

Workplace learning through interaction

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Workplace Learning through Interaction:
Using sociocultural theory to study residency
training

Francisco M Olmos-Vega

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Workplace Learning through Interaction: Using sociocultural theory to study residency training

DISSERTATION

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by

Francisco M Olmos-Vega

Supervisors:

Prof. dr. D.H.J.M. Dolmans

Prof. dr. P.W. Teunissen

Co-Supervisor:

Dr. R.E. Stalmeijer

Assessment Committee:

Prof. dr. E.W. Driessen (Chairman)

Dr. J.M. Frambach

Dr. E. Helmich, Education Institute UMCG, Groningen

Prof. dr. I.C. Heyligers

Prof. dr. F. Scheele, Medical Education VUMC, Amsterdam

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Chapter 1

General Introduction

Introduction

Workplace learning constitutes the backbone of postgraduate training. Through working in clinical settings, residents achieve the required level of competency needed to practice as future professionals¹. Learning from practice enables residents to learn how to act, think and interact in ways that are appropriate for their context². However, the clinical setting is a complex learning environment; therefore, learning outcomes in the workplace are unpredictable³. In addition, many learning opportunities that could be made available to residents are not⁴. At the heart of this problem are the intricacies of the social interactions that occur between residents and members of healthcare teams^{4,5}. Successful engagement in workplace learning opportunities entails, therefore, understanding the complexity of such social interactions⁶. In the field of medical education, research on workplace learning has traditionally used cognitive and behaviourist theories to understand and optimise learning^{7,8,9}. More recently, the importance of moving away from the individual as the focus of learning towards a more sociocultural viewpoint on workplace learning has been stressed^{6,10}. Sociocultural learning theories highlight the significance of understanding workplace learning as a process resulting from residents' interactions with different healthcare team members within social and culturally shaped workplace contexts⁶. This PhD thesis aims to disentangle the complexity of workplace interactions in postgraduate training by using sociocultural learning concepts^{11,12,13,14} in an attempt to expand our understanding of workplace learning in these setting¹⁵.

In this chapter, we discuss the literature that has explored residents' interactions with clinical supervisors and with other members of healthcare teams leading to the conclusion that sociocultural theories could be helpful for understanding the complexity of such interactions. We also describe the sociocultural concepts used throughout this PhD thesis. We then offer an overview of studies included in this PhD thesis and finish with a section on reflexivity, which explores the PhD candidate's background and motivation while undertaking this project.

Narrowing the scope: supervisor - resident interactions in the workplace

The most studied type of interaction in clinical workplace learning is most likely the one between clinical supervisors and residents. Supervisory interactions are crucial for residents for many reasons: clinical supervisors model and demonstrate the competencies residents aim to acquire as providers of patient care¹⁶; the supervisors legitimise, to a great extent, the residents' role in clinical settings¹⁷ and allow for the specific and guided participation that is needed to become competent¹⁸. Clinical supervision is a broad concept in itself; clinical supervisors must juggle competing priorities of varied tasks¹⁹, including providing patient care, overseeing resident performance to ensure patient

safety, and teaching²⁰. The inherent tensions among these tasks have dominated the focus of previous studies on supervisory interactions. Goldszmidt et al., for example, identify specific supervisory styles based on how supervisors balance the three tasks mentioned above, ranging from providing direct patient care to delegating most patient care to the resident²⁰. Kennedy et al., on the other hand, focuses only on how supervisors ensure patient safety while overseeing residents' work^{21,22} and describes a set of strategies that can be used to assess residents' competency and respond accordingly to safeguard patient safety. Another set of articles more explicitly examines the teaching tasks that are part of clinical supervision. These articles provide insight into how to best perform as a clinical teacher under workplace setting constraints^{26,27}, including articles that explore residents' perceptions of the most desirable characteristics of clinical supervisors^{16,28}.

The body of literature on clinical supervision has been mostly influenced by the competency-based education movement, which frames residents' learning trajectory to expertise development using both both behaviourist and cognitivist approaches^{23,24}. According to these theoretical perspectives, the interactions between residents and clinical supervisors are dominated by the search for a balance between providing room for residents' independent practice and supervising them²⁵. These assumptions gave priority to how residents learn as individuals, despite having explored how supervisors could assist this process. There is a lack of knowledge regarding how residents react to their supervisors' learning opportunities and how residents learn from supervisory interactions; such queries could be examined by research using sociocultural concepts²⁹.

Broadening the scope: residents' interactions with other healthcare team members

Research on workplace learning strongly focuses on exploring the supervisors' role in workplace learning interactions but has paid less attention to residents' interactions with other healthcare members such as peers, nurses, administrative personnel, and therapists²⁹. How successfully residents engage with these members while providing patient care influences what and how much they learn in clinical settings⁴, which is why we need to explore workplace learning as a form of (re)acting, participating and interacting with the entire healthcare team. Some studies have examined how residents are taught by nurses and pharmacists^{30,31,32}, showing how valuable these actors are to the process in which residents acquire specific skills such as communication and procedural skills and how the pedagogic strategies of the nurses and pharmacists are similar to those used by clinical supervisors. However, no previous study has specifically explored how residents learn from their interactions with the broader healthcare team. A related body of research focuses on how healthcare team members collaborate with each other in intensive care units³³, operating rooms³⁴, outpatient clinics³⁵ and inpatients

wards³⁶. These studies explore how interdisciplinary healthcare team members interact and negotiate to provide patient care together. Consequently, the primary focus of these studies is not how residents learn from their interactions with the healthcare team, a gap that is addressed in this thesis.

Understanding learning from a sociocultural vantage point

As explained in the preceding sections, residents' workplace learning includes more than the interactions between the supervisor and the resident: workplace learning is a process that includes many interactions with various members of healthcare teams. Using sociocultural learning theories allow us to disentangle the complexity of such workplace interactions^{6,10}. In this section, we review these sociocultural learning models along with examples showing how they have been used to study workplace learning in postgraduate training (Figure 1).

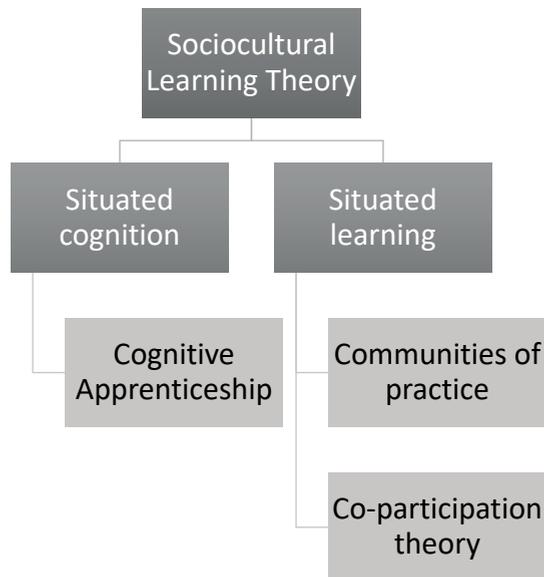


Figure 1. Sociocultural learning models used as theoretical lenses throughout this thesis (in light grey) and their connections.

Sociocultural learning theory emphasises the role of society and culture in enhancing learning and cognitive development¹¹. Sociocultural learning theory emerged in the early 20th century when Lev Vygotsky conducted several studies on children's thinking processes. Based on his findings, Vygotsky purports that adults influence children's cognitive development by helping them complete challenging tasks³⁷. Vygotsky describes how adults offer such assistance by communicating the meanings their culture

assigns to objects and circumstances, providing children with the physical and cognitive tools to make tasks and problems easier. In his view, children acquire higher mental functions - such as logical reasoning - by interacting with adults and peers³⁷. Rogoff expands on this idea and claims that adults involve children in adult experiences through forms of guided participation that mediate, scaffold and supervise their engagement with the activity³⁸. Examples of guided participation include learning to calculate by using a line of numbers as an aid or learning to read by sounding out words³⁸. In line with these claims, clinical supervision could be conceived as a guided form of participation where experienced physicians help residents achieve a higher level of performance compared to the one they might achieve by themselves.

Collins and colleagues' cognitive apprenticeship model (CAM) provides a more detailed description of guided participation activities. Framed within situated cognition³⁹, the CAM aims to make explicit the cognitive tools used by experts for completing complex tasks so learners could have better access to those strategies⁴⁰. CAM consists of four dimensions: a) the type of knowledge required for attaining expertise in a given field, b) the methods experts use to promote expertise development, c) keys to sequencing the learning activities afforded to the learner and d) the required learning environment. The second dimension of CAM describes six teaching methods aimed at mediating the interactions between experts and learners: Modelling, coaching and scaffolding help learners acquire and integrate knowledge and skills through observation and guided participation. Articulation and reflection make experts' cognitive processes visible to the learner while allowing learners to access and control their own problem-solving strategies. Finally, exploration encourages learners to formulate learning goals. These teaching methods have been used successfully in medical education to inform instructional design strategies, to develop evaluation instruments and as theoretical lenses to understand resident/supervisor interactions⁴¹. In addition to identifying teaching methods, Collins purports that successful learning, although necessarily guided, is only achieved by having students approach and solve problems in authentic environments. Such environments should enable learners' active engagement in contextualised real-life situations so they can refine their knowledge and skills, which makes the learning process contextually situated. The concept of structuring and formulating learning environments that suit the CAM came from their originally-intended application, which included learning math and reading/writing skills. However, the CAM sociological dimension is inherently present in workplace learning settings⁴².

