Thereafter, four of the six researchers (LW, KVR, HS and DB) analysed and coded the interviews in rotating pairs, discussing the codes until they reached consensus. The final interviews were coded individually but were always discussed extensively during research team meetings. After conducting and analysing all 22 interviews, we felt that no new themes could be constructed and that our research questions could be answered. Using axial coding involving extensive discussions and reflections with the whole team to ensure triangulation, we constructed an overview of aspects of learning conversations as described by the supervisors and their own learning activities and outcomes regarding EBM.(26)

Results

Twenty-two supervisors participated in the study, selected to form a heterogeneous group in terms of experience, age, and practice type (Table 1).

Table 1: Characteristics of participants.

	GP supervisors (n=22)
Female	11 *
Age (average in years (range))	52 (36-67)
PhD trajectory (finished or ongoing)	2
Trainee in first year of training	13
Trainee in last year of training	9
Supervisor's experience as GP (average in years (range))	23 (12-38)
Supervisor's experience supervising trainees (average in years (range))	10 (1.5-25)
Duration of collaboration between supervisor and trainee (average in months, collected when starting the video recordings (range))	8 (3-18)
Practice type	
Solo	2
Duo	9
Health centre	11
Training institute	
Utrecht	9
Antwerp	3
Ghent	10

*: Results are numbers, unless stated otherwise

Analysis of these 22 supervisors' interviews revealed that they perceived three different aspects playing a role during learning conversations: encouraging the trainee's learning (both EBM and non-EBM), maintaining the quality of care within their general practice, and stimulating their own learning (Figure 1).

Encouraging trainee's EBM and non-EBM learning and maintaining the quality of care

Not surprisingly, most supervisors did prioritize their trainee's learning process and goals during their learning conversations. Supervisors elaborated on what they saw as essential goals of this process. Some goals were EBM-related, but many were not. One important goal was that trainees should be able to learn actively and independently, take control of their learning processes and grow in their role as independently functioning GPs. Coaching trainees in how to take on such a role, for instance by discussing practical skills such as conducting GP-specific examinations and organizing and managing a practice, was seen as an important non-EBM aspects of these dedicated conversations.

Supervisor 15

"And I consider that important, because it might be the most useful [information] to him when he sets up his own practice later. I do think so, because you learn the medical side of things as you go, and largely through independent study, but how to organise a practice and, for example, how to make sure that your instruments are disinfected, those are structural interventions that also have to be learned."

When addressing their trainee's EBM learning, supervisors pointed out that knowledge-gathering is an individual task for the trainee and should not be part of the learning conversation. These supervisors tended to focus on how their expertise helped trainees to apply knowledge when assisting individual patients, for example by discussing how to share decision-making.

Supervisor 14

"Because in theory they already know it all [...] so that feeling, the feeling of dealing with the patient, what is the patient asking, what can you do? Do you go along with that, or not? To what extent do you want to lead the patient to something like, more like interaction. [...] Not all patients would go along with what you suggest and then you'd have to look for something else. That's how you interact with a patient to find the best solution."

Supervisors also saw the learning conversation as an opportunity to maintain the quality of care within their practice. GP trainees worked independently, and if they did not ask for feedback or help, supervisors did not see the relevant patients. The supervisors therefore used the learning conversations to check up on their trainees' actions and the decisions that they had made during consultations. They also used these conversations to align medical decisions.

Supervisor 20

"Whether the trainee, so to speak, has overlooked anything. Just go over everything again, even an ordinary cold or so is discussed briefly. [...] But then all patients get examined and that's actually like doing a check for us, so to speak."

Supervisor's EBM learning

First and foremost, the supervisors saw learning conversations as an opportunity for their trainee to learn. However, when reflecting on the video-recorded conversations

that they were shown during the interview, they did see their own learning as a benefit, with several learning activities leading to EBM learning for themselves.

Supervisor 12

“Yes, I do pick up things, of course. Like when a trainee says ‘I’ve looked that up and this is how it is’. Sometimes a trainee tells me ‘You told me it’s this way, but I believe it’s something else’, and then I quickly adapt my policy.”

Supervisors associated most learning activities and outcomes with their gaining up-to-date knowledge on evidence, and not with the whole spectrum of EBM; they did not mention balancing the clinician’s expertise, the patient’s perspective and the best available evidence as an aspect that they had learned from their trainee.

Up-to-date knowledge and search skills

The learning conversation allowed these supervisors to obtain new, up-to-date knowledge or to search for evidence in different ways. They sometimes described trainees as bringing new, up-to-date evidence or knowledge to the table of which they themselves were not yet aware. This might include evidence-based knowledge, but also forgotten facts about pathophysiology, or more general items from lectures at the training institute. Furthermore, some supervisor-trainee pairs first read a guideline or article individually and then discussed it in-depth during the learning conversations. The conversation could also be a starting point for seeking additional evidence in response to questions that came up during their discussion. Some pairs agreed to look for substantiating evidence individually and discuss it again during the next meeting.

Supervisor 4

“So, when I think, well I don’t know but we’ll get back to it. So, then I think oh, let’s see what I can find out about it or see how a colleague does it. So, putting something I don’t know and she doesn’t know on the agenda is like challenging [me] to look up [the answer].”

During the conversation, some supervisors asked their trainee to search for additional evidence or to report the answer during the next conversation if a question or topic remained unclear. Supervisors often saw their trainees as more skilled at searching for evidence online and trainees would show their supervisor how to access all information quickly and easily during the learning conversation.

The supervisors in our study not only gained up-to-date knowledge in this way but also learned how to obtain evidence.

Supervisor 3

"For the knee, for example, if I wrote down that I'd do a Thessaly test and not a McMurray then he'd get on to the computer straight away and do a search to see what the specificity and sensitivity of it is. So that's really useful for me because I don't look at it like that, so in that sense it's very nice working with XXX (trainee) because he looks at what it's worth [the value] far more [than I do]."

Awareness of own knowledge

Supervisors found that the trainee's questions during the learning conversations stimulated them to think about substantiating their behavior while reflecting on how they handle issues themselves during daily practice. Having to explain something to the trainee revealed their knowledge gaps and stimulated them to look for new evidence or to check their assertions against the literature.

As a learning outcome, this process of reflection sometimes led to the supervisors becoming aware of their own, often implicit and tacit, knowledge. In our interviews, the supervisors acknowledged that much of their behavior was based on internalized, less explicit routines drawn from their experience. Answering the trainee's questions forced these supervisors to go back to their own reasoning and substantiations, presumably leading to more explicit EBM behavior themselves. Furthermore, having to reflect on their behavior so explicitly sometimes made them reconsider and change their behavior.

Supervisor 16

"One of the nice things about working with people in training is always that [I] can take a critical look at what I'm doing, at the factual basis of what I do. That can also be an incentive to say, I'm going to look at a standard again, for example, or check what's in the guideline nowadays."

Gaining a fresh perspective on patients

The interviewees did not mention balancing the clinician's expertise, the patient's perspective and the best available evidence as an aspect that they had learned from their trainee. However, when discussing cases from daily practice, some supervisors

noticed that trainees have a “fresh perspective” on patients whom they may have been treating for many years. Having a long history with patients is one of the strengths of general practice, but it can also obscure how the patient’s situation may have changed over time. By discussing such cases with their trainee, supervisors sometimes acquired a different perspective on the patient.

Supervisor 9

“Yes, in terms of content, certainly but also, in a manner of speaking, like an outsider seeing a client for the first time with their [fresh] eyes while my [old] eyes have been wearing out for 20-25 years. [...] And I’ve seen in learning conversations about a patient where I’ve said, my goodness, I’ve never seen that in her before. I’m seeing a completely different woman. I thought that was very nice.”

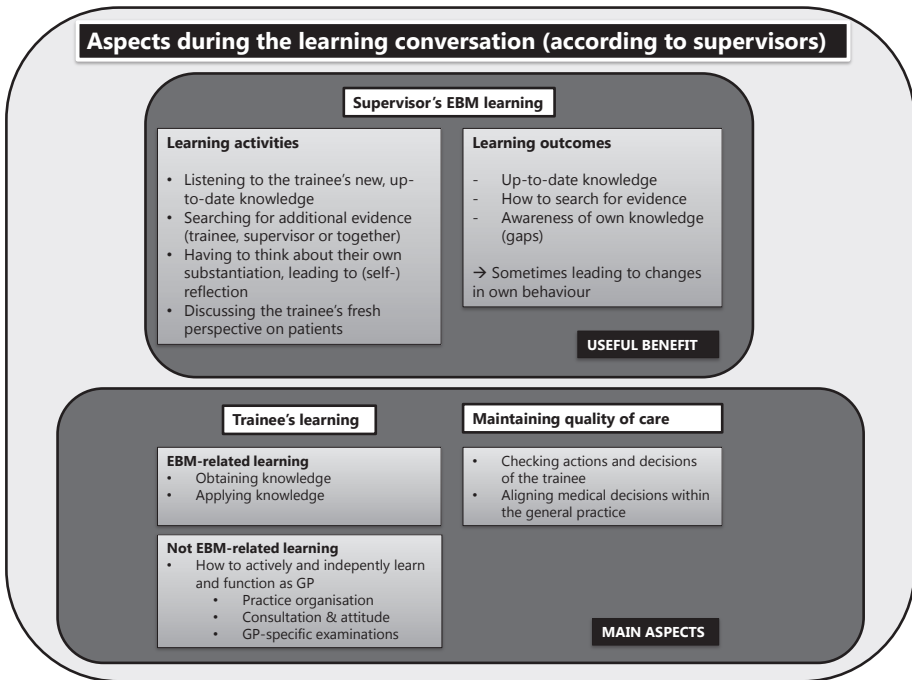


Figure 1: How supervisors perceive their own EBM learning during learning conversations.

Discussion

Most supervisors in our study did not immediately perceive learning conversations as an opportunity to learn EBM from their trainee. First and foremost, they saw these conversations as an opportunity for the trainee to learn and to monitor their trainee's behaviour to maintain the quality of care within their practice. Their own learning was seen as a valuable benefit, with several learning activities potentially leading to EBM learning. Learning outcomes included gaining up-to-date knowledge, search skills, and more awareness of their own knowledge or gaps in their knowledge.

There has been surprisingly little research on how medical supervisors themselves benefit from teaching and supervising in the workplace. Medical education research on supervisor learning focuses mainly on how they can acquire and update teaching skills, for instance through formal faculty development or informal experiential learning in the workplace,(27,28) but not on how they might gain new medical knowledge and skills. One recent report by Sun et al.(29) did show that clinician-teachers can benefit their own learning by teaching medical topics, especially those that they are less likely to encounter in daily practice, such as crisis resource management. Parallels can be drawn with our results. Even though practicing EBM is an everyday activity, experienced GPs may not always practice it consciously. Experienced GPs rely more on tacit knowledge derived from mindlines – internalized, collectively reinforced tacit guidelines – making them less aware of their own reasoning and substantiations on a day-to-day basis.(30) Having to discuss EBM during learning conversations deliberately may help them to combine such implicit and more explicit reasoning.(31)

Our results show that supervisors make their trainees' responsible for obtaining new EBM knowledge, stating that this is the trainee's individual learning process or that trainees are more skilled in searching for evidence. However, this is also precisely what they say that they can learn from their trainee. This somewhat contradictory way of thinking may be an outcome of the culture and context of workplace-based teaching within general practice. Recent research by Elmberger et al.(32) suggests that culture and context influence the way supervisors teach. They argue that *"attention needs to shift from individual teachers to developing the systems in which they work"* (p. 125). Current discourse within formal "teach-the-teacher" training focuses on making the trainee responsible for their learning so that they self-regulate their learning.(33,34) Given this, it is understandable that many supervisors regard obtaining EBM knowledge as something the trainee should do individually. However, our results suggest that supervisors may miss out on valuable learning opportunities for themselves if they persist in thinking that trainees should gain up-to-date knowledge on their own. Training institutes should

use formal education to encourage supervisors to change the culture and context: EBM learning is not exclusively a self-regulating learning activity for trainees. We recommend designing EBM learning as an activity in which bidirectional learning can benefit both trainee and supervisor. By stimulating explicit discussions in the workplace, supervisor and trainee can better align their expectations regarding learning outcomes.(35,36)

Limitations

Our interview questions asked supervisors about their own learning outcomes. The interviewees' answers focused predominantly on gaining and updating evidence, and less on applying this new knowledge judiciously in practice while considering the clinician's expertise and the patient's perspective. It is interesting that application in practice was not mentioned at all, since using evidence in clinical decision-making, especially in general practice, cannot be separated from the situation, context, and individual patient.(4,37) It may be that, even though we tried to focus on applying all three aspects of EBM during the interview, the wording of this question still led supervisors to associate it with searching for and appraising evidence. Future research might explore other methods of elucidating how and what supervisors can also learn from their trainees about applying their newly obtained, up-to-date knowledge in practice, especially when that knowledge deviates from what supervisors are accustomed to doing based on their clinical experience, for example.

A further limitation of our study was that it was unfeasible for us to collect data in an iterative manner, although that is recommended for studies taking a grounded theory-based approach. We have argued that iterative, and thus more theoretical, sampling is frequently challenging to implement.(38) Nevertheless, follow-up studies, starting with our model, would be recommended.

This study took a different and unique approach on EBM learning in the workplace by looking at what GP supervisors think they can learn from their trainees about EBM in the learning conversations format. There has been very little research addressing this question. Using the method of video-stimulated elicitation interviews produced richer results. Supervisors struggled to elaborate on their own learning opportunities, since they generally did not focus on this aspect of "being a supervisor". Our method made it easier for them to reflect on specific and concrete video-recorded events, leading to richer and more informative data. The results of this study can help tailor EBM learning and teaching to the GP workplace by using learning conversations efficiently and by linking them explicitly to existing routines in daily practice.

Conclusion

GP supervisors do not immediately perceive workplace-based learning conversations as an opportunity for them to learn EBM from their trainee. They see these regular meetings as learning opportunity for the trainee and as a procedure for maintaining the quality of care within their GP practice. However, supervisors do acknowledge that learning conversations allow them to gain new, up-to-date knowledge and search skills themselves, as well as more awareness of their own knowledge and any gaps in that knowledge. Not identified as a learning outcome was how to apply EBM in a clinical practice by combining evidence with clinical expertise and the patient's preferences. Emphasizing opportunities for bidirectional learning during learning conversations could improve workplace-based EBM learning.

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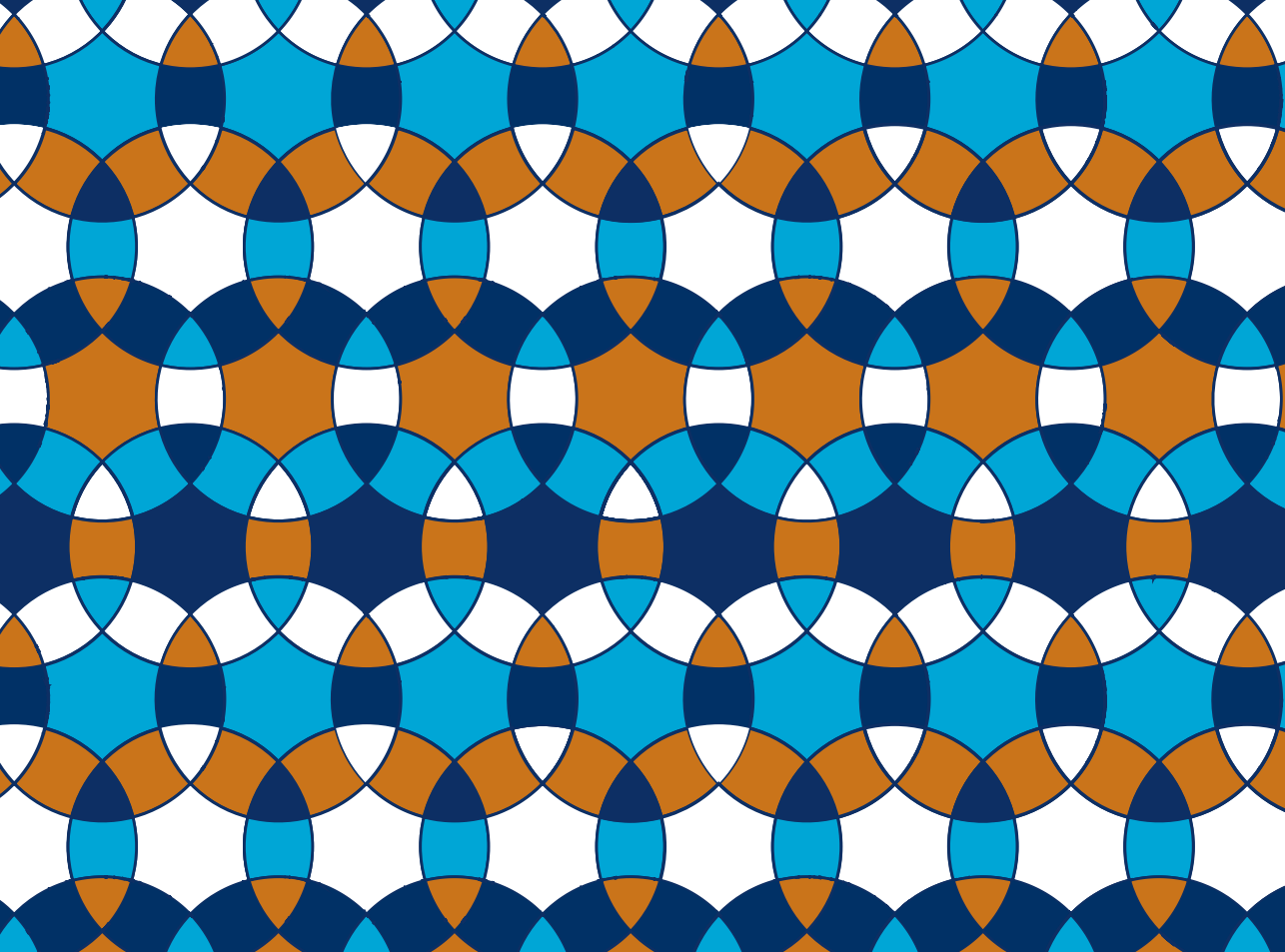
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Chapter 4

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Bidirectional learning opportunities: how GP-supervisors and trainees exchange knowledge

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Abstract

Introduction

Workplace-based learning conversations can be a good opportunity for supervisors and trainees to learn from each other. When both professionals discuss their specific knowledge openly with each other, learning conversations may be a useful educational tool, for instance for learning how to apply evidence-based medicine (EBM) in the workplace. We do, however, need a better understanding of how the exchange of knowledge provides opportunities for such bidirectional learning. The aim of this study was therefore to analyse how trainees and supervisors currently handle bidirectional learning opportunities by describing in detail how supervisors respond to knowledge expressed by trainees during a learning conversation.