One application of sociocultural learning theory that explores learning in authentic working settings is explicitly formulated by Lave and Wenger^{12,13,42}. In their study of vocational practice, these authors expand and refine the concepts of situated learning and learning in communities of practice (CoP). According to these scholars, learning results from negotiating different forms of participation within CoP^{12,13}. A CoP comprises a group of people that sustains mutual engagements to achieve a joint enterprise and that shares their repertoire to achieve their goals. The repertoire of these groups

includes not only various aspects including communication forms, tools and artefacts but also routines and practices unique to the community. Participation in these communities is a social process that includes not only engaging in CoP practices but also establishing meaningful relationships with community members; in fact, securing these relationships legitimises students' participation. Learning arises from a process in which students move from the periphery to the centre of the community, negotiating meaning and acquiring the knowledge and skills that allow them to function within the community. More recent participation conceptualisations within CoP include not only inbound trajectories to full participation but also remaining in the periphery with various identification levels with the CoP while still holding a legitimate role within the CoP⁴³. CoP theory has also been used to explore residents' interactions in the workplace, although mostly concerning clinical supervisors and always assuming an inbound trajectory to full participation^{18,44,45}.

Although CoP theory provides a good starting point to understand learning in the workplace as a social process, it does not explain how students decide to engage in CoP practices. Building bridges between sociocultural and cognitive learning theories, the work of Billett provides answers to this question¹⁴. According to Billett, workplace learning results from participating in and engaging with authentic, context-specific tasks⁴⁶, a concept already demonstrated in postgraduate medical education^{1,47}. Furthermore, learning relies on the interplay of two interdependent factors: the learning opportunities the workplace affords to the learners and the way the learner engages with these opportunities. The engagement of students is influenced by whether they perceive workplace affordances as invitational or restrictive⁴⁸. Such duality depends on students' motives, beliefs, preferences and previous experiences; the same opportunity could be conceived as invitational by some learners and limiting by others. Affordances, in turn, result from historical, cultural and situational factors that shape the environment where they were created; not all learning environments offer the same affordances to learners or at least not in the same form. Successful engagement in workplace affordances leads to meaningful learning experiences that nurture students' learning trajectory. However, learning opportunities are not equally distributed among all residents at the same workplace, and even when opportunities are available, a multitude of factors can negatively influence residents' engagement with them⁴.

To summarize, workplace learning can be conceived as a social process in which learners engage in CoP to amass multiple learning experiences that enrich their specific learning trajectories. Participation occurs because students engage in workplace affordances that are the source of continuous and meaningful interactions between these students and members of healthcare teams. Learning not only includes participating and (re)acting but also relating and building relationships with social groups that possess the knowledge and skills necessary to achieve their common goal.

Research questions

Using sociocultural learning theories to consider workplace learning in postgraduate training can improve our understanding of how residents learn by interacting with the various members of the healthcare team. However, clarification studies are needed to better understand how residents learn through these interactions. Consequently, the overarching research questions of this PhD are as follows:

1. How do residents learn by interacting with members of healthcare teams in the clinical workplace?
 - a. How do residents learn by interacting with their clinical supervisors (Study 1, 2 and 3)?
 - b. How do residents learn by interacting with the entire healthcare team (Study 4)?

Thesis overview

In the following chapters, we present four empirical studies that aim to understand how residents learn from interacting with multiple members of the healthcare team (Table 1). **Chapter Two** explores residents' preferences regarding the use of cognitive apprenticeship teaching methods based on their training level. This study uses a mixed-methods design with the concurrent collection of both quantitative and qualitative data. In **Chapter Three**, we explore what tensions (in terms of discrepancies between residents' preferences and supervisors' behaviours) arise between clinical supervisors and residents during their interactions at the workplace and how trainees decide to act on such tensions using a constructivist grounded theory (CGT) design. In **Chapter Four**, we take a closer look at the interactions between residents and clinical supervisors in the anaesthesiology department to understand how supervisory dyads arrive at a shared understanding regarding how to provide patient care from the theoretical perspective of intersubjectivity⁴⁶. Based on CGT, we conduct focus groups and non-participant observations to gather our data. In **Chapter Five**, we expand our focus of analysis and explore how residents engage with the different community of clinical practice members at the beginning of their rotations to understand their role as part of that community. Again, based on CGT, we interview residents from different disciplines using a visual aid called the Pictor technique. In **Chapter Six**, we discuss our main findings, outline the implications for research and practice, and explore the limitations of our work. In **Chapter Seven**, the valorisation implications of this research are explored. Finally, a summary of the work is presented in both English and Dutch. Because this thesis is based on published journal articles, some repetition across chapters is inevitable.

Reflexivity

Reflexivity constitutes a fundamental and defining characteristic of qualitative research⁴⁹. Since most of the studies in this thesis use this approach, I include a reflexivity section in this introductory chapter. Reflexivity entails a constant awareness regarding the researcher's role in the construction of knowledge⁵⁰. As a researcher using qualitative tools to conduct research, I keep asking myself who I am as a researcher, what are my interests, what has driven me to answer my research questions and, as a result, what is it that I contribute when conducting my studies. By answering these questions and exploring how the answers might impact data collection and analysis, as a researcher, I aim to improve the accountability, transparency and trustworthiness of the research⁵¹. To fulfil these aims, I include a reflexivity section in Chapters 3 to 5. Here, in this introduction, I present a brief reflexivity-as-introspection exercise to discuss my background, the motives for pursuing this PhD line of inquiry and how they have shaped my paradigmatic and theoretical lenses.

In line with my sociocultural understanding of learning, I contemplate my identity because I belong to multiple and sometimes competing CoPs⁵². Most of my professional life has been marked by an inbound trajectory towards full participation in the anaesthesiology community, which began when I was an undergraduate student in the anaesthesiology clerkship and continued while I was a resident and an attending physician in the hospital where I was trained. Becoming an attending physician at an academic centre also implies that I became a clinical supervisor, which entailed having supervisory interactions with students at all training levels, including relationships with anaesthesiology residents and residents from surgical disciplines. Driven by my lack of formal training in teaching and the need to modernise medical education locally, I decided to enrol in the master's programme for the Health Professions Education (MHPE) to improve my knowledge of the field of education. I did not leave my previous CoPs while I stepped into this new one, given the distance-based design of the master's programme. During my MHPE training, I became interested in workplace learning research, which came as no surprise, since it was my area of daily practice. I then decided to start a PhD programme, which has led me to become a member of a CoP of medical education researchers. To summarize, I see myself as an anaesthetist, a clinical supervisor, an educationist, and now, a researcher.

My journey into the PhD programme started with a cognitivist conception of workplace learning that was more in line with the competency-based education tradition I learned during my MHPE training. In fact, my first PhD study was also my master's thesis, and the original PhD proposal started with the premise of framing interactions between supervisors and residents as a function of a balance between supervision and independence. This view slowly moved towards a sociocultural understanding of workplace learning, putting residents' interactions with supervisors and healthcare team members in the spotlight of my inquiries. Two factors influence this transition: the data

analysis of each research piece and my context as an anaesthesiology supervisor. In the very first study, I noticed the eagerness of residents from different disciplines to have more interactions with their supervisors. I expected that such interest would decrease as resident training levels increased, but this was not the case. Residents from all training levels deemed all forms of supervisory teaching interactions as crucial for their learning. From that moment on, I designed one study after the other, always trying to explain why and how these interactions serve the purpose of learning in the workplace. The second factor that influenced the reshaping of my paradigmatic and theoretical accounts of workplace learning was the circumstances of my life as a supervisor. Formal Colombian legislation mandates that the anaesthetist should never leave the OR while a patient is being operated on, with grey areas regarding the residents' role, which means that it is not clear if I can leave the OR if I am supervising a resident. Facing such a dilemma, the primary stakeholders comprised by mandating that anaesthetists must be present when in the company of a junior resident but can leave the OR for a short period of time; however, they can never leave the hospital, even when they are with more advanced trainees. This compromise means that, in practical terms, the pursuit of resident independence in our department is challenging. Such a paternalistic approach to supervision has influenced the way I understand workplace learning: it has forced me to consider how residents learn through interacting intensively with me, moving away from my earlier efforts to balance supervision and "independent" practice. This approach has also highlighted the need to explore clinical supervision in other disciplines to compare the influence of different contexts on my informal observations, as the legislation mentioned above applies only to the anaesthesiology workforce.

In conclusion, each study included in this thesis has been influenced by the complexity of my identity and my own experiences as a participant in a specific workplace context. A careful reading of such articles should include my role as a researcher upon their claims and arguments.

Table 1. PhD thesis studies overview

Study	Study 1. Understanding how residents' preferences for supervisory methods change throughout residency training: a mixed-methods study	Study 2. Dealing with the tension: how residents seek autonomy and participation in the workplace	Study 3. Unravelling residents' and supervisors' workplace interactions: an intersubjectivity study	Study 4. Disentangling residents' engagement with communities of clinical practice at the workplace
Theoretical lens	Cognitive apprenticeship	Co-participation theory of workplace learning	Intersubjectivity as used in co-participation theory	Communities of practice, landscapes of practice, co-participation theory
Research questions	1. To what extent do residents prefer their supervisors to employ the different teaching methods of the CAM and does this differ according to the year of residency? 2. What reasons do residents provide for their preferences?	1. What tensions arise between clinical supervisors and residents during clinical supervision in the workplace? 2. How do trainees decide to act on such tensions to maximise their learning opportunities?	1. How do residents and supervisors come to a shared understanding of how to conjointly provide patient care? 2. What processes are involved in such a development?	1. How do residents engage with specific communities of practices when starting a new rotation?
Methodology and design	Mixed-methods with concurrent collection of quantitative and qualitative data	Constructivist grounded theory	Constructivist grounded theory	Constructivist grounded theory
Context and participants	211 residents from all training levels in 19 disciplines including both surgical and clinical	27 residents from all training levels in 13 disciplines including both surgical and clinical	11 residents and 18 supervisors from the anaesthesiology department	13 residents from different disciplines and training levels
Data sources	Maastricht Clinical Teaching Questionnaire with open-ended questions to explore the reasons behind residents' preferences	Three focus groups with junior, intermediate and senior residents; 10 Semi-structured interviews	Three focus groups: one with residents and two with supervisors; Field observations	Semi-structured interviews using the Pictor technique

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Chapter 1

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Chapter 2

Understanding how residents' preferences for supervisory methods change throughout residency training: a mixed-methods study

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Abstract

Background

A major challenge for clinical supervisors is to encourage their residents to be independent without jeopardising patient safety. Residents' preferences according to level of training on this regard have not been completely explored. This study has sought to investigate which teaching methods of the Cognitive Apprenticeship (CA) model junior, intermediate and senior residents preferred and why, and how these preferences differed between groups.

Methods

We invited 301 residents of all residency programmes of Javeriana University, Bogotá, Colombia, to participate. Each resident was asked to complete a Maastricht Clinical Teaching Questionnaire (MCTQ), which, being based on the teaching methods of CA, asked residents to rate the importance to their learning of each teaching method and to indicate which of these they preferred the most and why.

Results

A total of 215 residents (71 %) completed the questionnaire. All concurred that all CA teaching methods were important or very important to their learning, regardless of their level of training. However, the reasons for their preferences clearly differed between groups: junior and intermediate residents preferred teaching methods that were more supervisor-directed, such as modelling and coaching, whereas senior residents preferred teaching methods that were more resident-directed, such as exploration and articulation.

Conclusions

The results indicate that clinical supervision (CS) should accommodate to residents' varying degrees of development by attuning the configuration of CA teaching methods to each level of residency training. This configuration should initially vest more power in the supervisor, and gradually let the resident take charge, without ever discontinuing CS.

Introduction

The learning process of residents has traditionally been described as “a process of progressively *independent* delivery of patient care by a trainee, associated with a *decreasing level of supervision* by clinical supervisors”¹. The medical education literature worldwide seems to embrace the view that clinical residency training should promote progressive independence, implying a corresponding phasing out of supervision, even though there is no empirical evidence regarding the effectiveness of this approach¹. In fact, some of the literature on clinical supervision (CS) has sought to determine how this phasing out of CS should be effected and when completely independent resident practice should set in^{2,3,4,5}. At the same time, the benefits of supervision have been lauded in numerous publications on medical education^{6,7} and various guidelines for effective supervision in both undergraduate and postgraduate settings have been published⁸. Curiously, these frameworks envisage CS for *all* students, irrespective of their level of training, and the idea of progressive independence is mostly absent⁸. It follows that little is known about how supervisors should adapt their teaching methods or behaviours to residents’ varying levels of experience and expertise.

The idea that supervision should be phased out is part of the traditional apprenticeship model in which novices are apprenticed to experts. Collins and colleagues rethought this model by introducing Cognitive Apprenticeship (CA) which rendered the processes involved in experts’ solving of complex cognitive tasks more explicit⁹. Through *modelling*, clinical supervisors show trainees how to perform a given task, emphasising the important elements that elicit a correct performance. In the next process, *coaching*, supervisors directly observe trainees performing the task and give effective feedback to improve their overall performance. These processes are complemented by *scaffolding*, during which trainees’ levels of expertise are assessed, and trainees are challenged with tasks that are tailored to these levels. In this, supervisors should know whether additional support is needed and, if so, when, but should also gradually fade this support as trainees become more skilled. In the process of *articulation*, clinical teachers induce trainees to provide the reasoning behind their decisions. While doing so, clinical teachers also promote *reflection*, a process that helps students understand their own strengths and weaknesses. Finally, *exploration* is the method in which trainees are encouraged to formulate learning goals and find ways to achieve these⁹. It is important to indicate that a clinical teacher may point out both strengths and weaknesses of a given trainee as part of specific feedback. However, by using articulation, the trainee learns to understand what the specific characteristics of his performance are that require improving and as such strengthening the learning experiences.

These processes, hereinafter referred to as CA teaching methods, can be divided into two groups: modelling, coaching and scaffolding on the one hand, and reflection, articulation and exploration on the other. Where the first relate to the traditional ap-

prenticeship model and are supervisor-directed, the second can be coined resident-directed or self-directed⁹.

Previous research has indicated that both clerkship students and clinical teachers greatly value the use of CA teaching methods during supervision in the clinical workplace^{10,11}. However, as mentioned before, no empirical evidence exists as yet as to how supervisors should adjust their behaviour to residents' varying levels of expertise in the context of the CA model. Research on supervision in undergraduate education supports a developmental model of clinical teaching that is based on CA and in which the supervisory teaching methods move from modelling and creating a safe learning environment in the beginning, through coaching in a second phase, on to articulation and exploration in a third phase¹¹. This theoretical model implies that undergraduate supervision is an ongoing process in which the teaching methods used by the supervisor change with the student's level of expertise, from those that are mainly supervisor-directed to those that are mainly self-directed. Unlike the previously defined paradigm of postgraduate training¹, the undergraduate model does not suggest that clinical supervision should be discontinued in later stages of training. Instead, it proposes a variety of teaching methods that can be adjusted to the student's needs and to the context throughout the training process, allowing the supervisor to provide continued supervision that warrants good patient care without being too dominant.

The CA model of undergraduate supervision has found resonance only in research on training in counselling and psychotherapy which supports a developmental model of supervision that accounts for trainees' level of expertise¹². This model progresses from intensive supervision and feedback for the beginner, to being collaborative and consultative for the advanced trainees, without discontinuing supervision, but changing its focus of action. An important feature is that it also incorporates trainees' reflection into all levels of training¹².

The main hypothesis underpinning this study is that CS should be provided at all levels of residency training instead of phasing it out as independence at work progressively increases. What's more, clinical supervisors should attune their teaching methods to residents' level of training, gradually increasing their autonomy without depriving them of opportunities to extend their expertise. One advantage of residency programmes is that rotations span a significant period of time allowing students to be incessantly exposed to the same group of supervisors; this adds continuity to supervision and, theoretically, provides scope for students to be exposed to the whole string of teaching methods proposed by Collins¹¹. The present study therefore seeks to investigate which teaching methods of the CA model junior, intermediate and senior residents prefer and why, and how these responses differ between groups.

The research questions are:

1. To which extent do residents prefer their supervisors to employ the different teaching methods of the CA model and does this differ according to years of residency?
2. What reasons do residents provide for their preferences?

Methods

Setting and participants

The study was conducted at San Ignacio Hospital, the main academic centre of Javeriana University in Bogotá, Colombia. The university has 19 residency programmes, with 301 students enrolled at the time the study was conducted (between December 2013 and February 2014). As literature suggests that learners can be more easily subjected to the whole string of CA teaching methods when they have the same supervisors for an extended period of time^{10,11}, we only invited residents who had been enrolled in a residency programme for at least two months; this increased the likelihood of residents recognising the methods in the questionnaire. In Colombia, medical training consists of a 6-year undergraduate programme that ends with an internship in the final year. To be able to apply for a residency programme, all graduate students must consequently complete one year of rural community service. Residency programmes vary from 3 to 5 years depending on the specialty.

Methodology

We used a mixed-methods design with concurrent collection of quantitative and qualitative data to answer the research questions¹³. The collection of quantitative data by means of a questionnaire allowed us to include a large sample of residents, whereas the qualitative data served to give us a better insight into the rationales behind the answers to the quantitative questions.

Research team

The research team consisted of an anaesthesiologist pursuing a Master's in Health Professions Education¹⁴, two educationalists (DHJMD, RES) and one knowledge engineer (JD). As part of their mandatory research activities, three anaesthesiology residents assisted the first author in collecting the questionnaires.

Instrument

We used a validated Spanish version of the Maastricht Clinical Teaching Questionnaire (MCTQ)¹⁵ to measure residents' preferences with regard to the teaching methods of the cognitive apprenticeship model. The MCTQ was developed by Stalmeijer et al. based on

the CA model as described by Collins, and has been validated as a tool for the evaluation of clinical teaching quality and as a source of feedback regarding clinical supervisors' performance^{16,17}. The questionnaire has 15 items that are rated using a 5-point Likert scale, including an overall rating of the clinical teaching quality. The items are grouped according to Collins' model into the factors *modelling*, *coaching*, *articulation*, *exploration* with the addition of an element about the creation of a *safe learning environment* as this has been associated with successful learning in clinical environments⁸ (see Additional file 1).

Process

The first author contacted both the residents' current superior and the coordinator of each programme in order to schedule a half-hour session to complete the questionnaires. These meetings took place in the absence of supervisors. At the beginning of the session, we explained the purpose of the study and gave residents the opportunity to ask questions. Subsequently, we asked each resident to fill in a MCTQ, rating the importance of each item in the context of his or her current year of residency. We used a 5-point Likert scale on which the numerical values ranged from 1 being 'least important to my level of training' to 5 'being most important to my level of training'. The last question of the questionnaire asked residents to describe "Which of the previous factors-modelling, coaching, articulation, exploration and safe learning environment-do you deem the most important to your learning process in view of your current year of residency and why?".

Ethical considerations

We obtained ethical approval from the ethics research council of San Ignacio Hospital and Javeriana University before the beginning of the study. Informed consent was obtained from all the participants. Identifying information provided on each questionnaire was coded so as to guarantee residents anonymity of the results.