Method

We video-recorded learning conversations between supervisors and trainees in general practice (GP). Within these learning conversations, EBM discussions on medical topics were selected and transcribed. We then identified, analysed using Conversation Analysis (CA), and categorized each expression of knowledge by the trainee and the supervisor's subsequent response.

Results

We found that when a trainee expresses knowledge during the learning conversation, supervisors either 1) refute the expressed knowledge, 2) immediately suggest an alternative, or 3) pose (additional) questions. These responses have consequences for the learning opportunities of both trainee and supervisor: it is only when supervisors pose further questions that trainees are encouraged to elaborate on their knowledge, leading to a bidirectional learning opportunity.

Discussion

Improving EBM learning opportunities for both supervisors and trainees requires more than simply instructing trainees to express knowledge based – for instance – on recent evidence more often. Inflexible institutional roles related to historical claims of supervisors' epistemic authority hamper bidirectional learning. Posing open questions during learning conversations enhances the flexibility of institutional roles while also creating bidirectional learning opportunities.

Introduction

Medical education relies a great deal on workplace-based learning, in which trainees learn through, for instance, 'supported participation' and dialogue. (1) Dialogue between trainee and supervisor can be seen as one of the most important aspects of workplace-based learning, being deliberative yet informal. (2–5) One specific workplace dialogue that could be a good learning opportunity for both supervisor and trainee is the 'learning conversation', a standard practice in general practitioner (GP) specialty training. Learning conversations are regularly scheduled meetings in which clinical supervisor and trainee discuss clinical questions, medical topics or personal development. (6) They combine debriefing, supervision and feedback, in this way assigning the 'learner' role largely to the trainee while the supervisor advises, comments or instructs. (7) Knowledge on how these dialogues precisely occur and how both trainee and supervisor can learn from exchanging knowledge during such dialogues is lacking.

Although workplace learning conversations are mainly seen as an opportunity for trainees to learn from supervisors, supervisors can also learn from trainees. Previous research on bidirectional learning opportunities showed that supervisors acknowledge that they could learn from their trainee during learning conversations. (8,9) Also research on collaborative learning has shown that learning between peers or professionals can lead to valuable learning outcomes due to the exchange of knowledge and perspectives. (10,11) However, collaborative learning is mostly researched in a setting of two peers. The concept of bidirectional learning, defined as reciprocal learning between supervisor and trainee, has gained surprisingly little attention within medical education research. So it is unclear whether and how bidirectional learning opportunities during learning conversations are seized.

To analyse how bidirectional learning opportunities are approached, it is a good starting point to look at how trainees and supervisors learn to apply evidence-based medicine (EBM). While traditionally, learning of EBM has been mainly focused at how to search and appraise clinical evidence, recent papers advocate for a more holistic approach in which the contextual application of EBM at the workplace is essential. (12,13) This involves learning how to take decisions about individual patients by combining 1) the best available evidence, 2) the patient's preferences and 3) the clinician's clinical expertise. (12,14,15) However, combining all these relevant aspects during daily clinical practice is complex. When learning how to do this, trainees and supervisors may benefit from each other's strengths: trainees are likely to be more up-to-date on the latest evidence and have better literature search skills, while supervisors tend to know more about a patient's preferences and have more clinical experience. When both supervisor and trainee bring their specific knowledge to the table and discuss it openly with each other, bidirectional learning

within learning conversations can be an especially valuable educational tool for learning how to apply evidence-based medicine (EBM). Currently, it is not clear whether supervisor and trainee seize the opportunities to learn from each other during dialogues. In order to get a better view on the potential of bidirectional learning, it is essential to know how knowledge exchanges between supervisor and trainee currently occur.

To study bidirectional learning opportunities, we have applied the Conversation Analysis (CA) method. By analysing how people respond to each other's utterances, CA allows us to identify how people deal with asymmetries in knowledge, adding valuable new insights into learning and learning opportunities in medical education. (16–18) By describing in detail how supervisors and trainees exchange EBM knowledge together during their conversations, this study aimed to analyse how trainees and supervisors currently approach bidirectional learning opportunities.

Method

Setting

In the Netherlands, postgraduate GP specialty training takes three years. In the first and last year, trainees work alongside an experienced GP, i.e. their supervisor. One hour of the daily routine is set aside for workplace-based learning conversations covering a range of topics, from medical cases in daily practice and training institute assignments to personal development. Trainees are expected to set the agenda for the conversation, but the supervisor can also add topics.

Data collection

Between September 2016 and April 2017, we used convenience sampling to select a heterogeneous group of nine established pairs of Dutch GP supervisors and trainees affiliated with the GP training institute in Utrecht, the Netherlands. (19) The group differed in terms of the trainee's stage of training, the supervisor's age and experience, the length of collaboration between supervisor and trainee, and the type of practice – solo, duo or health centre – in which they worked. Each pair was asked to video-record two random learning conversations, both of which had to include at least one discussion of a medical topic, since that is how we defined an EBM dialogue.

To ensure a diverse range of medical topics, we selected one discussion of a medical topic per learning conversation, producing a dataset of 18 medical discussions in total, which we transcribed verbatim. These discussions lasted between 5 to 20 minutes and showed how a trainee and a supervisor discussed a medical question. The fragments selected, for example, involved discussions regarding

the appropriate medication for benign prostatic hyperplasia (BPH) or protocols on administering vitamin D supplements to the elderly. The discussion started with the trainee asking a question or introducing the topic, followed by a dialogue on that question or topic, and concluded with a wrap-up or transition to another topic. We examined our dataset of 18 medical discussions for opportunities for bidirectional learning. Since learning conversations are traditionally seen as an opportunity for trainees to learn from supervisors, we defined bidirectional learning opportunities as moments presenting learning opportunities not only for trainees but also for supervisors, with trainees expressing their knowledge to their supervisor.

Analytical procedure

Since CA is an inductive method, we started by taking an open approach to our dataset, focusing on the utterances in which trainees expressed knowledge. (20) We organized a data session in which ten CA researchers from various backgrounds commented on and analysed specific fragments, using the verbatim transcripts and anonymised video- and audio material. (21) We were then able to describe our phenomenon of interest in greater detail. CA focuses on how a conversation unfolds, turn by turn, emphasizing that language is co-constructed and happens according to fixed patterns. (17,20,22,23) CA sees knowledge as a socially constructed process that occurs in interaction with others through mutual social actions. (23–26) Since CA looks at previous and subsequent turns in the interaction (*why that now* (27)), we began our analysis by considering the trainee's expression of knowledge. We subsequently focused on how the supervisor responds to the trainee's expression of knowledge, as this provides interactional learning opportunities. (28–31) We also included the trainee's utterance following the supervisor's response. **Figure 1** depicts the interactional phenomenon, including the three steps that we analysed.

We then randomly selected one fragment from each supervisor-trainee pair (nine in total) in which this interactional phenomenon was present. We transcribed these fragments in detail using Jeffersonian transcription conventions and analysed the fragments according to CA standards. (32,33) Individual case analysis was undertaken, with a focus on the design of individual turns at talk and the relationship between turns. (34,35) Grouping fragments that showed a similar response by the supervisor to the trainee's utterance of knowledge allowed us to form three sub-collections. (20,23) We were thus able to identify patterns in how supervisors respond to an expression of knowledge by a trainee and whether this response promoted bidirectional learning opportunities.

To verify whether the identified patterns also applied to other sequences, we returned to the 18 medical discussions as a whole. Within these 18 discussions, two researchers (LW and LdC) looked for all sequences in which the trainee expressed knowledge. A total of 25 moments could be identified. All 25 moments fit within

the three defined categories, leading us to conclude that the results and fragments presented in the Results section are illustrative of the 25 sequences in the complete dataset. The researchers discussed all analyses and conclusions at length and in detail within the research group. (36)

Ethical considerations

This study was part of a larger research project on EBM learning in the GP workplace. Approval for the research project as a whole, in which also Belgian GP supervisors and trainees took part, was granted by the ethical board of the NVMO (Dutch Society of Medical Education) under case number 706. Belgian ethical approval was issued by the Ethics Committee of the University Hospital of Ghent.

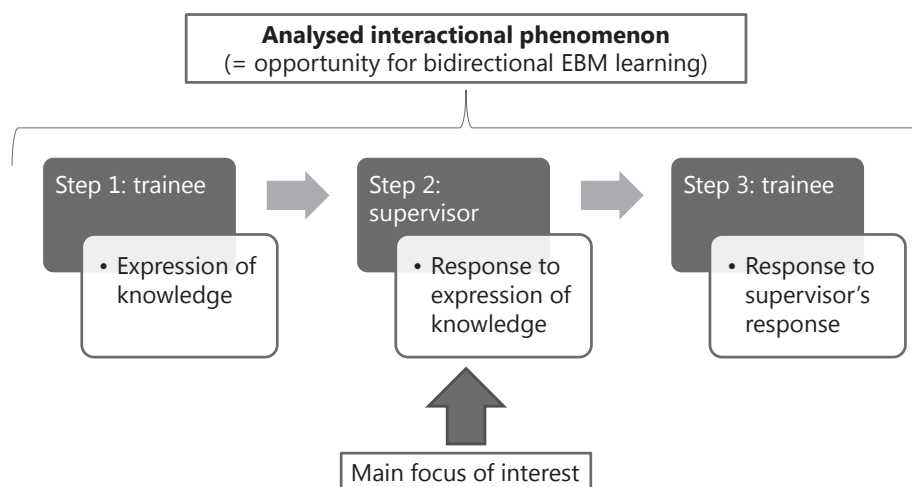


Figure 1: Illustration of the interactional phenomenon that was analysed, including relevant sequences

Results

Three kinds of responses by the supervisor could be identified. Supervisors 1) refute the expressed knowledge, 2) immediately suggest an alternative, or 3) pose (additional) questions. These three kinds of responses will be described below, using fragments that are illustrative of the interactional phenomena.

Refuting

The first response can be described as the supervisor refuting the expressed EBM knowledge (**Box 1**). In this fragment, trainee and supervisor discuss the amount of levothyroxine that the trainee prescribed to a female patient.

Box 1: The supervisor refutes the expressed knowledge

T = trainee, S = supervisor

1 T: Q patients younger than 60;
 2 With no cardiac comorbidity;
 3 1.6 micrograms of levothyroxine per kilogram of body weight,
 4 up to a maximum starting dose of 150.Q
 5 S: yes;
 6 T: yes then she'll be on a dose of 150.
 7 S: ((coughs))
 8 yes well I think that's a lot;
 9 T: yes.
 10 S: start immediately at 150;
 11 T: ° okay.°
 12 S: u:uhm;
 13 T: next time I need to go lower
 14 ((laughs))
 15 yes,
 16 (.)
 17 yes.
 18 S: yes;
 19 (4.8)
 20 what do they say again;
 21 what's that range
 22 for uhm at
 23 Q 1.6 micrograms -Q
 24 yes
 25 T: yes 1.6 micrograms
 26 per kilogram
 27 S: yes;
 28 well I- I often titrate up a bit uh;
 29 and she uh her hypo(.)thyroidism also was not;
 30 not even so shocking.
 31 T: ((shakes head no))
 32 °no°
 33 S: so I can imagine that you'd start at 1 microgram=
 34 =per uh kilo;
 35 T: yes.
 36 S: or even somewhat lower then;
 37 then you can still >°just°< titrate it up;
 38 in the month ahead;
 39 T: yes;

Due to the length of the quotes and to enhance readability, we provide only the English translations here. The Dutch transcripts are available on request.

In lines 1-6, the trainee expresses her knowledge by reading aloud the guideline to account for her deciding on a dosage of 150 (line 6). While the supervisor confirms the explicit reference to the guideline in line 5, the trainees' conclusion in line 6 is refuted by the supervisor in line 8. This refutation is not directed to the specific, theoretical knowledge presented by the trainee in lines 1-4, but refers to how

to interpret and use this information in practice. The supervisor formulates his refutation in line 8 by starting with an agreement token (yes) and continuing with his own opinion, using the first person perspective (I) and the verb 'think' ('I think that's a lot'), but without immediately explaining the source of his opinion. The addition of the word 'well' (line 8) illustrates a correction of the previous turns or information. (37) Following this refutation, the trainee responds with an accepting 'okay' (line 11) and proceeds to draw a conclusion about what to do in any future encounter (line 13), in this way accepting the supervisor's refutation. The trainee gives a nervous laughter during this turn, demonstrating a tension or consciousness that the two ideas (supervisor's and trainee's) are not (as yet) aligned. (38) Even though the trainee has already accepted his suggestion, the supervisor proceeds to substantiate his opinion by first referring to the guideline, using 'they' ('what do they say again', line 20) and adding a description of his own approach (line 28: 'I often titrate up a bit') and mentioning this patient's specific situation (lines 29-30). The supervisor concludes by suggesting in lines 33-34 and lines 36-38 how to proceed. He does with the phrase 'I can imagine' (line 33), implying that his approach might be an option instead of an obligation, but, on the other hand, also guiding the trainee towards a preferred response in the next turn ('yes') (line 35). (39) The trainee acknowledges these substantiations and suggestions multiple times with confirmatory responses such as 'no', 'yes' and 'okay' (e.g. lines 32, 35 and 39). When the supervisor immediately refutes the trainee's expressed knowledge, a discussion ensues in which the trainee no longer accounts for or expands on her knowledge and the supervisor does not ask for additional knowledge, missing an opportunity for bidirectional learning. The trainee accepts the supervisor's utterances without asking additional questions to improve her understanding, while the supervisor holds on to his 'teacher' role.

Immediately suggesting an alternative

Another way in which supervisors deal with trainees' expressed knowledge is to simply ignore it and immediately suggest an alternative. A detailed example is provided in **Box 2**, in which supervisor and trainee discuss a case handled by the latter in which a female patient with Parkinson's disease has sleeping problems.

Box 2: The supervisor immediately suggests an alternative

T = trainee, S = supervisor

1 T: yes,
 2 I said that I'd discuss it briefly,
 3 and that I would check;
 4 which drugs would be the most useful,
 5 and I found it's just ordinary benzos
 6 S: •h and and uh,
 7 I also think that you;
 8 could consult with the pharmacist;
 9 or, with the neurologist,;
 10 T: hmm.
 11 S: like, gee,
 12 what's your experience;
 13 what what do you prefer to prescribe;
 14 T: °yes°
 15 S: u:uhm,
 16 of course we don't have,
 17 at least I, don't have=
 18 =that many parkinson's cases in the practice;
 19 [(xx)
 20 T: [no,
 21 In the nursing home I=
 22 =did uh of course have parkinson's patients;
 23 S: nah I think that [that you
 24 T: [but (xx)
 25 S: the best resource,
 26 is I thi, nk,
 27 the neur- >attending< neurologist;
 28 T: yes;
 29 S: •h he knows the medication,
 30 T: hm hm;
 31 S: and he uh,
 32 u:uh will get that kind of question more often;
 33 it may well be that it's not recommended at all;
 34 she's that kind of patient
 35 T: yes.
 36 S: so maybe it's-
 37 the chief attending physician uh;
 38 who's best to talk to;
 39 T: yes;
 40 S: and the: pharmacist will in the second instance=
 41 =>also< look to see whether['t's compatible.
 42 T: [yes (.) yes;
 43 well;
 44 I did °already look° that;
 45 up in the Parkinson's guidelines;
 46 it also says just ordinary benzos;
 47 for sleeping (.)problems
 48 [so
 49 S: [okay?
 50 T: probably that will;
 51 u:uhm;
 52 the pharmacists will say that too=
 53 =the neurologist too I think.

The knowledge expressed by the trainee is presented in lines 1-5, where she concludes that, in this case, 'benzos' (line 5) are the best option, based on what she has 'checked'. By using the term 'just ordinary' (line 5), she appears to be normalizing her finding that this is the most suitable drug. In the next sequence, the supervisor does not respond to the substance of the trainee's knowledge expression but suggests an alternative. His and-prefaced suggestion ('and' in line 6) and 'I also think that you' (line 7) implies actions above and beyond what the trainee has presented, in this way treating the trainee's previous turn not as a conclusion but as an option. He then continues by advising the trainee to consult an external source. Lines 15-18 explain why he is advising the trainee to turn to external specialists: the supervisor himself lacks experience in this area ('I don't have that many Parkinson's cases in the practice'). By adding 'of course', he implies that the absence of such patients is only logical. The supervisor's rephrasing of his statement to 'at least I' gives the trainee leeway to respond by recounting her own experience with Parkinson's patients (lines 21-22). However, the supervisor once again does not respond to the trainee's experience but instead repeats his advice to consult the neurologist. He starts his turn with 'nah', which signals a contrasting or unexpected response to what has just been said. (40) He elaborates on why this alternative seems best to him, referring to the neurologist's expertise ('will get that kind of question more often', line 32) and the patient specifics ('she's that kind of patient', line 34). While introducing his substantiation, the supervisor twice says 'I think' (line 23 and line 26), implying that he is not basing his recommendation on factual knowledge but on personal opinion or doubt. (41) The trainee responds to his suggestions by referring to the external source again: she repeats that she has checked the specific guidelines (lines 43-47) and it says 'just ordinary benzos'. By bringing up the guideline, the trainee appears to be appealing to an external authority and thus minimizing the disagreement. (42) In the end, supervisor and trainee do not align; the trainee ultimately states that it's unnecessary to consult these specialists because they will reach the same conclusion. In this example, we see that ignoring the trainee's expressed knowledge by immediately suggesting alternatives prevents a knowledge exchange in which trainee and supervisor come to a shared decision or a general consensus on which knowledge is decisive, the medical guidelines or practical experience. They end up in a learning conversation in which they miss an opportunity for bidirectional learning.