Statistical analysis

We conducted a stepwise analysis of each factor as our aim was to compare the CA teaching methods. To this end, we computed means of all items pertinent to each factor. Before analysing the data, responses were grouped into three categories according to their origin: juniors (year 1 residents), intermediates (year 2 residents) and seniors (year 3–5 residents; our sample included only 1 year 5 resident). The reason for clustering residents this way was our interest in analysing preferences chronologically based on residency year. However, given the lack of Year 4 residents we decided to group all third and fourth year residents to avoid too much discrepancy in terms of size of the groups. We obtained descriptive statistics for all computed variables.

We ran separate one-way ANOVA tests for each cognitive apprenticeship teaching method of the MCTQ comparing the means for each level of training. We also ran two planned contrasts, the first one being the difference between junior residents on the one hand and the combination of intermediate and senior residents on the other, and the second one being the difference between intermediate and senior residents.

To allow for a comparison of the teaching method residents deemed most important across levels of training, we obtained crosstabs for these two variables. As the count for some cells of the crosstabs was less than 5, we calculated likelihood ratios for categorical variables, and standardised scores to determine trends of the main factors. All analyses were performed using SPSS version 19 for MAC OS. P values of less than 0.05 were considered significant.

Qualitative analysis

In a single document we ordered the answers to the open-ended question, first according to level of training and subsequently according to teaching method of the CA model. We performed thematic analysis as per the stepwise approach suggested by JW Creswell¹⁸. We extracted codes from the data and then grouped them into themes.

Results

Among the residents who agreed to participate, all departments and all levels of training were represented (see Table 1). A total of 211 in 301 residents completed the questionnaires (response rate: 71.4 %), whereas 45.1 % of the respondents were male, and 54.9 % were female. 206 residents answered which was the most preferred teaching method, however only 65.1 % junior, 57.5 % intermediate and 25 % senior residents that completed the MCTQ answer the open-ended question fully.

Residents' preferences as to the type of CA teaching method used

All CA teaching methods of the MCTQ were rated highly by residents at all levels of training (see Table 2). From an analysis of the Likert-scale questions about the preferred teaching method, modelling emerged as the only teaching method that received ratings that differed significantly across the three levels $F(2, 211)=7.02, p=.001$, although the effect size was small, $\omega=0.2$. Further analysis unveiled a significant linear trend, $F(1, 211)=8.47, p=.004$, of residents attaching less and less weight to modelling as they progress through their residency programme. Planned contrast confirmed that junior residents indeed preferred modelling more in comparison to their senior colleagues $t(211)=-3.70, p=.000, r=0.24$. Intermediate residents, by extension, did not differ significantly from senior residents in the value they attached to modelling, $t(211)=-0.24, p=.809, r=0.01$.

Table 1. Contingency table of residency programme and level of training.

Residency Programme	Level of training			Total
	Junior	Intermediate	Senior	
Anaesthesiology	6	6	6	18
General Surgery	6	2	8	16
Plastic Surgery	1	1	1	3
Gynaecology and Obstetrics	4	2	2	8
Genetics	2	2	1	5
Geriatrics	3	5	3	11
Family Medicine	4	5	5	14
Internal Medicine	11	11	11	33
Emergency Medicine	4	6	3	13
Neurosurgery	0	1	4	5
Neurology	1	2	2	5
Ophthalmology	2	1	0	3
Otorhinolaryngology	2	2	2	6
Orthopaedics	7	3	10	20
Pathology	2	3	2	7
Paediatrics	0	5	7	12
Psychiatry	6	6	5	17
Radiology	5	3	6	14
Urology	0	0	1	1
Total	66	66	79	211
Mean age	27	28	28	

When asked which CA teaching method they deemed most important in regard to their level of training, replies appeared to be significantly contingent on the level of training (see Table 3 and Fig. 1). The standardised residuals of each cell revealed that among junior residents modelling was most preferred, and articulation least; intermediate residents had a strongest preference for coaching, while there was no particular teaching method they preferred the least; senior residents, in contrast, preferred articulation most, and modelling and coaching least. The differences were significant, $\Lambda(8)=59.86$, $p<.001$.

Table 2. Mean residents' preferences according to level of training for each Maastricht Clinical Teaching Questionnaire (MCTQ) factor

MCTQ Factor	Level of training		
	Junior	Intermediate	Senior
Modelling	4.6 (0.44)	4.39 (0.77)	4.2 (0.75)
Coaching	4.57(0.47)	4.58(0.48)	4.43(0.54)
Articulation	4.28 (0.82)	4.12 (0.94)	4.2 (0.85)
Exploration	4.02(1.06)	3.91(1.17)	4.12(1.02)
SLE	4.89(0.28)	4.76(0.36)	4.74(0.60)

Note: SLE = Safe Learning Environment. Results are presented in means, standard deviations are in brackets.

Table 3. Contingency table of level of training and the most preferred MCTQ teaching method (TM)

Level of Training		Teaching Method					Total
		M	C	A	E	SLE	
Junior	Count	24	29	4	2	7	66
	% within TM	77.4	31.5	11.8	14.3	20	32%
	Std Residual	4.5	-0.1	-2.1	-1.2	-1.3	
Intermediate	Count	4	40	7	3	8	62
	% within TM	12.9	43.5	20.6	21.4	22.9	30.1%
	Std Residual	-1.7	2.3	-1.0	-0.6	-0.8	
Senior	Count	3	23	23	9	20	78
	% within TM	9.7	25	67.6	64.3	57.1	37.9%
	Std Residual	-2.6	-2.0	2.8	1.6	1.9	
Total		31	92	34	14	35	206

Note: Standardised residuals (Std Residual) in bold correspond to $p < 0.05$. Positive values of these standardised residuals correspond to the teaching methods that are more preferred and negative values to those that are the less preferred ones. M= Modelling, C=Coaching, A=Articulation, E= Exploration, SLE = Safe Learning Environment

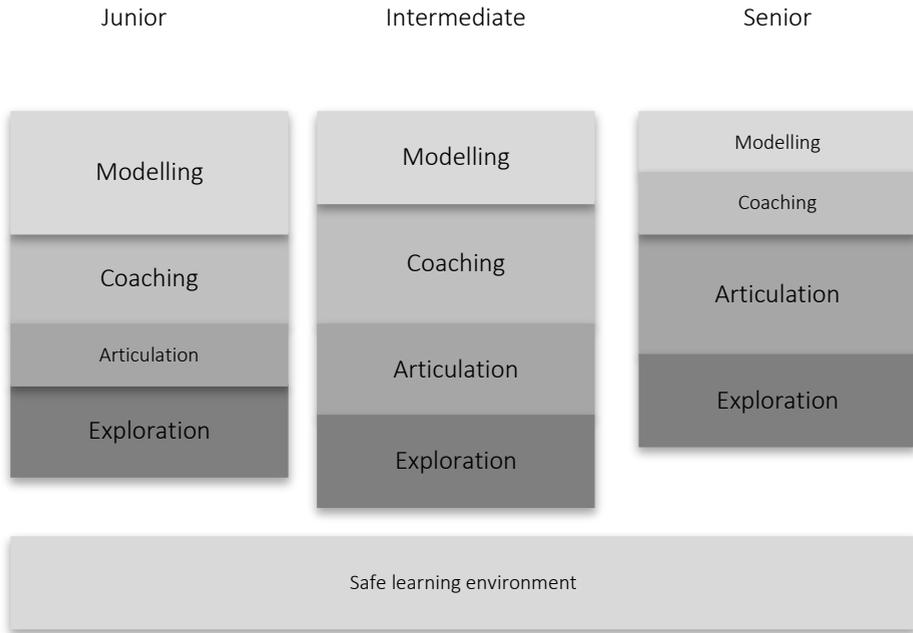


Figure 1. Developmental model of clinical supervision according to residents' preferences. The bigger the box, the more preferred the factor is.

Exploring reasons behind these preferences

To gain insight into residents' motives for preferring certain teaching methods to others, we analysed the answers to the open-ended question asked at the end of the MCTQs. The analysis below presents the main themes that emerged for each group of residents (See Table 4).

Junior residents

The most important concern for junior residents was to have good foundations in terms of knowledge and clinical skills. They considered it very important that these foundations were acquired rapidly such that they could avail themselves fully of the learning opportunities the workplace offered. Modelling and coaching were perceived as the tools that could effectively address these concerns: modelling helped residents, under the wing of their clinical supervisors, to construct solid knowledge and skills foundations that support the acquisition of clinical expertise, whereas coaching encouraged them to become better aware of their strengths and weaknesses and to overcome initial deficiencies. An important aspect of these teaching methods, in the view of junior residents, was that, being under constant supervision, they did not yet have to work completely independently, which minimised errors in patient care. A precondition, however, was that learning took place in a safe environment that fostered their active participa-

tion in the patient-care process. In summary, modelling and coaching were considered crucial for a rapid construction of solid clinical skills, for encouraging residents' reflection about their strengths and weaknesses and for minimising errors that would arise from unsupervised practice.

Intermediate residents

To intermediate residents, on the other hand, it was very important that they could build upon their previously acquired knowledge and skills and grow in their role. In their view, increased independence would help them achieve this. At the same time, however, most of the intermediate residents also appreciated receiving feedback on their independent performance. They therefore chose coaching as the most important teaching method as it allowed them to work independently and receive feedback as well. This feedback was needed to improve their skills and knowledge step by step. Intermediate residents further regarded coaching as a bridge between modelling and articulation: together with modelling, it provided the right basis for the resident to be able to occupy a more central role in patient care later on by means of articulation. Articulation, moreover, was perceived as a method that helped them develop decision-making skills and expand their knowledge base. Yet, what figured as most important at this stage of training was a combination of coaching and independent practice.