Posing questions

Finally, a supervisor can respond to expressions of knowledge by posing additional questions that may have various different aims: a) to clarify the expressed knowledge (**Box 3**) or b) to clarify the described situation (**Box 4**). In Box 3, supervisor and trainee discuss the case of a boy with an immune deficiency and persistent diarrhoea whose mother has celiac disease. The boy has already been tested for celiac disease and the result came back negative.

Box 3: The supervisor poses additional questions to clarify the expressed knowledge

T = trainee, S = supervisor

1 T: yes I was sitting here ju=
 2 =what suddenly oc[curred to me;
 3 S: [yes.
 4 T: is after I;
 5 it crossed my mind,
 6 it's(.) very rare=
 7 S: =hm hm
 8 T: but?
 9 that that boy an uh immunodeficiency;
 10 I thought if you have an IgA deficiency;
 11 then your: test for celiac may be false negative.
 12 I tho- thought of that tha- yes.
 13 S: okay?
 14 T: yes that's something that;
 15 I don't believe I copie- or wrote it down;
 16 but it's °that° something I thought about,
 17 like well it's really very rare but?
 18 yes maybe after all (.) exceptional;
 19 S: okay then how is it?
 20 that he uh,
 21 T: yes that that;
 22 actually, they don't produce any antibodies;
 23 and then then it looks as if you indeed don't;
 24 produce any IgA- A₁ IgA antibodies;
 25 against those °I believe it's° anti-tTG or something?
 26 S: yes yes yes precisely [yes
 27 T: [BUT
 28 so then it indeed looks as if he
 29 or as if someone doesn't have celiac.
 30 S: okay?
 31 T: but actually it could still be the case;
 32 S: yes.

In lines 1-12, the trainee is hesitant about presenting his knowledge and uses several utterances and linguistic markers to emphasize that it is only his thinking: he says that 'it suddenly occurred to me' (line 2), that 'it crossed my mind' (line 5), and repeats that it is something that he 'thought' (lines 10 and 12). Moreover, he adds that it is 'very rare' (line 6), which makes it safe for him to utter this possibility, implying that it might not be correct because it is rare but could be an option. The trainee does not present any explicit substantiation of the origin of this knowledge. The supervisor's primary response is to use continuers, such as 'yes' and 'hm hm', which leads the trainee to elaborate (lines 8-12 and lines 14-18). (43) The trainee emphasizes again that it is 'very rare' but that this case might still be an 'exceptional' one (line 18). The supervisor does not respond to the phenomenon possibly being 'very rare' but instead asks an additional question after the trainee's utterance that

the test could be 'false negative' (line 11). The supervisor does this by asking for extra information on the origin of the possible 'false negative' outcome (lines 19-20). By starting with the word 'okay', she seems to accept the presented knowledge, leading the trainee to elaborate more extensively in the lines 21-31. The trainee starts his answer with the lexical usage of 'actually' (line 22), emphasizing the utterance 'they don't produce any antibodies'. (44) With the addition of the words 'or something' in line 25, the trainee is once again creating leeway for mistakes or necessary adjustments in the presented knowledge, but this appears to be unnecessary given the supervisor's agreeing response in line 26. Without the supervisor explicitly requesting it, the trainee continues to elaborate in lines 27-29 and 31. He does this with the word 'but', a cue that he is returning to the subject. (45) In conclusion, posing additional questions invites the trainee to elaborate on the expressed knowledge, creating learning opportunities for both trainee and supervisor. This example shows that it is possible for supervisor and trainee to reach consensus on new knowledge expressed by the trainee (lines 27-32).

The excerpt presented in Box 4 shows a supervisor asking a question to seek clarification of a specific case rather than to get the trainee to elaborate on (theoretical) knowledge. Supervisor and trainee discuss the risk of inducing hypotension when starting ACE inhibitors and diuretics at the same time to treat hypertension.

Box 4: The supervisor poses additional questions to clarify the described situation

T = trainee, S = supervisor

1 T: yes;
 2 yes for •h Mrs. •h De (name);
 3 I also;
 4 two we- three days later after that started;
 5 I went to see her;
 6 to take her blood pressure and see how she was=
 7 S: =since you can start the medication all at once?
 8 T: yes yes;
 9 S: just everything simultaneously;
 10 T: yes;
 11 and uh I did get uh;
 12 the pharmacy did indeed call me;
 13 saying Q yes uh a diuretic with an ace inhibitor Q
 14 I said yes but I'm starting it all simultANEOUSLY;
 15 S: and then that's allowed-
 16 T: and then that's indeed allowed;
 17 S: yes precisely.
 18 T: and that uh;
 19 S: since she wasn't on a diuretic;
 20 T: she wasn't on [anything;
 21 S: [no.°no°
 22 so tho- sorts of things are therefore really useful.
 23 T: °yes°

The trainee describes what he did during a recent case in lines 1-6. In line 7, the supervisor utters a declarative question about starting the two kinds of medication 'all at once'. In line 8, the trainee confirms that he was allowed to start these medicines 'all at once'. Who allowed him to do so is not made clear. The supervisor rephrases the question in line 9, which the trainee once again confirms. The rephrasing of the question causes the trainee to substantiate his actions in more detail: in lines 11-14 and 16, he explains that the pharmacy contacted him about starting ACE inhibitors and diuretics at the same time and allowed it in this specific situation. In contrast to Box 3, the supervisor then incorporates the situation of this specific patient lexically ('she') into a questioning utterance in which he seeks confirmation (line 19). Confirmation that the patient was not on any medication is given in line 20, again incorporating the lexical usage of 'she'. By asking for clarification in lines 7, 9 and especially 19, the supervisor creates a learning opportunity for himself about how to combine knowledge and this patient's specific situation, since this invites the trainee to elaborate on and specify his knowledge.

Discussion

This study illustrated how GP trainees and supervisors currently handle bidirectional learning opportunities during learning conversations by analysing in detail how supervisor and trainee together deal with the trainee's knowledge utterances. All of the supervisors' responses were found to have consequences for the learning conversation and, in turn, for bidirectional learning. It was only during conversations in which supervisors posed additional questions that trainees were encouraged to elaborate on their knowledge and a bidirectional learning opportunity emerged.

Our results add to current literature on dialogues at the workplace by providing real-world insights to the reciprocal aspect of workplace-based learning. No previous research has been done on how bidirectional learning takes place within clinical workplace-based conversations. Previous CA-research on workplace-based dialogues focussed on the mechanisms of feedback, and thus, on the learning process of the trainee. (46) Studies outside the medical field did look at the utterances that can support collaborative learning, for instance in collaborative writing of primary school children. (47) Since no previous study looked in this much detail at the mutual construction of knowledge, these results aim to unravel a bit of the 'butterfly effect': the tiny variations and nuances that can lead to great effects within complex and dynamic systems like workplace-based learning. (48)

Our results are related to perceptions of epistemic authority and show parallels with previous CA-research in this field. (49) Trainees easily position themselves in

a subordinate epistemic position by spontaneously and extensively accounting for their knowledge, by referring to an external source as evidence, or by using epistemic hedges such as 'I think' or adverbs such as 'probably' (Box 2 and 3). (50–52) On the other hand, supervisors maintain an epistemic authority position linguistically by, for instance, normalizing their own lack of knowledge or experience (Box 2, line 16: use of 'of course') or by recommending how to proceed without checking whether the trainee agrees (Box 1). In most institutional interactions, i.e. doctor-patient interactions, classroom talk or mortgage consultations, the 'institutional agent' – the physician, teacher or mortgage advisor – conveys expert information to a patient, student or client. (22,35,53–56) In other words, participants are tied to their institution-relevant identities. (57) Likewise, the GP trainees and supervisors in this study maintain their traditional identities and interact according to the customary view of workplace-based learning: supervisors present their knowledge or experience and teach trainees how to become good physicians, in this case GPs. Nevertheless, to optimize bidirectional learning, it is worth seeking out bidirectional learning opportunities and having both trainee and supervisor reflect on these interactional moments.

Bidirectional learning can occur when supervisors and trainees are able to make sense of clinical work together through dialogue and when they co-construct their knowledge while involving contextual factors. (2,10,18,58–60) It appears that the most successful approach is when the supervisor poses additional questions regarding the knowledge expressed by the trainee. Displays of mutual understanding and indicators of successful learning were clearest when the supervisor posed additional questions (for instance in Box 4, line 17: 'yes precisely'). (56) Our results also show that these additional questions make institutional roles more flexible, creating learning opportunities for the supervisor as well. (41,52)

Strengths and limitations

This study uses Conversation Analysis to offer a fine-grained examination of the learning opportunities that arise during conversations between trainees and supervisors in the workplace. As a data-driven method with a basis in actual rather than idealized workplace conversations, the usage of this methodology can be seen as a strength. As Peräkylä (2003) aptly describes it, *'Theories and concepts related to practices consist of ideals and visions of the "best possible situations", whereas institutional practices constantly deal with the range of cases that do not reach such ideals.'* (61) This also applies to EBM learning conversations, where clinicians often struggle with abstract instructions for applying the theoretical concept of EBM in daily clinical practice. The CA methodology helps to paint a more detailed picture of current practices and adds a new dimension to our understanding of these practices.

Since this study describes the consequences of particular utterances, it furthermore sheds light on how learners co-regulate their EBM learning. Numerous studies focus on how learners handle their learning processes themselves, as forms of self-regulated learning. (62–66) This study, however, emphasizes the role of co-regulated learning, providing additional evidence that learning is embedded in social interactions between supervisor and trainee. (18,58)

This study only looked at the opportunities for bidirectional learning during EBM related discussions within learning conversations. However, bidirectional learning might also take place during dialogues on different topics, such as communication or professional performance and attitude. It cannot be ruled out that supervisors respond differently to the trainee's utterances when the conversation concerns a different topic. Conversation Analysis with a more extensive data set needs to be performed to give a complete overview of the ways that bidirectional learning opportunities are handled during learning conversations in general. While this study illustrates how current interactions between supervisor and trainee influence EBM learning opportunities during learning conversations, it remains unclear precisely how we should teach supervisors and trainees to optimize their interaction during such conversations. Posing open questions is of course a well-known didactic tool, but simply advising professionals to pose open questions might not make institutional roles more flexible, so that bidirectional EBM learning is more successful. Further research on the Conversation Analytic Role-play Method (CARM), for instance, would promote progress in using learning conversations to enhance daily workplace-based EBM learning. (67)

Conclusions and recommendations

Conversation Analysis of learning conversations between supervisors and trainees in general practice shows that bidirectional EBM learning opportunities are not always handled successfully. Improving EBM learning opportunities for both supervisors and trainees requires more than simply instructing trainees to express knowledge based – for instance – on recent evidence more often. Inflexible institutional roles related to traditions of epistemic authority hamper bidirectional learning. To make expressing knowledge appropriate for bidirectional learning, the supervisor and trainee must co-construct learning opportunities and aim to make institutional roles more flexible by posing open questions about the expressed knowledge or situations.

Contributors

LW is a PhD candidate and former GP trainee. TvC is an assistant professor with a background in communication and linguistics, working as a researcher using CA.

Chapter 5

LDC is a graduate student in the field of communication and information sciences and a research assistant. MLB is an associate professor and a teacher in EBM. PP is an associate professor in General Practice and interprofessional collaboration. RD is a professor in General Practice and the head of GP specialty training. EdG is an assistant professor and researcher in the learning sciences in the medical domain.

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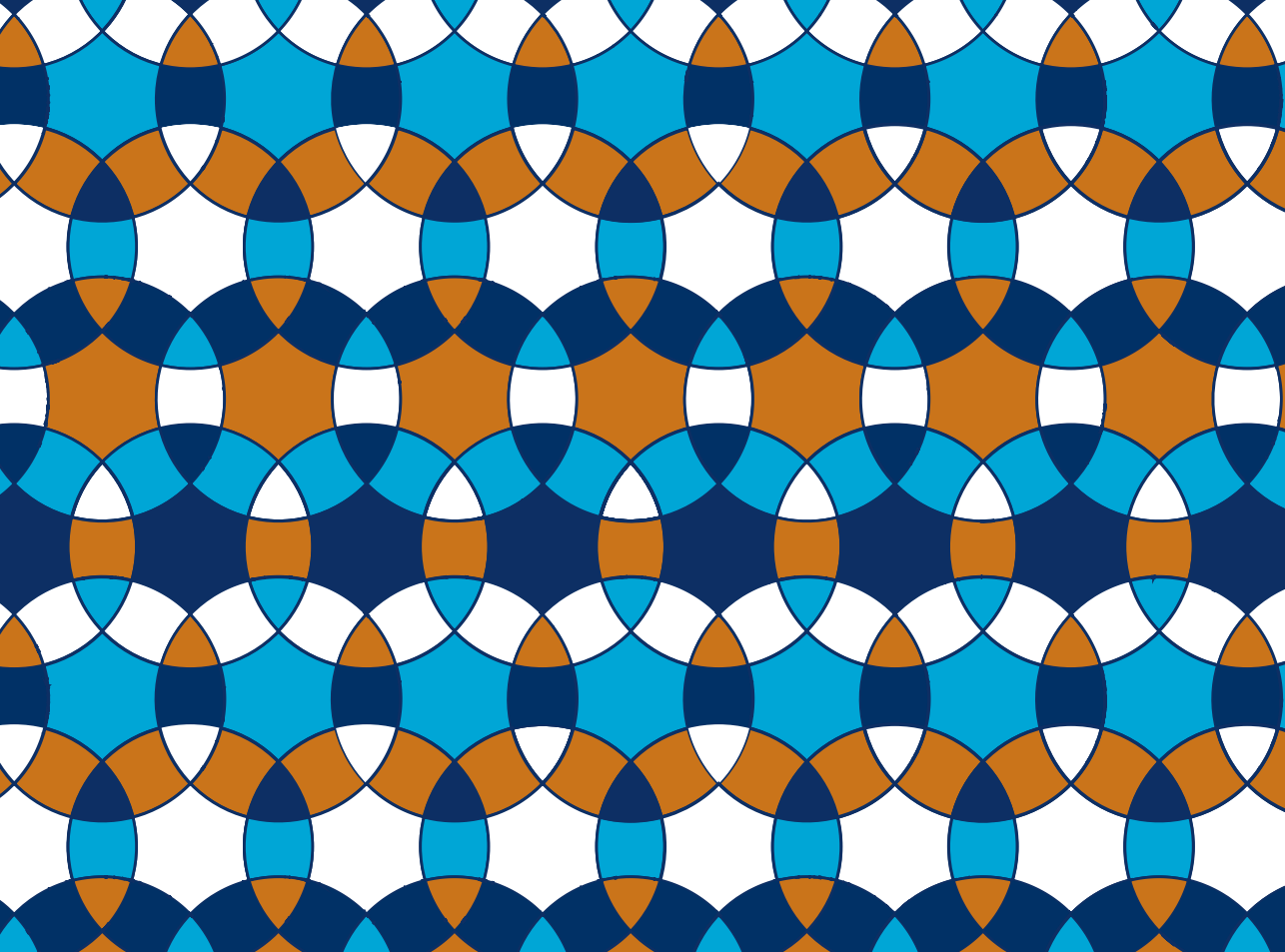
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Appendix A: Jeffersonian transcription conventions

The symbols listed below are based on Jefferson's glossary of transcript symbols, which are routinely used in conversation analytic transcription (32).

Symbol	Definition
?	Strong rising phrase intonation
.	Strong falling phrase intonation
,	Slightly rising phrase intonation
;	Neutral phrase intonation
Q...Q	Indicates that the speaker reads something out loud or quotes
↑	Rise in intonation
((coughs))	Verbal description of (non-verbal) actions
° okay.°	Softer than surrounding speech
:	Indication of a stretched sound
(.)	Pause or silence less than 0.2 seconds
(4.8)	Pause or silence of 4.8 seconds
=	Indicating there was no pause between the end of one utterance and the beginning of the next
>word<	Faster than surrounding speech
•h	Audible inhalation
[word]	Square brackets show where speech overlaps
(xx)	Inaudible speech
CAPITALS	Louder than surrounding speech





Educational strategies to enhance EBM teaching and learning in the workplace: a focus group study

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Abstract

Objectives

This study aimed to gather and synthesise educational strategies that can improve teaching and learning of evidence-based medicine (EBM) in the workplace, and make them concrete by listing ideas for implementing these strategies. Insight into current workplace-based EBM teaching and learning in general practice was the starting point to generate these strategies and ideas.

Design

Exploratory, qualitative focus group study, applying the consensus method of the nominal group technique (NGT).

Setting

Postgraduate medical education; general practitioner (GP) specialty training at University Medical Centre Utrecht, the Netherlands

Participants

33 GPs and 17 GP trainees, divided in four focus groups. Using opportunistic sampling, participants were selected from the GP workplace because of their role as supervisor or trainee.

Main outcomes

An overview of educational strategies and ideas on how to implement these strategies in the workplace, followed by the participants' global ranking of the most useful ideas.

Results

The supervisors and trainees generated a list of educational improvement strategies that can be applied in learning conversations, while observing each other's consultations, and in (multidisciplinary) learning opportunities in the workplace. Table 1 presents the educational strategies and suggestions for implementing them. Ideas regarded as most useful include taking turns to conduct consultations and observing the other, holding a structured, in-depth discussion after observation, preparing and discussing articles found in relevant journals, and on-the-spot searching for relevant evidence during learning conversations.

Conclusions

Participants provided an extensive list of educational strategies and ideas on how to implement EBM learning in daily practice. As a great deal of GP training takes place in clinical practice, supervisors and trainees could apply the suggested ideas to enhance EBM teaching and learning in the workplace.

Summary box

What is already known about this subject?

- Most educational programmes mainly deal with the first three steps of EBM (ask, acquire and appraise). In the workplace it is hard to achieve EBM learning that combines all five steps (including apply and assess).
- Observing one another and having learning conversations can create valuable learning opportunities during daily practice.
- There is a lack of practical suggestions on how to implement the three circles of clinical expertise, patient values and evidence in workplace-based EBM teaching and learning.

What are the new findings?

- This study presents an extensive list of educational strategies and ideas on how to implement EBM learning in daily practice, created by supervisors and trainees in the clinical workplace.

How might it impact clinical practice in the foreseeable future?

- Supervisors and trainees can apply the suggested educational strategies and practical ideas in their local practices to improve EBM teaching and learning in the clinical workplace.
-

Introduction

If physicians want to practice evidence-based medicine (EBM) when making decisions for individual patients, it is essential to learn how to combine the three circles of EBM: the best available evidence with the patient's preferences and their own clinical expertise. (1) However, teaching EBM is a complex task that current curricula often do not address very well. (2) Most educational interventions mainly deal with the first three steps of EBM (ask, acquire and appraise), and although most EBM programmes include clinical practice, combining all five steps (including apply and assess) is hard to achieve in training. (3–5)

Large parts of medical training take place in the workplace during internships and postgraduate training. Observation, supervision and discussions provide on-the-job opportunities to teach and learn to apply EBM in real practice, being both informal and more deliberative forms of learning. (6–8) During these educational moments, trainee and supervisor could probably learn from each other as well. Dutch general practitioner (GP) specialty training is an excellent example of trainees and supervisors working intensively together for a whole year. During

this time, multiple learning opportunities occur in the form of daily conversations, observations and other supervision moments. The opportunities and ideas about EBM learning gathered in GP training can be useful for workplace-based EBM learning in general.

We studied in previous qualitative research how workplace-based EBM teaching and learning currently takes place in general practice. In a workplace-based, video-stimulated interview study on GP trainees and supervisors observing each other's consultations, we found that they do not fully recognise EBM behaviour by observation alone. Aspects that negatively influence recognition are often observer-related: observers tend to be judgemental, give unsolicited comments on how they would act themselves and are more concerned with the trainee-supervisor relationship than objective observation. (9) Thus, observation on its own does not seem enough to learn EBM in practice. Consequently, we also looked at what trainees and supervisors learn about EBM in "learning conversations": regular meetings between GPs and trainees to discuss daily medical practice, selected topics or professional performance (data not yet published). This research shows that although these moments can be useful for both trainee and supervisor, they are open to improvement, for instance by ensuring that the trainee asks specific on-topic questions and the supervisor gives well-substantiated answers.

Besides describing the current situation of workplace-based EBM learning, it is important to improve daily learning in the workplace and so it makes sense to collect suggestions on how to involve EBM's three circles: clinical expertise, patient values and evidence in learning. These ideas could help us to combine all five steps of EBM in decision-making in practice. This study aimed to gather and synthesise educational strategies that can improve EBM teaching and learning in the workplace, and to explore ideas on how to implement these strategies.

Methods

We conducted an exploratory, qualitative study with four focus groups, applying the consensus method of the nominal group technique (NGT).

Educational setting

This study took place in the faculty of GP specialty training at University Medical Centre Utrecht, in the Netherlands. Dutch GP specialty training takes three years, mostly in the GP workplace. During the first and third years of training, trainees work alongside a GP supervisor. In the second year of training, trainees work outside the GP practice, in for instance a hospital emergency department, a nursing home or mental health care institution. Formal education takes place one day a week in

small group classes. Supervisors receive monthly formal training (including EBM) in teach-the-teacher sessions. Trainees and supervisors are accustomed to holding daily learning conversations and regularly video-record consultations with patients during GP specialty training.

Participants

Participants were selected using opportunistic sampling because they were either a supervisor in a GP practice or a GP specialty trainee. (10) Four NGT focus groups were held: one with trainees and three with supervisors. The four groups consisted of 17 third-year trainees (13 women and four men), ten supervisors of first-year trainees (five women and five men), 14 supervisors of first-year trainees (eight women and six men), and nine supervisors of third-year trainees (four women and five men). All participants signed informed consent to our audio-recording the sessions and using the data (Dutch quotes translated and edited for clarity).

Focus group procedure

NGT is a structured, well-established, focus group technique used to generate and prioritise answers to a specific question by a group of people who have expert insight. (11,12) Both LW and MLB acted as moderators of the sessions. We began each focus group by introducing the topic and the purpose of the meeting and showed the participants the results of our earlier studies on observational learning and the preliminary results on the effects of learning conversations, as sensitising concepts. Then we asked the participants to write down as many ideas as possible on how to learn better or more from each other to apply EBM in the workplace. We explicitly stated that they should not restrict themselves to real situations in their current practice but to think outside the box and keep an 'ideal situation' in mind. As trigger cases, we presented a few of our own examples.

The second phase of the NGT session involved each group member verbalising one idea at a time. Discussion with the moderator was allowed, to clarify an idea when necessary. This process continued until no new ideas emerged. The moderator entered each mentioned item in a table, projected onto a digital screen that enabled the whole group to see the growing list of ideas and to be stimulated to think of more ideas.

In the last phase of the session, participants were asked individually to rank their top three ideas and these rankings were also entered in the table on the digital screen. Thus each session produced a ranked list of ideas. All sessions were audio-recorded to enable us to listen to the participants' considerations again afterwards.

Researcher roles and backgrounds

LW is a PhD candidate and GP trainee at the GP specialty training of the University Medical Centre in Utrecht. As a trainee herself, she knew some of the participants informally. EdG is an assistant professor and a researcher in the learning sciences in the medical domain. RD is a professor in general practice and director of the GP specialty training in Utrecht. Because of his role, he was not involved in the focus group sessions and analysis of the raw material. As an associate professor and teacher in EBM in GP specialist training MLB was known to the participating trainees and supervisors.

Data analysis

LW and MLB critically reviewed the unique data produced by the separate focus groups and merged the duplicates (ideas with similar meaning). This process led to four lists of ideas. Then, as a form of axial coding, LW and MLB combined the items of all four groups into one thematically categorised list. In subsequent discussions, including the other authors (RD, EG), we reached consensus on a final thematic list of ideas. In order to prioritise the ideas regarded as most useful, we scored each participant's top three ideas and added these scores up.

Results

All ideas could be categorised in one of three main educational settings: learning conversations between supervisor and trainee, observing each other during consultations, and using opportunities in the workplace. Table 1 presents an overview of educational strategies and practical ideas on how to implement these strategies for all three settings.

Table 1: Educational strategies and ideas to implement EBM learning at the workplace

Setting	Educational strategies	Ideas on how to implement strategies in daily practice
Learning conversations	Prepare and discuss existing educational material	Read and discuss existing educational material such as knowledge tests and e-learning material
	Prepare and discuss evidence	Read and discuss articles provided by the training institute
	Explicitly discuss all EBM aspects of complex cases	Discuss clinical practice guidelines
	Explicitly discuss all EBM aspects of random cases	Choose complex cases, e.g., based on the trainee's questions and explicitly discuss all three EBM circles
	Explicitly discuss diagnostic considerations	Choose cases at random, e.g., using a dice, and explicitly discuss all three EBM circles
	Search (online) for further evidence and discuss search strategies	Note and discuss all three EBM circles of a case based on the entries in the medical record
	Discuss the supervisor's cases	Discuss how to deal with drug interactions which occur in electronic patient files
	Use the knowledge of medical specialists as a source of information	Explicitly elaborate on differential diagnoses, including all possible considerations and hypotheses
		Take laboratory analyses as a starting point to discuss diagnostic considerations
		Search for evidence together on-the-spot, based on a clinical question
		Discuss the trainee's search strategies and the relevance of evidence for the GP practice
		Put statements on research in newspapers or other media into perspective by looking up the primary evidence
		Check bold statements by medical specialists by looking for supporting evidence
		Specifically, discuss the supervisor's cases
		Pose questions to medical specialists through a uniquely designed medical communication app

Table 1: Continued

Setting	Educational strategies	Ideas on how to implement strategies in daily practice
Observations	Conduct consultations together with explicit debriefing afterwards	Take turns conducting consultations while observing each other; discuss the observations afterwards
	Watch video-recordings of consultations	Hold a structured debriefing after observation, including all three EBM circles Conduct consultations together. Explicitly mention EBM arguments during the consultation, and also enable shared decision-making Watch video-recordings of consultations by both trainee and supervisor. Follow this with structured discussion and elaboration of argumentation Pause the recording before decision-making happens, both noting the considerations and discuss these afterwards
Workplace opportunities	Teaching sessions in the workplace	Prepare a pharmacotherapy audit meeting together
	Develop local EBM protocols	Present a 'fact of the week' at collective meetings
	Involve other disciplines	Develop protocols, based on evidence, the experience of experts and the local context and implement these
	Be aware of one's EBM attitude during daily clinical practice	Gain insight into cases and dilemmas in other disciplines and discuss these together, e.g. by participating in their consultations or attending multidisciplinary meetings As a supervisor, be aware of all EBM considerations and communicate them explicitly with the trainee and in reports
	Enable easy access to evidence	Create self-awareness by explicitly mentioning arguments during consultations Install quick links on the computer to facilitate access to evidence

Learning conversations

Trainees and supervisors regarded learning conversations that enabled deliberative learning as important to improve EBM learning in the workplace. Participants suggested that as a starting point they could use existing educational material such as knowledge tests, e-learning or educational materials provided by the training institute or by The Dutch College of General Practitioners. Both trainee and supervisor should prepare this material beforehand and discuss it during learning conversations. Also, articles relevant to GP practice provided by the institute could stimulate participants to actually read and discuss such literature.

Supervisor, focus group 2

“The moment you say, well, let’s take a look at a couple of big scientific articles that have come out in the past month or so, okay? (...) It wouldn’t make a huge impact [in terms of] extra work but it could give an impetus. I think so, because it would stimulate me, at least.”

Trainees and supervisors can also select relevant articles themselves, agree to read the selected article and discuss it during the learning conversation. Moreover, studying and discussing specific clinical practice guidelines that synthesise all evidence, and actually move on from the clinical recommendation to the evidence and literature behind it can also be done together.

EBM learning can also start from clinical cases. Here the supervisor and trainee explicitly discuss all the EBM aspects during the learning conversations. Complex cases or clinical dilemmas brought up by either trainee or supervisor can be a good starting point, for instance when recommendations from the evidence do not match the wishes of the patient. Such cases can be discussed, explicitly stating all the factors that play a role in combining the evidence, clinical experience and the wishes of the patient.

Supervisor, focus group 3

“Now that you’ve deviated from the guideline, how bad is that? In some cases it would be very important, but in other cases sticking to it wouldn’t be so important. Then you might let the patient’s circle prevail. (...) Then, as a trainee, all week long you could keep track of which consultations you found difficult (...) or vice versa. Of course that’s possible, too.”

Furthermore, participants advocated discussing randomly chosen cases instead of specific situations, since this technique can fill knowledge gaps that one might be unaware of. There were several suggestions on how to select random cases.

Supervisor, focus group 2

"If you threw a dice and it landed on four, then it would be my fourth patient and your fourth patient this morning."

Participants suggested using medical records as EBM teaching material; for instance, covering up the therapeutic decision noted in the record and discussing what both supervisor and trainee would have done in that situation before revealing what was actually decided. Besides therapeutic decisions, differential diagnoses can be elaborated upon to include all the considerations and hypotheses for a specific diagnosis. It could be useful to start by discussing the GP's rationale for ordering a laboratory analysis for a particular patient, including the added diagnostic value of those tests.

Supervisor, focus group 3

"For example, if for one day you made a note of all the lab reports that both supervisor and trainee ask for. Then you could think of what the test criteria are, why they asked for it, and would the other have asked for this lab work too? (...) And is such test (meant) to prove or exclude (something) and so on."

Participants mentioned that searching for evidence together, on-the-spot, to answer a clinical question was an excellent learning opportunity for both supervisor and trainee. Discussing a trainee's (online) search strategy can help the supervisor develop their searching skills, since trainees are often better at finding the best available literature and can show their supervisor new sources of information. However, supervisors added that trainees can also learn from them, since supervisors use their experience to appraise guidelines aimed at medical specialists for relevance to the local context of general practice.

Supervisor, focus group 2

"Of course I notice the trainees do a lot of looking up, while I don't do it so much. I always ask them where they look, and then we come to sources I have never seen before. Guidelines and the like, that I don't know about. I find it interesting to see where they found it, that's only common sense, of course. (...) And what is the actual significance of the source you've looked up? Is it from the Dutch College of GPs, is it their journal, is it another journal, or a site written by specialists? It can be different. (...) The question is, are you looking up something about the subject and then look to the gynaecologist (for the answer) or something? That of course would make a difference for policy. (...) Yes, where to find reliable information, I think that's a relevant question."

Furthermore, the participants often mentioned that looking for the primary evidence behind articles on research in newspapers or other media benefited EBM learning. The same goes for checking "bold" statements by medical specialists. (13)

Learning conversations often deal with the trainee's consultations and aim at providing feedback and advice. However, participants from all focus groups said that it would be as useful to discuss the supervisor's consultations, since this could give both trainee and supervisor learning opportunities. Finally, learning conversations can be used to discuss the medical specialists' knowledge and recommendations for specific cases. Trainee and supervisor could pose questions to the specialists, using, for instance, a purpose-built medical communication app.

Observations

All focus groups agreed that conducting consultations together followed by very explicit discussions, including all three circles of EBM, was practically challenging but extremely beneficial to learning how to apply EBM in the workplace. A suggested design is to have the supervisor and trainee take turns for one hour a week: while the one conducts the consultation, the other acts as observer. It was emphasised that simply observing is not enough. One idea to ensure that the observer gains good insight into the considerations of the acting physician is to end the consultation with an explicit mention of the EBM argumentation used. This would enable shared decision-making and could lead to more transparent decision-making behaviour in general.

Supervisor, focus group 2

“Could you perhaps make it more evident, why you follow a particular protocol. So, if you do consultations together, you agree to always round off in a certain way. For example, (by saying to the patient) well, your request for help was this and that, and on my search I found this and that, and well... the good protocol for this is (or) according to the guidelines it's this and I've also had good experience with this or that. So you make why you are doing something very transparent, from the patient's circle as well.”

Another way to incorporate observations in daily practice is through video-recordings. These give the viewers the opportunity to place specific, thematic emphasis on the observation, such as focusing on the patient perspective, the evidence used or communicating evidence to patients. The video can be stopped to discuss the next steps, relevant information sources or other reflections on the EBM argumentation.

Supervisor, focus group 3

“Yes, observations too, but on video. So, we both shoot videos of our consultations and watch them together. Then I thought it might be nice to think up (a theme) in advance (...) and go into the meeting with my 'theme glasses' on, so to speak. Then, we ask each other critical questions, like what was on your mind when you made that decision, which resources (did you use)? Often (it's) the standard (protocol), or the GP present, or did you read an article somewhere, or do you have a particular role model, a supervisor like me or another colleague? And if you deviate from the standard, what was the argumentation?”

Workplace opportunities

Teaching activities concerning the practice as a whole can be valuable learning opportunities, such as preparing for and leading the weekly pharmacotherapy audit meetings. Attendees discuss not only the latest evidence, but also the application of this evidence in local practice, drawing on the experience of all the disciplines and colleagues present. Trainees can be asked to provide an interesting 'fact of the week' for these meetings of all the GPs in the practice.

Trainee, focus group 1

“Teaching, and then preparing for yourself. So, for example, for colleagues, if there are issues lying about, we should do a half-hour presentation, during coffee break, based on what the guideline basically says you should be doing. (...) Because now I see in our practice with four different GPs – four different practices in fact – they all have their own way of doing things. After all, everyone has more or less dropped certain guidelines, such as the STD guideline or something like it. So then, to identify it, and do a presentation on it, with bullet points, I think that would be useful for everyone.”

Developing local EBM-based protocols and implementing them together in the local practice can also be useful. Involving other disciplines, gaining insight into their cases or dilemmas, and discussing these together could not only produce learning outcomes for GPs and GP trainees alike, but could also benefit the whole practice. This can be achieved by, for instance, participating in their consultations or attending multidisciplinary meetings.

To ensure optimal EBM learning in the workplace, participants regarded easy access to evidence as essential. Furthermore, supervisors should be aware that they are role models. Therefore, participants from our focus groups said that optimal EBM learning also involves introspection and awareness of one’s own EBM attitude. This would be expressed in explicit, traceable argumentation during their consultations and in their communications.

Supervisor, focus group 3

“It’s actually realising why you actually do something. I get that in a learning conversation with the trainee, but also with colleagues, I’m always very clear in my EPD about why I do what I have done. And I take these factors into account, like why I choose to do this for that patient. So let’s say, clear communication is actually mainly about that. And naturally, first of all that demands clarity from yourself.”

Ranking the most useful ideas for learning EBM in daily medical practice

Table 2 presents the ideas that scored highest when participants were asked which ones would be most useful for learning EBM in daily practice. The two most useful ideas were observing each other’s consultations, followed by extensive discussions of all EBM considerations. Other useful EBM learning activities included involving evidence in different ways during learning conversations, for instance, by preparing and discussing evidence or looking for other relevant evidence on-the-spot.