Senior Residents

For residents in the final years of training, the most important concern was to consolidate knowledge and skills in order to be prepared for future practice. In this discourse, exploration arose as a method of crucial importance, for it helped senior residents to fix gaps in their competence development. A safe learning environment, which, moreover, in the view of senior residents should not be authoritative, was considered essential in pursuing this goal. Articulation was perceived as the teaching method that would nurture such a safe learning environment. In general, senior residents set great store by articulation which allowed them to expand their knowledge base and engage themselves in dialogue with the supervisor. As a result, they could participate more actively in the patient-care process while still being under supervision that was not authoritative.

Table 4. Residents’ Preferences with regard to the cognitive apprenticeship teaching methods. Main themes according to level of training.

Junior	Intermediate	Senior
<p><i>Supports skills acquisition by using Modelling</i></p> <p>“...because at this point rather than learning the theory stuff what I want is to acquire clinical abilities and skills when approaching the patients” (Junior Resident #26).</p>	<p><i>Support growing independent practice by using Coaching</i></p> <p>“I think this is the most important one, because it allows me to perform the clinical activities independently whilst receiving supervision and feedback in order to improve the abilities step by step.” (Intermediate Resident #3)</p>	<p><i>Fix gaps in competence development by using exploration</i></p> <p>“In this moment my training is almost complete and I think about what am I lacking to face a competitive working market” (Senior Resident # 75).</p>
<p><i>Overcoming deficiencies by using Coaching</i></p> <p>“I think that in this stage of training it would help me to have more feedback with regard to the quality, pertinence and rationally of my actions” (Resident (Junior) #34)</p> <p>“At this level of academic training, initial phase, I will be better helped by permanent feedback in order to fix the fails and to strengthen the right choices...” (Junior Resident #71)</p>	<p><i>Help expand knowledge base and engage in dialogue with supervisor by using Articulation</i></p> <p>“Laying the foundations of my actions and exploring my strengths and weaknesses allow me to develop and improve my clinical criterion and my decision-making skills” (Resident (Intermediate) #22)</p> <p>“Because I consider that it motivates you to make your own decisions and it makes you feel important in the patient care” (Intermediate Resident #65)</p>	<p><i>Help expand knowledge base and engage in dialogue with supervisor by using articulation</i></p> <p>“In this year I think that one already has enough knowledge and training to show what do you know and what you don’t.” (Senior Resident #24)</p> <p>“It allow us not only to answer questions but also to formulate them” (Senior Resident #54)</p>
<p><i>Encourage participation by creating a Safe Learning Environment</i></p> <p>“ I think that the supervisor-trainee relationship is very important. If the supervisor creates an environment of trust and respect, it is possible to loose a little bit that formality and rigidity a teacher has and one can ask questions, formulate doubts and even have more security as a student..” (Junior Resident #80)</p>		<p><i>Gain confidence in own performance by not be coerced using a Safe learning environment</i></p> <p>“...this is the moment to give confidence and respect (to the resident) in terms of what has been taught and modeled, this can only be reflected in a safe learning environment that not coerce our free performance.” (Senior Resident #18)</p>

Discussion

Previous studies have explored residents' perceptions of CS. While some of these focused on the intensity of supervision and residents' overall satisfaction with the supervision¹⁹, others have zoomed in on supervisor characteristics that residents preferred most^{20,21,22}. Yet, none of these has sought to identify how preferences with regard to the teaching methods used in CS differed according to level of training, nor have they used a clear theoretical framework to explore these perceptions.

In this study we have sought to determine residents' preferences with regard to the teaching methods used in CS, and to compare these across levels of training. To this end, we used the teaching methods of the CA model as the main theoretical framework⁹. Our results indicate that CS should accommodate to residents' varying degrees of development by attuning the configuration of CA teaching methods to each level of residency training. This configuration should initially vest more power in the supervisor (by using methods such as modelling and coaching) and gradually let the resident take charge (by using methods such as exploration and articulation), without ever discontinuing CS (see Fig. 1). Qualitative data confirmed and elucidated our quantitative findings, which revealed how this transition should be effected. The analysis also yielded valuable information on how to use each teaching method at each level of training so that the concerns of residents would be effectively addressed. The recommended approach varied from helping residents to construct solid knowledge and skills foundations, through to having them perform the task independently and providing effective feedback afterwards, to finally end with having them actively participate in patient care by engaging them in meaningful dialogue with the supervisor. In this last stage it is important to ensure that learning take place in an environment that is not intimidating the resident.

Our results are consistent with the CA teaching model for undergraduate students reported earlier¹⁶ and could extrapolate its application to postgraduate settings. They also reverberate the developmental model of supervision for counselling and psychotherapy students¹² in terms of how supervisory teaching methods should change with students' level of training. By exploring residents' preferences, we also put to the test the traditional paradigm that favours a gradual fading of CS in the course of residency training^{1,3}. Our findings indicate that by customising constellations of CA teaching methods, specific needs of residents can be targeted at each level of training. What's more, such constellations would allow supervisors to provide on-going supervision that warrants patient safety, and at the same time encourage residents to actively participate in patient care while retaining their autonomy.

In this discourse, however, some limitations are worthy of mention. First, although our hypothesis was supported by both statistical and thematic analyses, we only gauged residents' preferences with regard to supervisor behaviour, not the actual effectiveness of CS. Admittedly, our study provides a starting point for how to structure the CS teach-

ing methods according to residents' level of expertise. However, these results should be complemented by studies that measure the impact of this developmental model on residents' learning and development of expertise, especially in the long run. Second, future research should also explore more in-depth the perceptions of both residents and supervisors with regard to the value of each CA teaching method in relation to the various levels of training. Our study indeed revealed a high level of appreciation of all methods across all levels, but did not go into all aspects exhaustively: certain factors, such as exploration for instance, still remain obscured. An in-depth understanding of changes in appreciation according to residents' level of training would yield further insights with regard to how the cognitive apprenticeship model can guide CS during residency training. Third, our methodology did not allow us to determine the influence of specific factors on residents' preferences, such as individual characteristics, complexity of the task or even the specific workplace context in which this task is developed. Future research should explore these influences in-depth, in order to make a better informed decisions with regard to how to make the transition from one teaching method to the other.

The main practical implication arising from our results is that teaching methods of the CA model could be used at all levels of training, based on residents' preferences. Furthermore, we propose that CS should accommodate to residents' varying degrees of development by attuning the configuration of CA teaching methods to each level of residency training. This configuration should initially vest more power in the supervisor and gradually let the resident take charge by using self-directed teaching methods, without ever discontinuing CS. Consequently, our findings could be used to inform the training of clinical supervisors in faculty development programmes and curriculum design in postgraduate education. It could also be the first step to strike a balance between providing CS while simultaneously increasing residents' independence.

Conclusion

This survey into residents' preferences with regard to the use of teaching methods during CS expands the theories of workplace learning and teaching during residency^{23,24}; moreover, it yields important insights about how the CA model can be wielded to guide supervisor behaviour⁸ and improves our understanding of how such practices should be adjusted to residents' varying levels of expertise¹. What's more, it represents the first step in taking up the challenge of providing continuous supervision while encouraging resident autonomy.

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Appendix 1.*Maastricht Clinical Teaching Questionnaire**Residents' preferences with regard to Cognitive Apprenticeship teaching methods.*

Name: _____ Age: _____ Sex: _____

Residency programme: _____

Current year of residency: _____

Please rate the importance of each of the next items IN RELATION TO YOUR CURRENT LEVEL OF RESIDENCY: 1 if you consider it less important, and 5 if you deem it more important. Please give an overall rating of your preference and do not focus on specific or complex scenarios. Read each item carefully and be honest about your answer.

<u>Modelling.</u>					
Consistently demonstrated how to perform clinical skills.	1	2	3	4	5
Created sufficient opportunities for me to observe him/her.	1	2	3	4	5
Served as a role model as to the kind of doctor I would like to become.	1	2	3	4	5
<u>Coaching.</u>					
Gave useful feedback during or immediately after direct observation of my patient encounters.	1	2	3	4	5
Adjusted his/her teaching activities to my level of experience.	1	2	3	4	5
Offered me sufficient opportunities to perform activities independently.	1	2	3	4	5
<u>Articulation.</u>					
Asked me to provide a rationale for my actions.	1	2	3	4	5
Asked me question aimed at increasing my understanding.	1	2	3	4	5
Stimulated me to explore my strengths and weaknesses.	1	2	3	4	5
<u>Exploration.</u>					
Encouraged me to formulate learning goals.	1	2	3	4	5
Encouraged me to pursue my learning goals.	1	2	3	4	5
Safe Learning environment.					
Created a safe learning environment.	1	2	3	4	5
Was genuinely interested in me as a student.	1	2	3	4	5
Showed that he/she respected me.	1	2	3	4	5

Which of the previous factors -modelling, coaching, articulation, exploration and safe learning environment- do you deem the most important to your learning process in view of your current year of residency and why?

Chapter 3

Dealing with the tension: how residents seek autonomy and participation in the workplace

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Abstract

Context

The workplace can be a strenuous setting for residents: although it offers a wealth of learning opportunities, residents find themselves juggling their responsibilities. Even though supervisors regulate what is afforded to residents, the former find it difficult to strike the proper balance between residents' independence and support, which could create tensions. But what tensions do residents experience during clinical supervision and how do they cope with them to maximise their learning opportunities? Understanding how residents act on different affordances in the workplace is of paramount importance, as it influences their learning.