Trainee, focus group 1

“That’s the most important. Hey, you can come up with nice ideas about it all, but if you don’t observe each other to see what’s happening, if you don’t get around to having decent learning conversations, which I hear happens sometimes, then there’s no point to having those nice ideas.”

Table 2: Eight useful ideas for enhancing EBM learning in the workplace, ranked by focus group participants

1	Take turns conducting consultations, observing the other and discussing the consultation afterwards
2	Hold a very structured debriefing after observation, including all three EBM circles
3	Read and discuss articles that supervisors and trainees find in relevant journals
4	Search together for evidence on-the-spot, working from a clinical question
5	Read and discuss existing educational material such as knowledge tests and e-learning texts
6	Choose complex cases, based on the trainee’s questions, and explicitly discuss all EBM aspects
7	Prepare a pharmacotherapy audit meeting together
8	Elaborate on differential diagnoses, including all possible considerations and hypotheses

Discussion

This study aimed to gather and synthesise educational strategies that can improve both EBM teaching and learning in the workplace, and concretise this by describing practical ideas on how to implement these strategies. Educational strategies can be used during a learning conversation, while observing each other’s consultations and by making use of learning opportunities at the workplace. Table 1 depicts all educational strategies and ideas on how to implement these strategies in daily practice. The ideas regarded as most useful include taking turns to conduct consultations and observing each other in action, having a structured discussion after the observation, and preparing and discussing articles that supervisors and trainees found in relevant journals.

A strength of this study is the experience of our respondents, supervisors and trainees who are teachers and learners in current daily practice. They were reflective and able to think ‘out-of-the-box’ about improvements for practice. They came up with

interventions that they perceived as both useful for EBM learning in the workplace and applicable to daily practice. The four focus group sessions can also be considered a strength. Afterwards, we felt that we had reached saturation and managed to describe all educational strategies. Furthermore, the nominal group technique we applied produced a ranking of most useful ideas in practice, giving physicians and educators a practical guideline on how to proceed in their daily practice.

A limitation could be the fact that this study was conducted in GP specialty training. Although we expect that the context of general practice is a good example of a workplace in which EBM learning can occur, the general practice setting, with a trainee and a supervisor working together for an extended period and with time allocated to learning conversations and observations, might be different from other workplaces. However, the great variety of ideas collected in this study may make practical implementation easily possible in other settings. We did not specifically ask our respondents to take feasibility into account when they were generating and ranking ideas.

Evidence on how to help medical trainees learn EBM is still scarce, and few studies cover the combination of all steps in practice. (3,14,15) We know, however, what we want to achieve by training in EBM. Core competencies in EBM for health professionals have been formulated (16), and a real-world EBM competency framework for general practice has also been proposed, with clear implications for teaching practice. (17) The core competencies in the framework, namely mindfulness, pragmatism and knowledge of the patient, resonate in our study. Our findings also align with the expert view on teaching EBM, which advocates patients' and clinical scenarios, role models, the 'X-factor' and translating EBM in actual practice. (18)

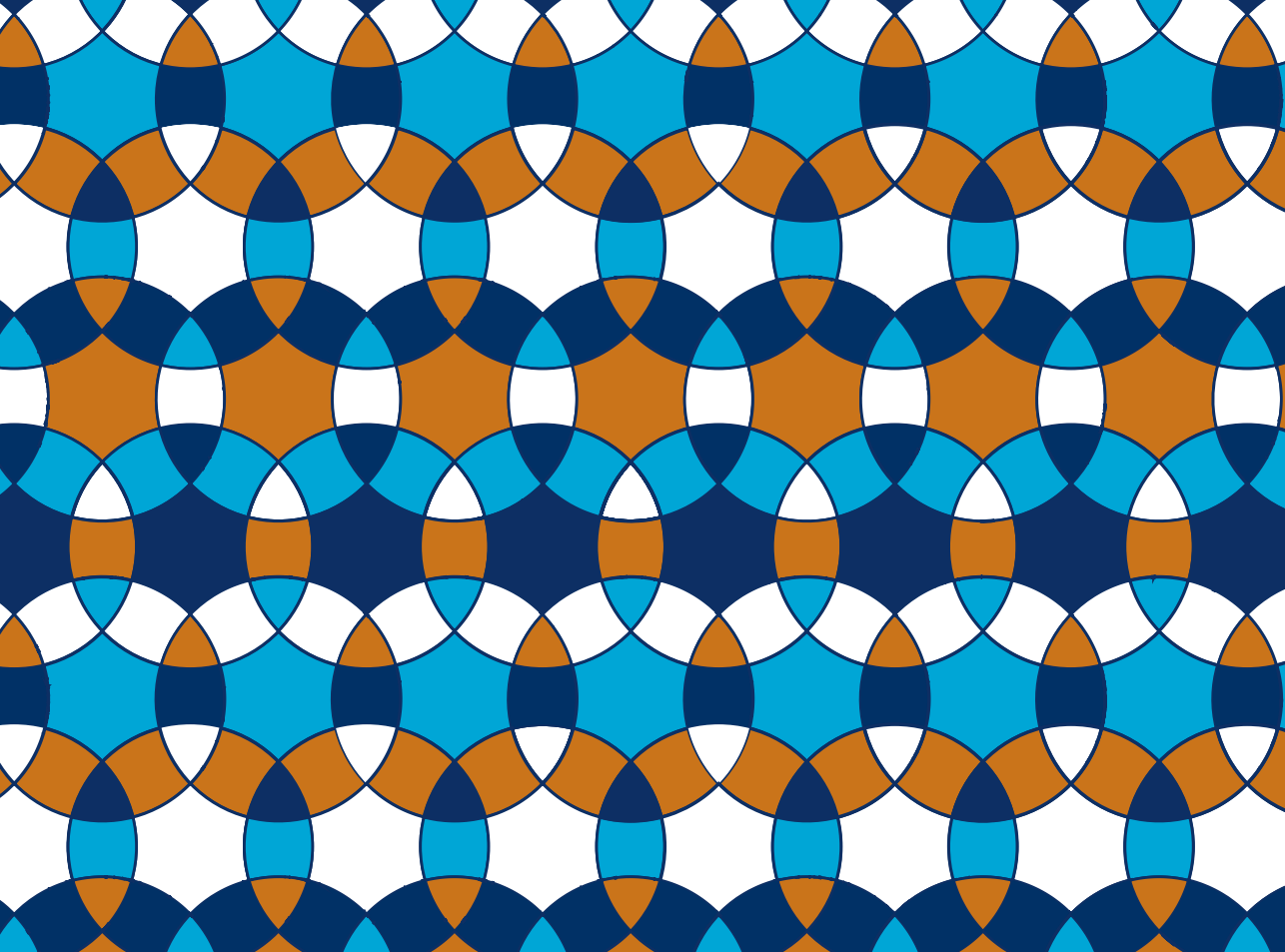
Our supervisors and trainees state that learning conversations, involving reflection on how decisions are made in practice and observations of consultations followed by extensive discussions, are important workplace-based learning instruments. Also recognised as important are discussions with co-workers and attitude in the workplace. Physicians could apply these practical ideas for implementation in a different field to enrich and improve EBM learning opportunities.

This study focused on the ideal situation, including all possible educational strategies, to present a wide-ranging overview of potential educational strategies for the workplace. However, there are barriers that stop physicians implementing every possible strategy to teach and practice EBM fruitfully. These may be related to organisation and practice, but can also involve personal attitude, skills or cognitive biases. (19–24) Further research should focus on how to strengthen the supervisors' and trainees' competencies to make optimal use of the opportunities given in the workplace, and thus learn optimally from each other how to apply EBM by explicitly involving evidence, clinical expertise and the patient's concerns.

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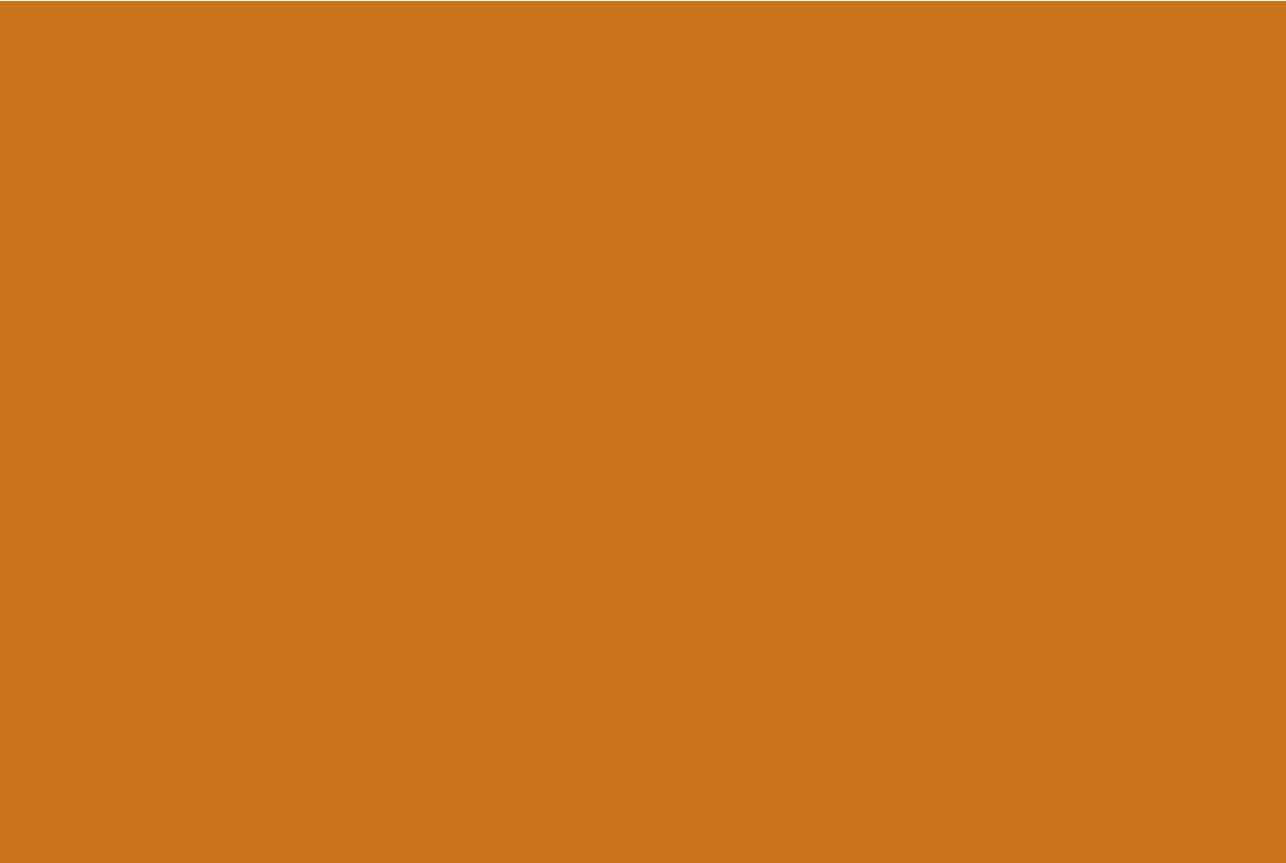
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General Discussion



In this thesis, a better understanding was gained on current workplace-based EBM learning processes in general practice. This last chapter briefly summarizes the key findings and elaborates on the major themes and insights from these findings, while reflecting on this in the light of current literature and providing suggestions for future practice. Subsequently, methodological issues will be discussed. This chapter concludes with implications for future research.

Key findings

To get a first grip on implicit learning processes that take place at the general practice workplace, this thesis started by investigating observational learning in workplace-based EBM learning. The extent to which GP supervisors and trainees recognise each other's EBM behaviour through observation was described in **Chapter 2**, and insight was given into aspects that influence such recognition. We concluded that GP trainees and supervisors do not fully recognise EBM behaviour through observing each other's consultations. Especially aspects related to the observer seemed to influence the degree of recognition: observers tend to be judgemental, give unsolicited comments on how they would act themselves. To improve recognition of EBM behaviour and thus benefit from informal observational learning, observers need to be more aware of the automatic judgements that they make. Explicit learning moments in which EBM decision-making is discussed, can lead to a culture of EBM-conscious behaviour, to more shared knowledge and to the unveiling of tacit knowledge from mindlines, thus improving observational learning.

Building further on these conclusions, **Chapter 3** and **4** investigated current learning processes of GP supervisors and trainees during the already existing explicit learning moments at the workplace, being the learning conversations that are common practice within GP specialty training. In the study in **Chapter 3**, GP trainees were asked, using video-stimulated elicitation interviews, to elaborate on their current EBM learning during learning conversations. This study showed that GP trainees perceive learning conversations as a useful way to learn and discuss EBM, by for instance discussing evidence together, by relating evidence to cases in daily practice and by discussing the supervisor's experience and the specific local context in the light of what the evidence recommends. However, specific behaviour of both supervisor and trainee is needed to make these learning activities happen. A safe space, allowing for an equal and open discussion between GP trainee and supervisor is perceived as essential for optimal EBM learning.

Chapter 4 aimed to explore the possibilities of bidirectional learning, building on the hypothesis that not only trainees can learn from workplace-based learning conversations, but that supervisors might learn from such discussions as well. The

study explored which role and place GP supervisors see for their own EBM learning during conversations with their trainee. It concluded that supervisors acknowledge to learn aspects of EBM from their trainee through learning conversations, but that they currently see this as secondary to the trainee's learning process and to maintaining quality of care within the practice. Aspects that they acknowledge to learn from trainees involve gaining up-to-date knowledge, search skills or more awareness of their own knowledge gaps.

Within **Chapter 3** and **4**, learning was investigated through interviews with actual learners (trainees) or possible learners (supervisors). During this research, we felt that it would be of added value to have a closer look at how such bidirectional learning through social interaction occurs. By describing precisely, using Conversation Analysis (CA), how GP supervisors respond to their trainee's utterances of EBM knowledge in learning conversations, **Chapter 5** illustrated that bidirectional learning opportunities are often not optimally seized. Supervisors tend to refute the expressed knowledge of the trainee or immediately suggest an alternative. Only when additional questions are asked, the trainee is encouraged to elaborate on his or her knowledge, leading to a bidirectional learning opportunity. We concluded that inflexible institutional roles, related to historical claims of supervisors' epistemic authority, hamper bidirectional learning. We suggest that posing open questions can enhance flexibility in roles and create bidirectional learning opportunities.

Incorporating the new insights and understandings that were gained in **Chapter 2-5**, **Chapter 6** aimed to take a first step to operationalise these insights into practice. Educational strategies to improve teaching and learning of EBM were gathered and synthesized using focus groups with GP supervisors and trainees. The described strategies may be implemented during the learning conversations, during observations of each other or during other workplace opportunities, such as teaching sessions with colleagues or meetings with other professionals from other disciplines.

Major themes and insights

In conclusion, this thesis showed that implicit as well as more deliberative ways of workplace-based EBM learning are already occurring within general practice. However, both implicit and deliberative EBM-learning can be improved and should complement each other in order to improve workplace-based EBM learning. To do so, both workplace-based learning opportunities and formal learning moments at the training institute need to be re-examined.

Previous thinking on workplace-based EBM learning has focused mainly on gaining explicit knowledge, while implicit learning has gained less attention. Moreover, the implicit learning processes that were identified, did often not occur in a productive way. (1) However, we would like to argue that implicit EBM learning is both fundamental and desirable.

First and foremost, implicit learning is fundamental. Hafferty already stated, when writing on the informal and hidden curriculum within medical education, that there is *'a fundamental distinction between what students are taught and what they learn'*. (2) Both through informal learning moments, but also through implicit cultural 'norms', trainees learn how to behave and form their professional identity. Such implicit and unintended learning is always taking place when trainees are present within medical practice: not only regarding the formation of identity, but also regarding decision-making, use of knowledge and weighing different aspects of EBM during medical practice. (3,4) So, implicit learning needs to be taken into account and should not be neglected.

Secondly, as indicated in **Chapter 1**, EBM consists of more than just 'learnable' rules and guidelines. Gaining tacit knowledge through implicit learning is desirable when learning how to apply EBM in practice. Opinion papers on how to practice EBM more 'real', also advocate that EBM should be looked at more holistically, by emphasising – also often tacit – expert judgment and shared decision-making skills. (5) Moreover, an EBM-mindful, yet pragmatic way of dealing with EBM, in which knowledge of the patient is stated to be the most useful resource, is described as 'real-world' approach towards practicing EBM in general practice in particular. (6) Lastly, some research argues that the tacit knowledge of mindlines aligns better with the complexity of decisions in daily practice than *"the 'if...then'-structure of guidelines and decision support tools"*, (7) and that *"tacit knowledge is necessary for understanding how clinical judgment and medical decisions involve persons"*. (8) It can be concluded that implicit learning is desirable, since it can help physicians to gain valuable tacit knowledge that can improve 'real-world' EBM behaviour.

Additionally, it is important to accompany implicit learning with some form of deliberative learning to support implicit learning, enhance a positive attitude towards EBM and to make sure that no learning takes place based on erroneous assumptions during implicit learning moments. (4,9–11) Moreover, previous research already showed that implicit learning is often reactive, unplanned and unintentional, which makes it hard to influence using educational interventions. (12,13) So not only exploration of implicit learning processes is needed, but also improvement of explicit learning is important. But how to optimally design explicit learning so that implicit learning can also come to its full potential?

We would like to suggest three themes, derived from the results in this thesis:

1. Stimulate bidirectional EBM learning at the workplace;
2. Create an open learning environment at the workplace, with equivalent roles between supervisor and trainee, while treating their mutual differences as strengths;
3. Raise awareness during formal educational moments on the importance of bidirectional learning, create insight into the role and power of implicit learning moments and provide practical tools to improve implicit and explicit learning moments at the workplace.

Stimulating bidirectional learning

To help both trainees and supervisors to learn how to apply EBM in practice, bidirectional learning should be stimulated and elaborated. **Chapter 2, 4** and **5** of this thesis showed that supervisors not only guide their trainee, but (can) also gain knowledge themselves. However, these chapters also showed that bidirectional learning opportunities are not always optimally seized and are hampered by for instance traditional epistemic roles, unconscious judgments and different perceptions on the goal of learning conversations.

Stimulating moments of bidirectional learning is important because it can lead to more explicit knowledge amongst supervisors and can create awareness of their implicit knowledge and learning processes (**Chapter 4**). The importance of creating such explicit knowledge and awareness amongst supervisors, can be illustrated by referring to dual process theory.

Dual process theory argues that clinicians process and use information in two ways during daily practice: non-analytical 'system-1-thinking', which entails fast, unconscious pattern-recognition, and analytical 'system-2-thinking': making decisions and recognising diagnoses through a slow, conscious and analytical cognitive process. (14–18) Parallels can be seen with the earlier introduced concept of mindlines, which is by some papers described as a form of intuitive system-1-thinking. (7,19) Non-analytical system-1 thinking is preferred by experienced clinicians, but this way of thinking influences how they apply and evaluate EBM. This is well explained by Bate (2012): *"Human beings unconsciously use System 1 processing whenever possible because it is quicker and requires less effort than System 2. In clinical practice, gaps between evidence and practice can occur when a clinician develops a pattern of knowledge, which is then relied on for decisions using System 1 processing, without the activation of a System 2 check against the best available evidence from high quality research."*(19)

Following this, the use of system-1-thinking within the application of EBM is inevitable – and, as said before, also desirable – in experienced supervisors, but it is

important to keep explicit knowledge (the 'system-2-check') present and activated within these experienced clinicians, to avoid gaps between evidence and practice and thus aim for the best quality of care. Moreover, it is needed to adequately teach other clinicians. As seen in **Chapter 2**, observational learning is difficult when the observed clinician is overly relying on system-1-thinking.

Papers on dual process theory make multiple suggestions on how to combine both systems. For instance Croskerry suggests that in order to have a functional, error-reductive approach on (in this case) decision-making, amongst others, intuition should be made scientific, critical thinking should be stimulated and verification of expert heuristics need to be promoted. (20) In another paper, he states that "*All clinicians should develop the habit of conducting regular and frequent surveillance of their intuitive behavior.*" (21)

In line with the theory stated above, we found that intuitive, system-1-thinking plays an important role within the EBM behaviour of supervisors. Croskerry's approach seems somewhat rigid and overlooking the positive sides of mindlines and tacit knowledge, but we do acknowledge that raising awareness on the explicit knowledge of supervisors might improve learning and teaching of EBM as a whole. We argue that bidirectional learning, as suggested in this thesis, can help to check the intuitive behaviour of experienced GPs, and in this way help to stimulate adequate implicit EBM learning as well. Furthermore, when done in collaboration with their trainee, these 'checks' of intuitive behaviour during learning conversations can help trainees to get grip on how to translate their theoretical knowledge on the latest evidence and guidelines to practice. In this way, it can also improve EBM learning of trainees as well.

No previous research has been done on the concept of bidirectional EBM learning between supervisor and trainee. Focus within medical education research has mostly been on facilitating the individual learning process of the trainee. In only a few papers it has been advocated that, in order to come to adequate workplace based medical education, "*adult educators may consider adopting a view of themselves as both learners and educators.*" (22) On the other hand, it has not been specified how such a view could be adopted.

Recently, discourse within medical education research and workplace-based learning has been often focused on self-regulated learning. Through a cycle of goal-directed behaviour, the use of specific strategies to reach those goals and the adaptation of behaviour and strategies to optimise learning, the individual should be able to learn. (23,24) Teaching at the workplace should be aimed at supporting this individual learning process through coaching, learning plans and supportive tools. (25) Whether teachers also learn themselves is not mentioned. Furthermore,

the concept of co-regulated learning (CRL) has recently gained attention. With CRL, the impact of social interactions on learning is acknowledged and placed central within individual learning. Learners regulate their learning processes, consisting of cognitions, motivation and behaviour, together with other persons in their environment. (26,27) However, CRL still focuses on the individual learning process of a trainee or student, in which the environment has a guiding and facilitating character. The starting point that also skilled, experienced physicians can learn from trainees is not acknowledged within CRL.

The view on learning as being self-regulated, in which a teacher is a tutor or coach, is also visible when looking at the current terminology. Learning conversations are referred to as 'tutorial dialogues', which implies the role of a tutor and someone who 'needs to be tutored'. (28,29) However, from our perspective, both supervisor and trainee are learners, with respect to the process of life-long learning and using the most up-to-date evidence. This is why we chose to use the term 'learning conversation'.

Bidirectional learning could also be understood as collaborative learning, even though this is mostly used in a setting of two equal peers. Collaborative learning acknowledges that two individuals can learn from each other when working or talking together. A lot of research has been done on collaborative learning within a simulated environment, on for instance the acquisition of clinical skills. (30) Moreover, also research has been done on collaborative learning at the workplace: a realist review on workplace learning through collaboration in primary care summarized and interpreted these studies. Their results and recommendations show similarities with the recommendations regarding bidirectional learning within this thesis. Mertens et al (2018) found that, as also described in this thesis, any professional or clinician could learn and facilitate other's learning, but that clinicians were often unaware of their learning through collaboration. However, collaborative learning could lead to valuable learning outcomes such as how to contextualise new knowledge to a local context. They suggest that, in order to use the full potential of collaborative workplace learning, it should be made more explicit that professionals can both learn and facilitate other's learning. (1) The same observations are made within the research about Complex Adaptive Systems (CAS), which states that open and explicit interaction within a team, can lead to new behaviour and also to new shared mental models within the team. (31,32)

In conclusion, bidirectional learning between supervisor and trainee regarding the application of EBM in practice is a greatly unexplored but valuable concept. More explicit bidirectional learning moments can help supervisors to create more explicit knowledge and awareness of their implicit knowledge, which helps trainees to learn explicitly and implicitly.

Focusing on safe learning conversations with equivalence while keeping epistemic roles in mind

Learning EBM at the workplace should be aimed at creating an open environment with equivalent roles between supervisor and trainee, while treating their mutual differences as strengths. Implicitly occurring patterns within the supervisory relationship and learning conversations in particular need to be made explicit and used in an effective way. This can lead to more effective (bidirectional) EBM learning.

Chapter 3 of this thesis showed that, in order to optimally learn EBM, trainees perceive a safe space, allowing equal and open discussion between trainee and supervisor, as essential. **Chapter 5**, however, revealed that traditional epistemic roles currently hamper this equal and open discussion. Supervisors tend to 'overrule' the knowledge of their trainee by ignoring it or suggesting an alternative, giving no or little space to the trainee to express his or her knowledge. Such a power imbalance, probably due to the assessment and monitoring role of supervisors, can hinder the relationship between supervisor and trainee in general practice and thus learning. (33)

However, we argue that asymmetry does not necessarily hinder reciprocity, but is a common aspect of institutional interactions. (34) Focus should be on how such (implicit) asymmetries are handled during discourse, in order to promote effective EBM learning. Furthermore, as also stated by a paper of Brown (2020), we argue that it is important that supervisors are aware of their role and position towards their trainee and explicitly re-evaluate their position towards each other when training and development of the trainee progresses. (35)

Research on asymmetry within medical institutional interactions has been mostly focused on doctor-patient communication. Whilst recent discourse promotes equality between patient and clinician through for instance concepts as patient-centeredness and shared decision-making, research showed that asymmetry within this kind of institutional interaction still exists. (36,37) Both participants within the conversation have their own strengths and also their own knowledge-gaps: patients have more knowledge on their own personal situation, beliefs and history – so called 'epistemics of experience' –, whilst physicians have more knowledge on the exact medical aspects – 'epistemic of expertise'. (38) Due to these differences within knowledge, epistemic roles switch during the consultation. During every stage of the conversation, some form of asymmetry exists.

Results from studies on doctor-patient interaction are relevant to consider when looking at supervisor-trainee interaction during workplace-based learning conversations. Striving for complete equality between supervisor and trainee

might not be feasible and also not desirable, since, just as with doctor-patient communication, both supervisor and trainee have their own epistemic strengths regarding EBM. However, inflexibility exists within learning conversations, leading to missed learning opportunities for both. Insights from conversation analytical research can help to reveal explicit possibilities to enhance this flexibility: **Chapter 5**, for instance, suggests that supervisors should pose open questions in response to knowledge utterances of their trainee. Other CA-research on collaborative learning highlights the role of turn design, sequential organisation and so-called ‘repair’ within collaborative learning. (39)

Another way to create awareness on the roles that supervisor and trainee have towards each other and the way this influences EBM learning, is by looking at the suggested framework by Brown (2020), who investigated the formation of identity of GP trainees in the context of the supervisory relationship. (35) He states that it is a reciprocal process, in which four stages of identities can be identified. Each stage has its own discourse on the ownership of medical knowledge (table 1).

Table 1: Trajectory of trainee and supervisor reciprocal identities with associated positioning of medical knowledge (adapted version of figure 4 in Brown et al, 2020)

Reciprocal identities	Social discourse on ownership of medical knowledge
1. Junior learner and expert clinician	Knowledge is a resource that trainee seeks and supervisor dispenses
2. Apprentice assistant and master coach	Knowledge is a resource that supervisor has authority in
3. Co-clinicians	Knowledge is a shared asset to be brought to a common purpose
4. Lead clinician and advisor	Knowledge is a resource to be sourced

He emphasizes that the supervisor, being the more powerful person in the supervisory relationship, needs to give the trainee the space to develop their professional identity and progress to a next ‘stage’. However, alignment between the willingness of the supervisor to provide space and the ability of the trainee to ‘take’ their role as clinician is essential and is reached by, amongst others, explicit dialogue. Such explicit dialogue can stimulate an equivalent conversation on medical knowledge as well. This resonates with the results within this thesis. Within **Chapter 3** and **4**, similar identities were described by the participants and their effect on learning and teaching EBM. Also, explicit dialogue with each other might help to align these roles and create an environment as open as possible.

In conclusion, we would like to advocate for more awareness of the roles supervisor and trainee take during the learning conversation and the (implicit) discourse that keeps these traditional epistemic roles in place. When this implicit discourse is not taken into consideration explicitly, asymmetry can get too big and learning of both supervisor and trainee will be suboptimal. In order to improve workplace-based EBM learning, flexibility within epistemic roles during conversations on evidence is needed. In order to do so, supervisors should get explicit suggestions on how to make these roles flexible, for instance by giving trainees space to display their EBM knowledge.

Reforming formal educational moments on EBM

Even though this thesis focuses on learning processes at the workplace, the role and place of formal education also deserves attention. First of all because the theoretical background and skills regarding the first three steps of EBM (ask, acquire, appraise) still need to be learned at the training institute. (40) Furthermore, formal educational moments can serve as complementary to explicit and implicit workplace-based learning, in positive and negative ways. Recent research of Braschi et al (2020) for instance showed that formal education also plays an important role in the formation of attitude and convictions on EBM through a hidden curriculum. By analysing Powerpoint slides that were used during formal educational moments, she showed that the hidden curriculum on EBM exists, leading to misconceptions and a negative attitude towards EBM. (3) Moreover, as also already pointed out in **Chapter 3**, context and culture at the training institute influence the way that supervisors teach. (41) Research on Complex Adaptive Systems (CAS) shows that teams – being an open system in interaction with the environment – are influenced not only by each other, but also by other factors, such as the (culture within the) educational system. Illustrative research on CAS within palliative care showed that the way that individual professionals are educated, influences the way that teams work together and the way that palliative care at the workplace is handled. (31)

Following the results of this thesis, formal educational moments to enhance workplace-based EBM learning need to be aimed at three goals: raising awareness on the importance of bidirectional learning, creating insight into the role and power of implicit learning moments and getting practical tools to improve implicit and explicit learning moments at the workplace.

1. As seen in **Chapter 3**, supervisors do not immediately perceive learning conversations as an opportunity to learn EBM from their trainee. However, they do acknowledge that their trainees are for instance better in critically reading articles. (42) Moreover, supervisors perceive their role as supervisors as a motivation to stay up-to-date and engage in lifelong learning. However, as said above, to create an environment in which an equal conversation is

- possible, supervisors should take the first step and be willing to 'share' their role as educator with their trainee. Since this is different from the traditional, institutional roles on epistemic authority within supervisor-trainee pairs during workplace-based learning, providing insight into these processes and roles during formal training moments is necessary. Emphasis should be given on the possibilities of bidirectional EBM learning during learning conversations.
2. The power and possibilities of implicit learning, through for instance observing, should get attention during formal learning moments. **Chapter 6** showed that supervisors and trainees acknowledge the beneficial effect of for instance observational learning, and would also like to implement this more often when improving workplace-based EBM learning. Also a recent opinion paper by Ende (2019) stated that *"In our zeal to provide active, experiential, learner-centered learning, with a focus on learners' autonomy and independence, it is easy to forget how much can be learned just by observing (...)".* (43) So the awareness that implicit observational learning can be useful does exist. However, **Chapter 2** revealed that simply observing each other objectively is difficult and can easily lead to erroneous assumptions of the observer, leading to wrongful implicit learning. Raising awareness for these mechanisms and for the fact that explicit time needs to be available for discussion and reflection afterwards, could improve implicit observational learning at the workplace.
 3. However, only raising awareness is a good first step but might not be enough. There is a need for practical, hands-on tools that can help supervisors and trainees to implement more explicit workplace-based EBM learning moments. When doing so, implicit learning can be improved as well. The results within this thesis give direction for the development of such educational tools: the suggestions in **Chapter 2**, stating that explicit dialogue is needed to elucidate implicit considerations during decision-making, the recommendations regarding discourse from **Chapter 5** and the list with educational strategies and ideas to implement EBM learning from **Chapter 6** can be seen as a first exploration. However, a detailed suggestion on effective and beneficial tools goes outside the scope of this thesis. Further research should be done to investigate which practical educational interventions align most with the workplace. We will go into our suggestions for further research later on in this chapter.

Conclusion

In conclusion: how to balance implicit learning and more deliberative forms of learning at the workplace? Formal training sessions can help to guide and instruct both supervisors and trainees on their EBM-learning behaviour at the workplace but can also hamper informal workplace-based learning. Thus, it is important to align formal education with informal EBM-learning at the workplace. To do so, EBM learning can be seen as a social process, in which the interactions between

physicians together create their shared knowledge and their EBM behaviour. Implicit learning is an essential part of this process and its positive and negative aspects should not be diminished. Deliberative, constructive and well-guided dialogues between supervisor and trainee must be encouraged to complement implicit learning moments such as observations. To come to such dialogues, the potential of bidirectional learning needs to be used and attention should be given to creating an open environment in which knowledge asymmetries are dealt with in a flexible way.

Methodological reflections and its impact on medical education research

One of the strengths of this thesis is the different research techniques that were used to get more grip on EBM learning at the workplace. As said in **Chapter 1**, previous research mainly used quantitative research techniques such as randomized controlled trials and questionnaires to investigate the process and effects of EBM learning. (44–47) Even though this research has provided important insights into EBM learning, it failed to really grasp the core of why EBM learning and applying EBM in practice is so difficult. The lack of effect of different educational interventions has not been explained.

Without claiming that this thesis gives answers to all the remaining questions on why educational interventions on EBM-learning are without great effect, we do think that the research techniques that have been used in this thesis, are of value and should be used more within medical education research. They give a different perspective on (tacit) EBM-knowledge and acknowledge the fact that learning can occur implicitly, while being in interaction with others. (4)

Video-stimulated elicitation interviewing

Even broadly used qualitative research techniques such as formal interviewing, are often insufficient to reveal tacit knowledge, which, as said above, plays an important role within learning. Video-stimulated elicitation interviewing (VSI), however, can stimulate reflection and elicit tacit knowledge and implicit learning processes. (48,49) As explained by Van Braak (2018), VSI can be used both as a way to enhance *recall* and as a way to enhance *reflection*. Within this thesis, we gained experience with both purposes: **Chapter 2** was aimed at revealing (the recognition of) cognitive processes during decision-making in clinical practice. For this, we specifically aimed for recall of the considerations that led to the observed medical decisions. However, in **Chapter 3** and **4**, videos were used to enhance reflection and try to elicit implicit learning processes during learning conversations.

Using VSI for recall has been criticized as a tool to elicit tacit knowledge. Firstly, recalled cognitive processes are not necessarily linked to tacit knowledge. Secondly, recalled thoughts and considerations might not reflect implicit processes, since, as said by Van Braak: *“Participants might consciously censor the recall while being interviewed or unintentionally involve sense-making processes that produce convincing stories unrelated to their thinking processes during the event.”* (48) However, the aim of **Chapter 2** was not to elicit the tacit knowledge of the observed supervisors and trainees, but investigate whether observers were able to recognize the considerations of the observed physicians. Using an analyzing approach in which we compared the recalled considerations with the comments of the observers, we were able to, indirectly, draw conclusions on the value of (implicit) observational learning.

Remarkable, however, was the fact that almost all physicians declared that participation in the interviews focused on recall, also led to increased reflection on their (EBM-)considerations and decision-making behaviour in general. Often, participants stated that they discussed insights from the interview with their supervisor/trainee during the next, regular, learning conversation or mentioned that it changed the way they applied EBM during daily practice.

Supervisor:

“So, for me, it happened more than average the last months that I think ah yes there might be a guideline for that and we can look it up. So in that way participating in the study helped to bring out the guidelines and the standards. [...] You know there is a lot that you solve in a particular way and you are also used to solve it in a way and using guidelines and standards is not, to say so, the most important source to solve things you don’t know. And of course it is an important part of our job, because each day there are a lot of things we simply don’t know. How to deal with the things you don’t know and I think, to say so, simply looking up a guideline to work along those advices has changed with respect to before we participated in the study.”