Method

Residents from different levels of training and disciplines participated in three focus groups (n = 19) and 10 semi-structured interviews (n = 10). The authors recruited these trainees using purposive and convenience sampling. Audio-recordings were transcribed verbatim and the ensuing scripts were analysed using a constructivist grounded theory methodology.

Results

Residents reported that the autonomy and practice opportunities given by their supervisors were either excessive or too limited, and both were perceived as tensions. When in excess, trainees enlisted the help of their supervisor or peers, depending on how safe they recognised the learning environment to be. When practice opportunities were curtailed, trainees tried to negotiate more if they felt the learning environment was safe. When they did not, trainees became passive observers. Learning from each engagement was subject to the extent of intersubjectivity achieved between the actors involved.

Conclusions

Tensions arose when supervisors did not give trainees the desired degree of autonomy and opportunities to participate. Trainees responded in various ways to maximise their learning opportunities. For these different engagement-related responses to enhance workplace learning in specialty training, achieving intersubjectivity between trainee and supervisor seems foundational.

Introduction

The workplace can be a challenging setting for residents: although it offers a great wealth of learning opportunities^{1,2,3}, residents find themselves juggling their responsibilities, which can be daunting⁴. Even though supervisors regulate what is afforded to residents, they often find it difficult to strike a balance between residents' independence and support, which could create tensions between them. But what tensions do residents experience during clinical supervision and how do they cope with them to maximise their learning opportunities? Understanding how trainees act on different affordances in the workplace is crucial, as it influences their learning^{2,5}.

In his co-participation theory, Billet acknowledges that workplace learning is conditioned by two interdependent factors: what the workplace affords to learners, and how the latter decide to act on these affordances based on their interest, intentions and capacities². Active engagement in the workplace has been previously described to be a crucial element of learning in postgraduate and undergraduate medical education⁶⁻¹⁰. However, learning opportunities are not equally distributed among all learners², and what is afforded to the learner is overwhelmingly regulated by clinical supervisors¹¹. They, in turn, find it difficult to strike the right balance between independent practice and support^{12,14}, a decision based on a multitude of factors¹¹. In this regard, different conceptual models of gradual independence and workplace learning have been described previously, which include grades of supported participation⁷, strategies to balance learners' independence and patient safety^{13,14} and pedagogic practices that supervisors can adjust to match students' training level^{15,16}. Nonetheless, scant attention has been paid to the question of how residents respond to such supervisory practices when these do not match their preferences, which could result in tensions during clinical supervision. Apramian and colleagues have described how residents must negotiate procedural variations with their supervisors, in an effort to access practice and discover their preferences and principles of practice^{17,18}. What they did not explore, however, is how residents decide to act on both invitational and restricted workplace affordances, and how these co-participation practices could maximise residents' learning opportunities. The purpose of this study is, therefore, to explore and understand tensions that residents experience during supervision, and how residents cope with them to maximise their learning opportunities.

The research questions are:

What tensions arise between clinical supervisors and residents during clinical supervision in the workplace?

How do trainees decide to act on such tensions to maximise their learning opportunities?

Methods

Methodology

We designed a constructivist grounded theory study to answer the research questions. As explained in detail in the following paragraphs, we follow the principal tenets of this methodology, which include: iterative data analysis and collection, theoretical sampling and data analysis using constant comparison methods^{19,20}. By following this methodology, we assured that our theory was grounded in participants' experiences. We chose constructivist grounded theory as the methodology because it allowed us to collect and analyse data systematically and generate empirically grounded conceptualisations that helped us answer our research questions¹⁹. By using constructivist grounded theory, we could discern the why and the how of the social processes of residents' interactions with the workplace, and how they deal with invitational and restricted workplace affordances in relation to their learning. As the methodology is rooted in the constructivist research paradigm, analysis and interpretation of the data result from the shared experience between the researchers and the participants, whose views influenced the ultimate conceptualisations as presented in this manuscript¹⁹.

Reflexivity

Reflexivity refers to attending researchers' motives and preconceptions, as well as their position in relation to the participants, and how these factors affected the research process²¹. In this respect, we provide information about the background of each researcher. The first author (FOV) is an anaesthesiologist who works in a teaching hospital and supervises undergraduate and postgraduate students; NVC is a doctor who, at the time of data collection and analysis, was completing his internship; and DD and RS are educationalists with extensive experience in medical education research and qualitative methods. FOV holds a position as clinical supervisor in the research setting. He had direct contact with residents from the surgical disciplines but only supervisory interactions with all anaesthesia residents that agreed to participate in the study. We are aware that this power position could have influenced residents' decision to take part in the study and the subsequent results. To mitigate this influence, we assured anonymity of the results, researchers' triangulation and member checking, as we will explain in the next sections.

The study is part of a comprehensive PhD project of the first author. The overarching goal of the project is to explore and understand how supervisors and residents balance the tension between providing supervision and encouraging autonomy, and how residents learn from the supervisory interaction that is at the heart of such tension. The project follows a constructivist paradigm research approach throughout all the individual studies.

Existing literature on co-participation and workplace learning^{2,3,5} influenced the research process, including data collection and analysis, and provided sensitising concepts that informed the coding process and interview probes. Central to these frameworks is the fact that active participation in authentic workplace activities results in learning, which is the vision that guided our analysis.

Setting

We conducted the study at Javeriana University in Bogotá, Colombia, which has 19 programmes, with around 300 trainees working in the main teaching hospital, San Ignacio. Medical training in Colombia consists of a 6-year undergraduate programme that includes a final internship year. After completion of this 6-year programme, new doctors must first work in a rural area for over a year before being able to apply for specialty training. Depending on the discipline, specialty training can span from 3 to 5 years. Contrary to North America and Europe, residents only receive a small financial reward from their hospital, as they do not have a formal working contract with their employer. The reward could be as low as 100 dollars per month, with food subsidies to use within the hospital during day and night shifts. Some residents also receive a small remuneration of about twice the Colombian minimum wage paid by the government. In addition, residents must pay a tuition fee of about 5 000 American dollars each semester.

Data collection and analysis

We recruited residents from different levels of training and disciplines, both surgical and non-surgical, using purposive and convenience sampling. By using these sampling strategies, we assured a representative sample of residents that could cover all possible ranges of supervisory experiences, enriching and reinforcing the emergent theory. Having such a broad range of participants also secured transferability of the findings²¹. FOV contacted each participant personally, explained the study objectives and invited him or her to be part of the study. Those residents that declined to participate told us that they did not have time in their schedule to attend the focus groups or to perform a semi-structured interview. We did not explore further reasons behind their negative answers.

For our data collection, we held three focus-group discussions with junior, intermediate and senior trainees, respectively, to have a broad range of opinions that could generate a great wealth of initial information²². To foster the discussion and uncover the tensions, we used vignettes describing supervisory methods derive from the cognitive apprenticeship model¹⁶. During the discussion, we initially explored to what extent residents' preferences regarding such methods matched supervisors' behaviour and if those circumstances resulted in tensions (see Appendix 1). FOV acted as moderator of the discussions and NVC as an observer, taking notes of participants' dynamics and individual reactions. The focus groups were followed by semi-structured interviews, conducted by the first author, to explore the preliminary data categories in more depth.

By using theoretical sampling, we decided which residents could provide experiences that could fill the gaps in the emergent theory. Discussions and interviews were audio-taped and transcribed verbatim for data analysis. We also included NVC's notes about focus group members' interactions for data analysis.

We collected and analysed the data in an iterative fashion. Initial in vivo coding and process coding were performed by FOV and NVC independently but were subsequently compared to reach consensus. In vivo coding refers to using participants' personal wording and language to code a fragment of data, whereas process coding involves using gerunds to connote action in the data. These two types of codes are part of grounded theory tradition, as they help the researchers to root the emergent theory in the data and to understand the social processes involved in it beyond a simple description of the facts¹⁹. Focused and axial coding allowed us to find emerging categories and their relationships using the principles of constant comparison¹⁹. FOV, DD and RS discussed intermediate outcomes and conceptualisations to refine the final framework and determine if new data needed to be collected. Constant comparison during data analysis informed the semi-structured interview prompts to further explore the emerging theory. Using theoretical sampling we decided whether we had reached saturation; this occurred after the tenth semi-structured interview¹⁹. After we had consolidated the results, we sent them to all participants for a member check and we received no further comments or changes. We used ATLAS.ti software v1.0.18 (From ATLAS.ti Scientific Software Development GmbH developer) to facilitate storage and analysis of the data. The first author wrote reflective memos that helped him with the interpretative analysis and served as a means of reflexivity throughout the research process¹⁹.

Ethical considerations

We obtained ethical approval from the Research Ethics Committee of Javeriana University and San Ignacio Hospital. Informed consent was obtained from all the participants. We coded all information that could potentially disclose the identity of participants so as to guarantee their anonymity in the results.

Results

We interviewed a total of 25 residents aged between 25 and 33 years, 44% of whom were male and 56% female. We held three focus-group discussions with junior (n = 7), intermediate (n = 6) and senior trainees (n = 6). We also conducted 10 semi-structured interviews, three of which were with residents who had also attended the focus groups. See Table 1 for more details about participants' characteristics.