In conclusion, the VSI technique is helpful for medical education research on tacit knowledge. Moreover, the concept of watching each other’s consultations using a structured way of reflection and observing, might also be an educational tool on itself to enhance reflection on EBM-considerations and to help trainees access the knowledge and expertise of their more experienced supervisors. **Chapter 6** indicated that video-based observations are already seen as a valuable way of learning from each other at the workplace, but are currently scarcely used for EBM-learning. Currently, also instructions on how to make such observations and the subsequent conversations useful and effective is lacking. Insights and experiences

from VSI might help to incorporate observational learning in daily workplace-based EBM learning.

Conversation Analysis

Secondly, the methodology of Conversation Analysis (CA), as used in **Chapter 5**, is a valuable addition to medical education research. It is valuable since it has a social constructivist perspective on learning and because it can help to bridge the gap between theory and practice within EBM-learning. Moreover, it can help to provide a closer and more detailed look on the, often tacit, complex social processes that occur during workplace-based learning and that have a big effect on learning and development. This effect is described accurately by Klasen and Lingard as 'the butterfly effect'. Within their article they advocate for new research methods to unravel the complex social processes that influence learning and giving supervision: "[...] *unless our research advances to make the[se] small disturbances recognizable and provide a new language for talking about them. What appears as chaos, as unpredictable in any single study, may present itself as an emergent pattern if we can step back and take a wider view.*" (50) In our opinion, CA is pre-eminently suitable to provide such a new language and reveal the patterns within workplace-based discourse.

First of all, CA looks at learning from a social constructivist perspective, acknowledging the fact that learning is a socially constructed process that occurs in interaction with others through mutual social actions. (38,51,52) This is different to current discourse on for instance self-regulated learning, which follows a more cognitive constructivism, arguing that knowledge is individually constructed and discovered. (25,53) Following this paradigm, learning processes should be learner-centered, in which the social environment and social interaction are merely a stimulus for individual cognitive conflict. (54) We think, however, that such an approach overlooks the possibilities and effects of bidirectional learning and the social environment of the workplace in general. In our opinion, learning how to apply EBM at the workplace is a skill that particularly has to be learned in collaboration and through social interaction. CA can play an important role in describing and possibly improving these social processes.

Secondly, CA can play an important role within medical education research to bridge the gap between theoretical ideas and actual practices on (EBM-)teaching and learning. Since CA plainly and in detail describes what the effect is of linguistic utterances, it analyses physicians' actions in real situations. As Peräkylä (2003) states, this approach makes that CA is able to falsify and correct assumptions on how certain practices 'work', provide a more detailed picture, add a new dimension to the understanding of practices and suggest missing links between theory and practice. (55) In this way, CA can help to challenge common perceptions, for

instance the perception that learning EBM is an individual process of the trainee him- or herself in which the supervisor does not play a role. Even though the concrete effects on 'learning' cannot be measured, counted or described using CA, looking into detail at the consequences of certain utterances during social intercourse, does add to understanding how EBM learning is currently shaped.

Fortunately, the potential of CA does recently get more attention in medical education literature. Nieboer advocates in a commentary in *Medical Education* (2020) that learning in clinical settings is shaped in and through interaction. To study and enhance such learning, we need *"to shift our focus away from studying perceptions students hold about learning and attend more to the real-time interactions that take place in the clinical workplace. It is such observations that will allow us to identify best practices"*. (56) When studying for instance effective ways of feedback, group reflection or ways to engage supervisors for learning, CA is already used and has provided interesting insights. (57–59)

Altogether, different research techniques can help to get more grip on the implicit learning processes that occur during EBM learning at the workplace. However, this thesis should only be seen as a starting point. More research should be done to unravel the workplace-based EBM learning processes that occur in general practice.

Implications for future research

Based on the results of this thesis, further research on EBM learning should be interdisciplinary, incorporating social sciences and qualitative techniques, in order to get even better grip on how implicit learning processes occur and look at these processes from different angles. The role and effects of reactive learning – a different aspect of informal learning at the workplace – should be investigated. Also the effects of socialization during formal educational moments needs to be taken into account.

Looking at Eraut's typology of non-formal learning at the workplace, this thesis focused on implicit learning and deliberative learning. However, a third typology exists: reactive on-the-spot learning. Eraut describes this as *"situations where the learning is explicit but takes place almost spontaneously in response to recent, current or imminent situations without any time being specifically set aside for it."* (4) Further research should focus on the effect and efficiency of such learning. In this way, a better view on the whole spectrum of non-formal learning at the workplace can be obtained.

Secondly, it might be good to research the effects of socialization during formal education. As investigated by Braschi et al, a hidden curriculum during formal education exists, leading to misconceptions towards EBM. (3) Such a hidden curriculum can influence attitude towards EBM and can hamper learning at the workplace. Previous research also already pointed out that a negative attitude towards EBM can be a barrier towards applying EBM in practice. (60,61) On the contrary, Draaisma et al showed that ongoing and frequent deliberative EBM practice can lead to a more positive EBM attitude and improved EBM behavior. (11) Gaining more insight into how such a negative attitude arises and actively fostering a positive attitude during formal education can help create support for future educational interventions at the workplace.

Qualitative research techniques that try to reveal implicit learning should be used more when investigating EBM learning. To do so, we advocate for an interdisciplinary approach: input and research techniques from linguistic, psychological and social research can be valuable. Moreover, a (social) constructivist approach is essential. Of course, as seen in **Chapter 5**, a more descriptive approach can help to gain insight in implicit learning processes as well, but to gain a deeper insight into the whole spectrum of EBM learning at the workplace, research with a constructivist paradigm is inevitable.

Researchers within medical education research have extensively discussed the different paradigms underlying medical education research and a debate is still ongoing on how researchers look at the nature of knowledge and how to approach research on medical education. (62–64) Ioannidis for instance recently argues, in a commentary on how to learn teachers and supervisors to deal with research, that medical education research is not meeting standards of rigorous research and expresses a desire for the incorporation of more robust, positivist, research methods that can increase generalizability. (65) However, we believe that in order to research EBM learning in a complex environment like a clinical workplace or general practice, with ever-changing factors that knowingly and unknowingly influence learning, generalizability is almost impossible to achieve. (66) Moreover, especially tacit knowledge is something that is subjective and constructed and cannot be grasped through positivist research methods. (7) Following this, we think that research methods with a purely positivist paradigm, such as randomized controlled trials and questionnaires, are less suited when trying to unravel workplace-based EBM learning.

A final note

This thesis presented new perspectives on the complex process of workplace-based learning of EBM in general practice. A better understanding of current implicit and explicit EBM learning processes was gained. In future, these insights can be used to create educational designs that are in line with current learning processes at the workplace and that can help both trainees and supervisors to learn how to apply EBM in practice. However, to do so, further research should be done that takes contextual factors and implicit learning processes into account. Doing so, educational interventions can be developed that help both trainees and supervisors to learn how to apply EBM in practice.

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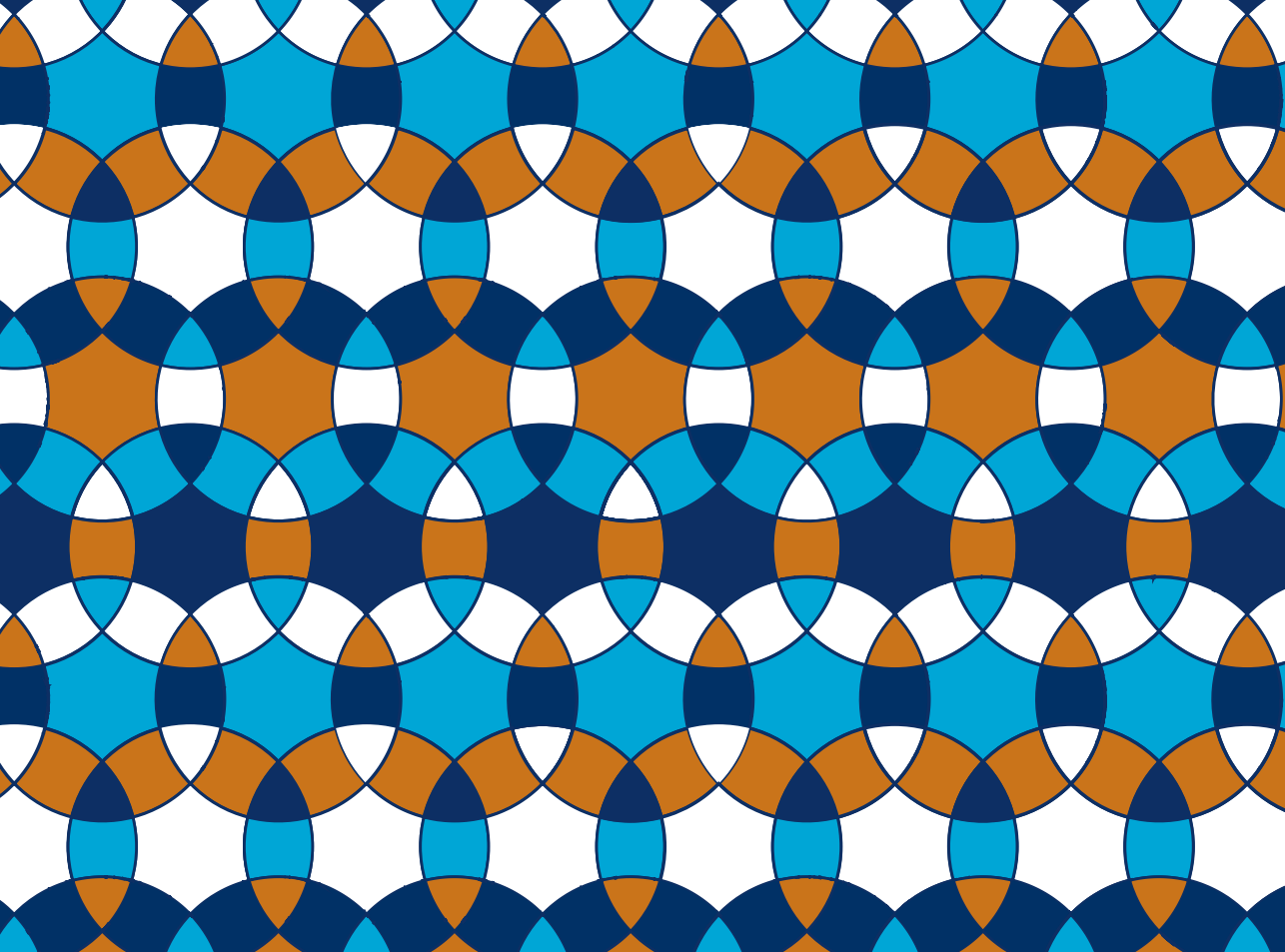
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Appendix

Summary

Nederlandse samenvatting

Dankwoord

About the author

List of publications

Summary

The main goal of this thesis is to gain a better understanding of current evidence-based medicine (EBM) learning processes at the general practice (GP) workplace. EBM is defined as combining clinical expertise, the preferences of the patient and the best-available evidence when making decisions for individual patients within clinical practice. However, it is complex to learn and teach this. Nowadays, in many medical schools, EBM is taught according to the five steps defined in the Sicily Statement: ask, acquire, appraise, apply and evaluate. First, a clinical problem or uncertainty should be translated to an answerable question (ask). As a next step, relevant evidence from the literature should be systematically acquired and afterwards, appraised for its validity, clinical relevance and applicability. The obtained results need to be applied in practice, keeping clinical expertise and the patient's preferences in mind. Lastly, an evaluation of performance should be held to assess effect and results. The emphasis within medical education currently mainly lies on teaching the first three steps during formal educational moments. Insight into current informal workplace-based learning processes is needed to develop future educational designs that align more with the workplace and stimulate the application and evaluation of EBM during daily clinical care.

Within informal workplace-based learning three forms can be distinguished: deliberative learning occurs when time at the workplace is specifically set aside for a learning purpose, while reactive learning happens near-spontaneous and unplanned, often in response to daily activities. Implicit learning, being the least conscious form of learning, takes place without awareness of learning at the time it takes place. Implicit learning is one of the ways in which tacit knowledge is gained. In this thesis, we investigate how both tacit and more explicit EBM knowledge is learned by investigating different ways of workplace-based learning and using different research methods. We focus on two ways of learning in particular: observational learning and learning through dialogue during learning conversations.

Chapter 2 aims to gain insight into workplace-based EBM learning by investigating the extent to which GP supervisors and trainees recognise each other's EBM behaviour through observation, and by identifying aspects that influence their recognition. To do so, video-stimulated elicitation interviews (VSI) with paired GP supervisors and GP trainees, affiliated with GP training institutes in Belgium and the Netherlands, were held. The GP pairs (n=22) were shown fragments of their own and their partner's consultations and were asked to elucidate their own EBM considerations and the ones they recognised in their partner's actions. By comparing pairs who recognised each other's considerations well with those who did not, we developed a model describing the aspects that influence the observer's recognition of an actor's EBM behaviour. This study shows that GP trainees and

supervisors do not fully recognise EBM behaviour through observing each other's consultations. Aspects that negatively influence recognition are often observer-related. Observers tend to be judgemental, give unsolicited comments on how they would act themselves and are more concerned with the trainee-supervisor relationship than objective observation. There is less recognition when actors use implicit reasoning, such as mindlines (internalised, collectively reinforced tacit guidelines). Pair-related aspects also play a role: previous discussion of a specific topic or EBM decision-making generally enhances recognition. Consultation-specific aspects play only a marginal role. Based on these results, the suggestion is done that to improve recognition of EBM behaviour and thus benefit from informal observational learning at the workplace, trainees and supervisors need to be made aware of the automatic judgements that they make, based on their own cognitive framework. Creating explicit learning moments in which EBM decision-making can be discussed can be beneficial, since such moments can lead to shared background knowledge. Furthermore, such discussions can also be useful to unveil tacit knowledge, which may benefit both supervisor and trainee.

Chapter 3 builds on the recommendations of **Chapter 2** by investigating the perceptions of GP trainees on their EBM learning processes during current learning conversations. Semi-structured VSI with GP trainees were held, in which they were shown fragments of their learning conversations, enabling reflection during the interview. The study describes that GP trainees perceive learning conversations as useful for learning and discussing EBM. Multiple EBM learning activities are identified, such as discussing evidence together, relating evidence to cases in daily practice and discussing the supervisor's experience and the specific local context in the light of what the evidence recommends. However, for learning to occur, trainees need and expect specific behaviour, both from their supervisors and themselves. Supervisors ought to supply well-substantiated answers that are applicable in practice and give the trainee confirmation. In turn, the trainee needs to prepare well in order to ask focused, in-depth questions. A safe space allowing equal and open discussion between trainee and supervisor is perceived as an essential context for optimal EBM learning. To bring EBM learning to its full potential, attention needs to be paid to optimising the behavioural and contextual factors found relevant to enhancing EBM learning.

Since we assume that learning conversations can also be beneficial for the learning of supervisors, within **Chapter 4** we explore supervisors' perceptions of how they currently learn EBM by engaging in learning conversations with their trainee. We did this by performing semi-structured VSI with twenty-two Dutch and Belgian supervisors in general practice. This study shows that supervisors do not immediately perceive workplace learning conversations as an opportunity to learn EBM from their trainee. They mostly see these conversations as a learning

opportunity for trainees and a chance to maintain the quality of care within their practice. Nevertheless, during the interviews, supervisors did acknowledge that learning conversations help them to gain up-to-date knowledge and search skills or more awareness of their own knowledge or gaps in their knowledge. This chapter concludes that emphasizing opportunities for bidirectional learning could improve learning of EBM during workplace learning conversations.

Chapter 3 and **4** show that learning conversations could be a good opportunity for supervisors and trainees to learn how to apply EBM from each other, since both professionals acknowledge that the other has strengths from which they could learn. However, it remained unknown whether such bidirectional learning opportunities are currently seized. To gain more insight into the way that knowledge is currently exchanged during EBM learning conversations, **Chapter 5** describes in detail how supervisors respond to knowledge expressed by trainees during such a learning conversation. To do so, fine-grained Conversation Analysis (CA) was used. By analysing how people respond to each other's utterances, CA allowed us to identify how people deal with asymmetries in knowledge, adding valuable new insights into learning and learning opportunities in medical education. The study shows that when a trainee expresses knowledge during the learning conversation, supervisors either 1) refute the expressed knowledge, 2) immediately suggest an alternative, or 3) pose (additional) questions. These responses have consequences for the learning opportunities of both trainee and supervisor: it is only when supervisors pose further questions that trainees are encouraged to elaborate on their knowledge, leading to a bidirectional learning opportunity. This research shows that improving EBM learning opportunities for both supervisors and trainees requires more than simply instructing trainees to express knowledge based – for instance – on recent evidence more often. Inflexible institutional roles related to historical claims of supervisors' epistemic authority hamper bidirectional learning. Posing open questions during learning conversations can enhance the flexibility of these institutional roles while also creating bidirectional learning opportunities.

To take a first step towards operationalizing the new insights that were gained in **Chapter 2-5** into practice, **Chapter 6** gathers and synthesizes educational strategies that could improve teaching and learning of EBM at the workplace. To do so, three focus group sessions with supervisors and one focus group session with trainees were held at the GP specialty training in at the University Medical Centre Utrecht. Within this focus group sessions, the consensus method of the nominal group technique was used. This resulted in an overview of educational strategies and ideas on how to implement these strategies in the workplace, followed by the participants' global ranking of the most useful ideas. The collected educational improvement strategies can be applied in learning conversations, while observing each other's consultations, and in (multidisciplinary) learning opportunities in

the workplace. Ideas regarded as most useful included taking turns to conduct consultations and observing the other, holding a structured, in-depth discussion after observation, preparing and discussing articles found in relevant journals, and on-the-spot searching for relevant evidence during learning conversations. The study concludes by stating that further research should focus on how to strengthen the supervisors' and trainees' competencies to make optimal use of the opportunities given in the workplace.

In **Chapter 7**, we discuss our main findings in a broader context and provide recommendations for future research. We argue that both implicit and deliberative EBM learning should complement each other in order to improve workplace-based EBM learning. To do so, both workplace-based learning opportunities and formal learning moments at the training institute need to be re-examined. We state that in order to enhance implicit learning, not only exploration of implicit learning processes is needed, but also improvement of explicit learning is important. Formal training sessions can help to guide and instruct both supervisors and trainees on their EBM learning behaviour at the workplace. However, formal learning can also hamper informal learning by for instance influencing conceptions and attitude towards EBM. Thus, it is important to align formal education with informal EBM learning at the workplace. To do so, EBM learning can be seen as a social process, in which the interactions between physicians together create their shared knowledge and their EBM behaviour. Implicit learning is an essential part of this process and its positive and negative aspects should not be diminished. Deliberative, constructive and well-guided dialogues between supervisor and trainee must be encouraged to complement implicit learning moments such as observations. Using the potential of bidirectional learning and creating an open environment in which knowledge asymmetries are dealt with flexibly will help realize such dialogues.

Within this thesis, different methods such as VSI and CA have been used. Within the last part of **Chapter 7**, we advocate for the use of these and other qualitative research methods in future research. We recommend an interdisciplinary approach: input and research techniques from linguistic, psychological and social research will be valuable.

In conclusion, this thesis presents new perspectives on the complex process of workplace-based learning of EBM in general practice. A better understanding of current implicit and explicit EBM learning processes is gained. In future, these insights can be used to create educational designs that are in line with current learning processes at the workplace and that can help both trainees and supervisors to learn how to apply EBM in practice. However, to do so, further research should be done that takes contextual factors and implicit learning processes into account. Doing so, educational interventions can be developed that help both trainees and supervisors to learn how to apply EBM in practice.

Nederlandse samenvatting

Het belangrijkste doel van dit proefschrift is het beter begrijpen van de huidige manier waarop evidence-based medicine (EBM) wordt geleerd in de huisartspraktijk. EBM wordt gedefinieerd als het combineren van de klinische expertise van de arts, de wensen en voorkeuren van de patiënt en het best beschikbare wetenschappelijk bewijs om tot een beslissing te komen voor een individuele patiënt in de dagelijkse klinische praktijk. Het is echter moeilijk om dit goed te leren en te onderwijzen. Momenteel wordt EBM in veel medische opleidingen onderwezen aan de hand van vijf stappen, die zijn gedefinieerd in het Sicily Statement: vragen (*ask*), verkrijgen (*acquire*), beoordelen (*appraise*), toepassen (*apply*) en evalueren (*evaluate*). Eerst moet een klinisch probleem of onduidelijkheid worden vertaald naar een geschikte vraag. De volgende stap is het verkrijgen van wetenschappelijke literatuur, die moet worden beoordeeld op validiteit, klinische relevantie en toepasbaarheid. De resultaten en inzichten uit deze literatuur moeten vervolgens worden toegepast in de praktijk, waarbij rekening moet worden gehouden met de klinische expertise van de arts en de voorkeuren en wensen van de patiënt. Als laatste stap moeten het effect en het resultaat van deze stappen worden geëvalueerd. Momenteel ligt de nadruk binnen medisch onderwijs vooral op het onderwijzen van de eerste drie stappen gedurende formele onderwijsmomenten. Het is nodig om inzicht te krijgen in de huidige informele leerprocessen op de werkvloer, zodat toekomstige onderwijsontwikkelingen meer overeenkomen met de praktijk en het toepassen en evalueren van EBM in deze dagelijkse praktijk kunnen stimuleren.

Informeel leren op de werkvloer kan worden opgesplitst in drie vormen: doelbewust leren vindt plaats als er expliciet tijd wordt gereserveerd voor leren, terwijl reactief leren spontaan en ongepland is, vaak in reactie op gebeurtenissen in de dagelijkse praktijk. Impliciet leren is de meest onbewuste vorm van leren, omdat het plaatsvindt zonder bewustwording van het feit dat er geleerd wordt op dat moment. In dit proefschrift onderzoeken we hoe zowel impliciete als meer expliciete EBM kennis wordt vergaard door verschillende manieren van leren op de werkplek te onderzoeken en verschillende onderzoeksmethoden te gebruiken. We focussen op twee manieren van leren: het leren door elkaar te observeren en het leren door met elkaar te praten gedurende leergesprekken.

Hoofdstuk 2 heeft als doel om inzicht te geven in het leren van EBM op de werkvloer door te onderzoeken in welke mate huisarts-opleiders en huisartsenin-opleiding (AIOS) elkaars EBM-gedrag herkennen door elkaar te observeren, en door te onderzoeken welke factoren deze observaties beïnvloeden. Hiervoor hebben we video-gestimuleerde interviews afgenomen met duos van huisartsopleiders en AIOS, die waren verbonden aan huisartsopleidingen in België en Nederland. De duos (n=22) kregen videofragmenten te zien van hun eigen

consulten en van de consulten van de andere deelnemer van het duo. Aan hen werd gevraagd terug te halen welke EBM-overwegingen meespeelden bij de geobserveerde beslissing, en daarna werd gevraagd te beschrijven welke EBM-overwegingen van de ander zij herkenden. Door duo's te vergelijken die elkaars overwegingen goed herkenden met duo's die die niet goed herkenden, konden we een beschrijvend model ontwikkelen van factoren die herkenning van elkaars overwegingen beïnvloeden. De studie liet zien dat huisarts-opleiders en AIOS elkaars EBM-gedrag niet goed herkennen als zij elkaars consulten observeren. Factoren die deze herkenning negatief beïnvloeden zijn vaak gerelateerd aan degene die observeert: het bleek lastig om de overwegingen van de ander zonder oordeel te observeren. Observatoren hadden de neiging snel een negatief oordeel te vellen over het gedrag van de ander of ongevraagd hun eigen overwegingen te benoemen in plaats van die van de andere persoon. Ze hadden tevens de neiging om het EBM-gedrag van de ander te interpreteren vanuit hun 'rol' als opleider of AIOS. Er is tevens minder herkenning als de actoren impliciete manieren van redeneren gebruiken, zoals *mindlines* (geïnternaliseerde, collectief bekrachtigde, onbewuste richtlijnen die tot stand komen door interactie met andere artsen, met patiënten en op bij- en nascholingen). Duo-gerelateerde factoren spelen tevens een rol: eerdere gesprekken over een specifiek onderwerp of EBM-besluitvorming in het algemeen bevorderen de herkenning van elkaars EBM-gedrag. Consult-specifieke factoren spelen slechts een marginale rol. Gebaseerd op deze resultaten wordt in **Hoofdstuk 2** geadviseerd dat huisarts-opleiders en AIOS, om de herkenning van elkaars EBM-gedrag te verbeteren en daarmee te profiteren van informeel observationeel leren, bewust moeten worden gemaakt van de automatische oordelen die zij vellen. Het is tevens nuttig om expliciete leermomenten te creëren waarin EBM-besluitvorming kan worden besproken, omdat deze momenten kunnen leiden tot de vorming van gedeelde, expliciete kennis. Daarbij kunnen expliciete leermomenten ook waardevol zijn om impliciete kennis aan het licht te brengen, waar zowel opleider als AIOS van kan profiteren.

Hoofdstuk 3 bouwt verder op de aanbevelingen van **Hoofdstuk 2** door te onderzoeken wat de kijk is van AIOS op hun huidige EBM leerproces gedurende leergesprekken. Hiervoor werden semigestructureerde, video-gestimuleerde interviews met AIOS gehouden, waarin zij fragmenten van hun eigen leergesprekken te zien kregen, zodat zij hierop konden reflecteren. De studie liet zien dat AIOS leergesprekken nuttig vinden voor het leren en bediscussiëren van EBM. Er werden verschillende EBM-gerelateerde leeractiviteiten geïdentificeerd, zoals het gezamenlijk bespreken van literatuur, het relateren van literatuur aan casus uit de dagelijkse praktijk en het bespreken van de ervaringen van de opleider en de specifieke lokale context in het licht van wat de literatuur en de richtlijnen aanbevelen. Echter, deze studie toonde ook dat AIOS specifiek gedrag nodig hebben en verwachten van zowel hun opleider als van zichzelf om te kunnen leren.

Opleiders moeten goed onderbouwde antwoorden geven, die toepasbaar zijn in de praktijk, en ze moeten de AIOS vertrouwen geven. AIOS moeten zich op hun beurt goed voorbereiden op het leergesprek om in staat te zijn scherpe, verdiepende vragen te stellen. Het is essentieel voor AIOS dat een dergelijk gesprek plaatsvindt in een veilige sfeer, waardoor een gelijkwaardige en open discussie kan ontstaan. Om EBM leren optimaal te laten plaatsvinden is het dus nodig om aandacht te besteden aan het optimaliseren van bovenstaande gedragsmatige en contextuele factoren.

Omdat we aannemen dat leergesprekken ook nuttig kunnen zijn voor het leren van opleiders, exploreerde **Hoofdstuk 4** wat de gedachten zijn van huisarts-opleiders over hoe zij momenteel EBM leren door leergesprekken met hun AIOS. Hiervoor hielden we semigestructureerde video-gestimuleerde interviews met tweeëntwintig Nederlandse en Belgische huisarts-opleiders. De studie toonde dat opleiders leergesprekken momenteel niet onmiddellijk zien als een mogelijkheid om zelf EBM te leren van hun AIOS. Ze zien de leergesprekken vooral als een leermogelijkheid voor de AIOS en als een kans om zicht te houden op de kwaliteit van zorg binnen hun praktijk. Gedurende de interviews erkenden opleiders echter dat de leergesprekken hen wel helpen om up-to-date kennis te vergaren, hun vaardigheden rondom het zoeken van literatuur te verbeteren en hen bewust maakt van gaten in hun eigen kennis. Dit hoofdstuk concludeert dat het benadrukken van de mogelijkheden van wederzijds leren het leren van EBM gedurende leergesprekken zou kunnen verbeteren.

Hoofdstuk 3 en 4 laten zien dat leergesprekken zowel voor AIOS als voor opleiders een goede mogelijkheid kunnen zijn om EBM van elkaar te leren, aangezien beide groepen artsen erkennen dat de ander sterke punten heeft waarvan ze zouden kunnen leren. Het is echter onbekend of zulke wederzijdse leermogelijkheden momenteel worden benut. Om meer inzicht te krijgen in de manier waarop kennis momenteel wordt uitgewisseld gedurende leergesprekken, wordt in **Hoofdstuk 5** in detail beschreven hoe opleiders reageren op een uiting van kennis door de AIOS. Hiervoor is gebruikt gemaakt van de zeer gedetailleerde methodologie van Conversatie Analyse (CA). Door te analyseren hoe mensen reageren op elkaars uitingen kan CA ons laten zien hoe mensen gedurende een gesprek omgaan met verschillen in kennis. Dit onderzoek laat zien dat wanneer een AIOS tijdens het leergesprek kennis uit, opleiders dan wel 1) deze kennis negeren, 2) meteen een alternatief voorstellen, of 3) (aanvullende) vragen stellen. Alle drie deze reacties hebben consequenties voor de leermogelijkheden van zowel opleider als AIOS: alleen als de opleider aanvullende vragen stelt, zorgt dit ervoor dat de AIOS verder kan uitweiden over zijn of haar kennis, wat weer leidt tot een wederzijdse leermogelijkheid. Dit onderzoek toont dat het verbeteren van wederzijdse EBM leermogelijkheden meer vraagt dan het simpelweg instrueren van AIOS om

hun kennis, gebaseerd op bijvoorbeeld recente literatuur, ter tafel te brengen. Inflexibele institutionele rollen, ontstaan door de van oudsher bestaande situatie waarin opleiders geacht worden meer kennis te hebben dan de AIOS, zitten wederzijds leren in de weg. Het stellen van open vragen gedurende de leergesprekken kan de flexibiliteit van de institutionele rollen verbeteren en daarbij wederzijdse leermogelijkheden creëren.

Om een eerste stap te zetten richting het in de praktijk brengen van de inzichten die zijn verkregen in **Hoofdstuk 2-5**, verzamelt en verwerkt **Hoofdstuk 6** strategieën die het onderwijzen en leren van EBM in de praktijk zouden kunnen verbeteren. Hiervoor organiseerden we drie focusgroepen met huisarts-opleiders en één focusgroep met AIOS op de huisartsopleiding van het Universitair Medisch Centrum Utrecht. Gedurende deze focusgroepen werd de Nominal Group Technique (NGT) gebruikt. Het gebruik van deze techniek zorgde voor een overzicht van strategieën en ideeën hoe het leren van EBM zou kunnen worden geïmplementeerd op de werkvloer, gevolgd door een door de deelnemers samengestelde rangschikking van de meeste nuttige ideeën. De verzamelde ideeën kunnen worden toegepast in leergesprekken gedurende het observeren van elkaars consulten en gedurende (multidisciplinaire) leermogelijkheden op de werkvloer. De ideeën die als meest nuttig werden gezien, waren het om de beurt observeren van elkaars consulten, het voeren van een gestructureerd gesprek na een observatie waarin alle drie de EBM-aspecten aan de orde komen, het voorbereiden en bediscussiëren van artikelen uit relevante tijdschriften en het ter plekke opzoeken van relevante literatuur gedurende het leergesprek. Als afsluiting van het hoofdstuk adviseren we verder onderzoek te doen naar de manier waarop competenties van opleiders en AIOS kunnen worden verbeterd zodat er optimaal gebruik kan worden gemaakt van de leermogelijkheden op de werkvloer.

In **Hoofdstuk 7** bespreken we onze belangrijkste resultaten in een bredere context en geven we aanbevelingen voor verder onderzoek. We beargumenteren dat zowel impliciet als expliciet leren elkaar moet aanvullen om EBM leren op de werkvloer te verbeteren. Hiervoor adviseren we zowel de leermogelijkheden op de werkvloer als de formele leermomenten op het opleidingsinstituut opnieuw onder de loep te nemen. We stellen dat het voor de verbetering van impliciet leren niet alleen nodig is om impliciete leerprocessen beter in kaart te brengen, maar dat ook verbetering van expliciete leermomenten belangrijk is. Formele trainingsmomenten kunnen helpen om zowel opleiders als AIOS te begeleiden bij hun EBM-gedrag op de werkvloer. Formeel leren kan informeel leren echter ook belemmeren door bijvoorbeeld de opvattingen en attitude jegens EBM te beïnvloeden. Het is dus belangrijk om het formele leren af te stemmen op het informele leren van EBM op de werkvloer. Hiervoor is het belangrijk dat het leren van EBM wordt gezien als een sociaal proces, waarin de interactie tussen artsen zorgt voor het

creëren van gedeelde kennis en hun gezamenlijk EBM-gedrag. Impliciet leren is een essentieel onderdeel van dit proces. Doelbewuste, constructieve en goed begeleide gesprekken tussen opleider en AIOS moeten worden aangemoedigd om de meer impliciete leermomenten zoals observaties te ondersteunen. Om dit soort constructieve gesprekken mogelijk te maken, pleiten we voor een betere benutting van de mogelijkheden van wederzijds leren en is het noodzakelijk dat er aandacht is voor het creëren van een open, veilige leeromgeving waarin er flexibel wordt omgegaan met verschillen in kennis.

In dit proefschrift zijn verschillende onderzoeksmethoden gebruikt, zoals video-gestimuleerde interviews, focusgroepen en Conversatie Analyse. In het laatste deel van **Hoofdstuk 7** pleiten we voor het gebruik van deze en andere kwalitatieve onderzoeksmethoden in toekomstig onderzoek. We bevelen een interdisciplinaire aanpak aan: input en onderzoekstechnieken vanuit taalkundig, psychologisch en sociologisch onderzoek kunnen waardevol zijn.

Concluderend presenteert dit proefschrift nieuwe inzichten in het complexe proces van het leren van EBM in de huisartspraktijk. Het geeft een beter begrip van de huidige impliciete en expliciete leerprocessen. In de toekomst kunnen deze inzichten worden gebruikt om onderwijs te ontwikkelen dat in lijn is met de huidige leerprocessen op de werkvloer en dat zowel opleiders als AIOS kan helpen om te leren EBM toe te passen in de praktijk.

Dankwoord

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Lisanne

About the author

Lisanne Welink was born on the 18th of April 1989 in Nijmegen, the Netherlands, and grew up in Mill. After completing her secondary school at Stedelijk Gymnasium Nijmegen in 2007, she started her study Medicine at Utrecht University. During her study, she broadened her scope by taking electives in for instance Antic Myths in European Literature and Medical Education. After obtaining her medical degree in April 2014, she started working as a physician in elderly care at Me-doc. Following her interest in medical education and medical education research, she switched to working as a policy advisor and research assistant at the Education Center / Center for Research and Development of Education of the University Medical Center in Utrecht. During her time here, she helped to develop a new undergraduate medical curriculum, including longitudinal clerkships and entrustable professional activities (EPAs). She also participated in the WatchMe project, an international, EU-funded project aimed at improving feedback, assessment and professional development of students through learning analytics. Moreover, she obtained her University Teaching Qualification (BKO) in 2016. She started working as a PhD-candidate in March 2016, combining research with the General Practice Training in Utrecht. Besides, she followed courses of the Postgraduate Master of Epidemiology. After careful deliberation she decided in 2020 that working in elderly care fits her better and she resigned her residency for general practice while finishing her thesis. She started working as a physician in elderly care at Stichting Zorgcentra De Betuwe. From September 2021 onwards, she is in training to become an elderly care physician.



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