Table 1. Participant numbers by level of training and specialty programme

Programme	Level of training		
	Junior	Intermediate	Senior
General Surgery	1	1	
Ophthalmology	1		1
Pathology	1		
Radiology	1	1	
Paediatrics	1		
Internal Medicine		1	1
Geriatrics		1	
Anaesthesiology	2	2	3
ORL	1	1	
Gynaecology			1
Plastic Surgery		1	
Urology			1
Neurosurgery	1		1
Total	9	8	8

Our principal findings showed that residents experience two overarching tensions during their interactions with clinical supervisors in the workplace: supervisors gave trainees either too much or too little autonomy or too many or too few opportunities to participate. We found that residents associated the term opportunities to participate with procedural tasks, such as performing a surgery or putting in a central IV, and the term autonomy with decision-making tasks, such as deciding what drugs to use for anaesthesia induction or whether or not to order a diagnostic exam. Residents' responses to such tensions depended on how safe they perceived their learning environment to be. An unsafe learning environment was described as one in which the clinical supervisor was too frequently absent, bullied the trainees or created a hierarchical distance between them. Such conditions raised fears of supervisors' reactions if residents enlisted their help or sought their advice. In the following, we will describe these two overarching tensions placed on a continuum from a low to high degree of autonomy or opportunities to participate given to the trainee, and four responses to these tensions as depicted in Figure 1.

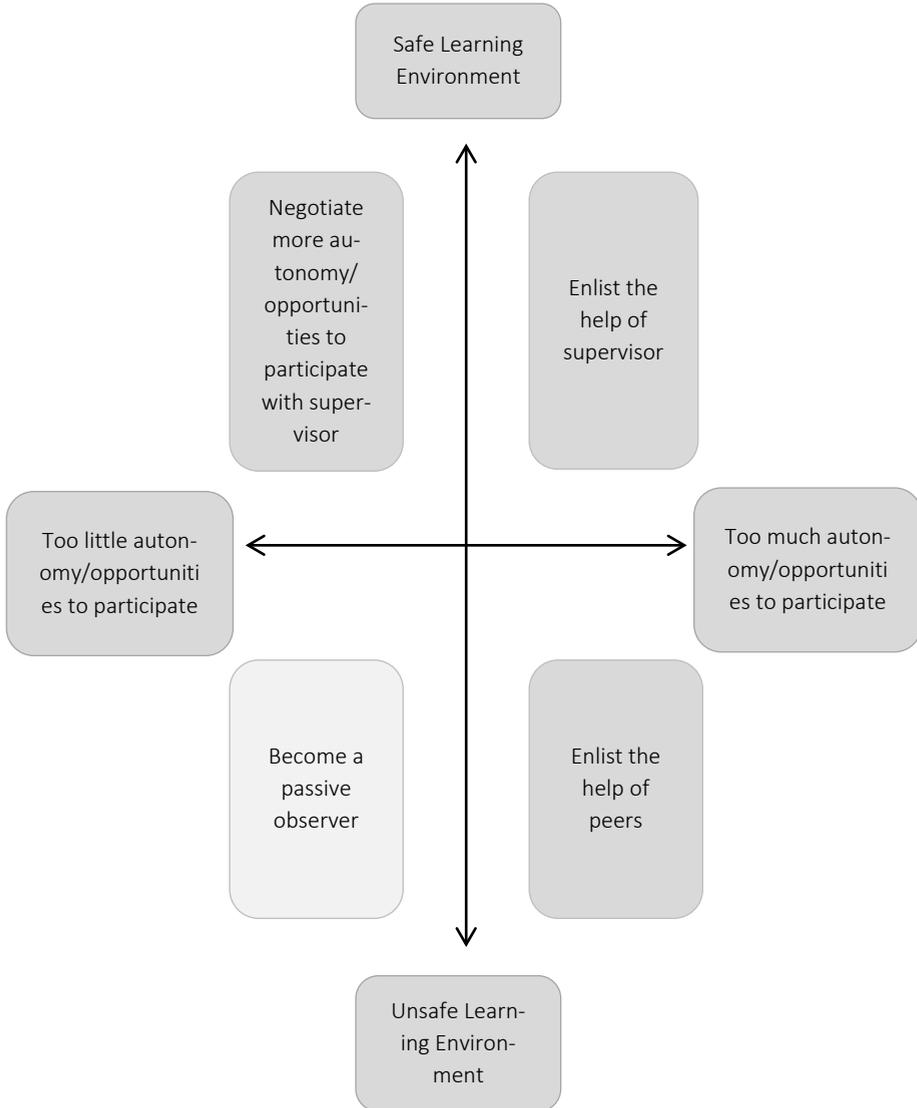


Figure 2. The tensions trainees experienced were two (depicted on the x axis): supervisors gave them either too much or too little autonomy/opportunities to participate. Trainees responded to such tensions depending on how safe they perceived the learning environment to be (y axis). Their engagements are depicted in each square. On white is the situation where intersubjectivity seems to be in its lowest level, as opposed to the grey ones.

Perceived tension 1: Supervisors give too much autonomy and too many opportunities to participate

Being given too much freedom sometimes caused tensions in cases where residents did not feel prepared to take over the responsibility, either because the task was too complex or because the resident had not received the proper training to perform it. According to residents, such tensions arose when supervisors overestimated their level of experience, when a single supervisor was in charge of multiple residents at the same time, or in situations where trainees were expected to take over their supervisors' duties. As described in the following transcript:

"As a senior trainee in the outpatient clinic all responsibility is resting with you, and in most cases, you already have the tools to solve the problems. However, some patient problems you cannot solve, and if the outcome is not a good one, the responsibility falls ultimately on the trainee, which is wrong because they did not support you in that difficult case."

Senior resident, clinical discipline

Residents responded to this tension in two different ways based on how safe they perceived the learning environment to be: they either turned to their clinical supervisor for support or sought help from their peers.

Enlist support from their supervisor

Residents described this as a 'call for help' and they resorted to it when they were sure that the supervisor would respond positively to it; that is, when they believed the supervisor would support them in their particular needs, using the situation as a teaching moment, rather than using this rescue call as an excuse to restrict their autonomy or opportunities to participate:

"For example Dr R., he let me perform the surgery by myself, but when there was something I didn't know, I asked for his help, like "I don't know how to do this", and he, well, he went like "let me step in and assist you with that", and then he said "look at how I do it, this way is better", and he let me try a lot of times, 'till I got it right. With Dr G. it is kind of the same because he gently persuades me to correct my mistakes, and asks for the concept I have of a patient first, we work together as a team."

Senior trainee, surgical discipline

Enlist peer support

If residents perceived the learning environment as unsafe, they shunned the clinical supervisor and sought support from their peers. Junior residents used this strategy

because they trusted their advanced peers; they knew it would be safe to enlist their help, without having to fear punishment or being bullied:

“Sometimes I think it is better [to be supervised by the senior resident]. In fact, there are some surgeries where I feel very comfortable with him [the senior resident], because he has performed this sort of surgery many times, he feels confident about his performance, and it hasn't been that long ago since he walked in my shoes. I guess he experienced the same learning curve, made the same mistakes, and he has more patience to walk you through it than does a person who is very experienced and, perhaps, expecting you to do the procedure much faster.”

Intermediate resident, surgical discipline

Perceived tension 2: Supervisors give too little autonomy or too few opportunities to participate

On the other hand, residents also felt their clinical supervisors sometimes deliberately restricted their opportunities to participate in patient care or their autonomy in decision-making tasks. It was described as supervisors taking over all patient care or imposing their personal preferences regarding decision-making tasks or procedural decisions. External regulations and fear of lawsuits increased chances of being exposed to such tensions. Supervisor practices that restricted resident's autonomy and opportunities to participate were presumed to stem from the assumption that the resident was not prepared to perform the task. Trust seemed to be central to this issue. Residents believed their clinical supervisors were less likely to restrict their autonomy and opportunities to participate when they had had sufficient contact with the resident:

“I'm basically not allowed to do anything, because he [the clinical supervisor] won't make me do anything, and this is a surgical discipline. I cannot spend four years only observing him perform all the surgeries and then go out and work as a specialist and practise what I've been watching in the last four years. And my attending doctor's excuse is like, “how many surgeries like this one did you observe?”, and I said “five”, and then he said, “I'm going to do everything in this one, and then you can try the next one.”

Intermediate resident, surgical discipline

In this case, residents had two responses: they either negotiated more autonomy and opportunities to participate with their supervisor or became passive observers.

Negotiate with supervisor

When faced with restrictions on autonomy and opportunities to participate, residents would consider negotiating if supervisors' preferences were flexible enough and they

trusted that the clinical supervisor would be approachable. According to residents, initiating a negotiation was a tricky move that depended on several factors. How complex was the task the resident was going to negotiate on? Would the resident be able to perform the task independently? Was the resident ready to be assessed by the supervisor? Did the resident sufficiently engage with this supervisor so that the latter could trust the resident with this task? In the case of an affirmative answer to most of the above questions, residents felt in a position to negotiate autonomy and opportunities to participate, which they did, for example, by asking the supervisor if they could perform the surgery or if they could present a case and management plan to the supervisor in advance. The supervisor could respond constructively, engaging residents in a dialogue aimed to assess their readiness regarding knowledge and skills and to understand their reasoning behind the decision-making process. Such dialogue allowed them to convince trainees to change their minds by pointing out errors or increasing their chances of succeeding in the task. Some residents regarded these negotiations as valuable because they were opportunities to learn and practice in the workplace without compromising their autonomy:

“I think this is the right way to do it in surgery. OK, so if you think you can do it, it is because you have shown to the attending doctor that you have the right knowledge and skills, so this is where the negotiation starts. “So Doctor, please let me do it” and he goes like, “why, how many have you performed this so far, what is the percentage of complications?” and you answer, and if the answers are right, then you get to do it.”

Intermediate resident, surgical discipline

Become a passive observer

If the clinical supervisor had created an unsafe learning environment in which the resident was exposed to bullying or mistreatment, the resident preferred to ask for specific directions from the supervisor on how to proceed with a given task. Residents learned supervisors' preferences to avoid confrontation and just performed the task accordingly; in this way they pleased the supervisor while sacrificing their autonomy and opportunities to participate. In such situations, according to the residents, they became passive observers:

“For example with Dr A.: I don't negotiate with him; if he takes over the procedure, I just let him do that; it is like you start to understand who is who, and the different preferences they have; you know that even if you try to convince them to do the procedure, they will always say no, and perhaps even go like ‘move away and just watch’, so I just learnt to please them to avoid any conflict.”

Senior resident, clinical discipline

The case about intersubjectivity

Billett acknowledges that trainees' learning from such co-participation practices varies with the degree of intersubjectivity achieved between the actors involved^{5,23}. In sociocultural constructivism, Rogoff defined intersubjectivity as a shared understanding between the learner and the experienced adult regarding achieving a common goal or task²⁴. Translated into our particular context, we argue that intersubjectivity implies a shared understanding between the resident and clinical supervisor and between the trainee and his peers in the workplace, whose joint goal is to provide patient care and attend to the residents' learning.

We determined that intersubjectivity had a paramount role in residents' workplace learning. By analysing those experiences where residents reckoned they had or had not learned from their interactions with supervisors, we noticed how important intersubjectivity was in assuring that residents' responses to perceived tensions resulted in learning. Satisfactory levels of intersubjectivity between residents and supervisors were obtained when trainees felt they were 'working as a team' and supervisors 'cared about my opinion' or engaged in an 'open dialogue'. We inferred that the common goal of residents, their supervisors and their peers was not only to get the job done but also to allow the resident to learn:

"Initially, he [the clinical supervisor] took a decision on what to do with the patient, and it wasn't a dialogue at all [restricting autonomy/opportunities to participate]; however, I so much insisted on changing the course of action that it became a dialogue between him and me, so he considered it important for us to discuss the subject at length. It could be said that it was like a negotiation: much of what I proposed he regarded as alternatives; it was kind of like we reached a midpoint between the two opposite opinions. We ended up doing much of what he initially proposed, but he had gently made me change my mind; I learnt a lot from that." Junior resident, clinical discipline

Low intersubjectivity levels, by contrast, created a situation that was least desirable, relegating the resident to the role of a passive observer. In these cases, the supervisor's only concern was to provide patient care, without attending to the resident's learning. In residents' words, supervisors only 'cared about working and not teaching':

"Some surgeons always prefer to perform the surgery by themselves; in fact, having a resident shadow them, to whom they have to explain everything, how to apply some stitches and stuff, is all very tedious to them; not all of them are used to teaching; they only want to get things done, so they would take over the procedure and make you watch and guess what they were doing."

Intermediate resident, surgical discipline

Discussion

In this study, we explored the tensions that residents experienced during clinical supervision and how residents handled them to capitalise on their learning opportunities. Tensions, in this context, sprang from an uneasy balance of affordances as moderated by the amount of clinical supervision provided to the resident. Engagement-related responses, by extension, referred to residents' mechanisms for coping with these affordances. According to residents' perceptions and accounts, we found that tensions arose when supervisors gave trainees either too much or too little autonomy or too many or too few opportunities to participate. Moreover, residents' responses to such tensions depended on how safe they perceived the learning environment to be and included enlisting the help of their supervisors or peers, negotiating autonomy and opportunities to participate with supervisors or becoming passive observers.

Whereas this study describes how residents managed challenging situations during clinical supervision to maximise their learning opportunities, it also highlights the importance of achieving an appropriate level of intersubjectivity between residents and their supervisors or peers for the success of such learning efforts. Our results suggest that pedagogic practices that encourage an open dialogue could be the key to achieving an optimal level of intersubjectivity²⁵. In addition to confirming how difficult it can be to give trainees the desired amount of autonomy and opportunities to participate^{11-13,26}, our findings expand our understanding of how residents take advantage of such imbalance. Even when the clinical supervisor did not provide the expected amount of autonomy or opportunities to participate, residents struck back and forced them to engage in productive pedagogic practices that benefited them, restoring the balance and easing the tension. We argue that achieving intersubjectivity and providing a safe learning environment constitute the key to finding the proper pitch. Such results matter because they confirm the crucial role of those factors in the search for the right fit between affordances and engagement, a fit that assures workplace learning. A safe learning environment that fosters intersubjectivity relates our findings to the Fuller and Unwin concept of expansive apprenticeships²⁷, characterised by a rich learning milieu that assures a gradual progression to full learner participation and also provides an alignment between organisational and individual capacity.

Further implications of our results are also worth noting. Apramian and colleagues described residents' responses to variations in surgical supervisors' procedures and their various restrictions, their negotiation strategies when confronted with different thresholds of practice, and how they deemed such restrictions desirable in surgical training^{17,18}. Our study complements their findings by highlighting the reverse source of tensions arising from too much autonomy and too many opportunities to participate and how residents coped with these. Furthermore, supervisors' procedural variations could shape competence judgements in residency training²⁸. The tensions revealed in our study underpin the difficulty in making such decisions. Practical implications arise

from this situation, to the extent that a safe learning environment and achieving inter-subjectivity could also influence competence judgements, facilitating entrustment assessments in the workplace²⁹.

Active engagement is crucial for workplace learning⁶⁻⁹ and we expand this principle by describing how trainees can best be engaged in workplace affordances. A final merit of our study is that it highlighted the role of senior peers as agents who can support residency learning in the context of the autonomy and opportunities to participate balance, especially when the relationship between resident and supervisor is not optimal. This finding emphasises the importance of the community and the context as learning facilitators in the workplace, beyond what has been described as ‘the power of the one’^{30,31} or the myopic vision of clinical supervisors being solely responsible for residents’ learning.

However, some limitations are worth noting. First, we must consider the unique characteristics of the research setting that may affect the transferability of our findings. In Colombia, residency training tuition fees are high and residents do not receive any formal financial allowance for their services. This reality may have influenced residents’ decisions and motivation to engage in the workplace, and outcomes could be different in other countries that have paid residency programmes. Second, we only investigated residents’ perceptions. Future research should explore why and how clinical supervisors respond to the described residents’ engagement the way they do and how contextual factors influence such interactions. It is also important to determine how other workplace actors, such as peers, nurses or undergraduate students, affect the autonomy and opportunities to participate balance, and which characteristics of such interactions contribute to learning. Third, given the fact that we revealed sensitive issues such as bullying, it was impossible for us to describe particular situations pertaining to specific disciplines without breaking participants’ anonymity. Although the differences were minor and engagement-related responses were present across diverse disciplines, anonymity issues prevented us presenting more detail. Fourth, based on our study design it was difficult for us to determine the influence of some important variables on our overarching results, such as gender or race.

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Appendix 1.

Questioning Route Residents' focus groups:

1. Tell us your name, to which residency programme you belong and how long have you been involved in the programme.
2. How would you describe in general the clinical supervision you have received during this period?
3. For each of the following vignettes, tell us:
 - a. Could you think back and give us an example of how this method has been useful for you in the past during an interaction between you and your clinical supervisor?
 - b. Do you think your preferences about this method match your clinical supervisor behaviour? If not, how do you deal with this mismatch at the workplace?
4. (After providing a summary of the meeting) How well does this captures what was said here? If you were summarizing the conversation, what would you change?
5. Is there anything that we should have talked about but didn't?

Vignettes

In the following vignettes, we provide examples of supervisors' behaviours in which we would like to focus our discussion. Take a look at them before starting our conversation.

Modelling The clinical supervisor demonstrated different skills. During or after the demonstration the clinical supervisor explained the task identifying aspects that are important for task performance. The clinical supervisor created opportunities for me to observe him/her. The clinical supervisor gave me ideas about how I wanted or did not want to function when working as a doctor in the future.

Coaching The clinical supervisor observed me on several occasions during my rotations in his/her department. After observing me the teacher gave me feedback, which gave me a better idea of which aspects I could improve and how.

Scaffolding The clinical supervisor was aware of my previous experience and offered sufficient opportunity for independent activities. The clinical supervisor also helped when activities were difficult for me. The clinical supervisor gradually reduced support for certain activities so that I could become more independent.

Articulation The clinical supervisor asked me to explain my actions and helped me become aware of gaps in my knowledge and skills. The clinical supervisor questioned me regularly to increase my understanding and encouraged me to ask questions.

Reflection The clinical supervisor encouraged me to become aware of my strengths and weaknesses and to consider what I could do to improve things.

Exploration The clinical supervisor encouraged me to formulate learning objectives and pursue them. The clinical supervisor challenged me to keep learning new things.

Chapter 4

Unravelling residents' and supervisors' workplace interactions: an intersubjectivity study

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Abstract

Context

Successful engagement between residents and supervisors lies at the core of workplace learning, a process that is not exempt from challenge. Clinical encounters have unique learning potential as they offer opportunities to achieve a shared understanding between the resident and supervisor of how to accomplish a common goal. How residents and supervisors develop such a mutual understanding is an issue that has received limited attention in the literature. We used the 'intersubjectivity' concept as a novel conceptual framework to analyse this issue.

Methods

We conducted a constructivist grounded theory study in an anaesthesiology department in Bogota, Colombia, using focus groups and field observations. Eleven residents of different training levels and 18 supervisors with varying years of teaching experience participated in the study. Through iterative data analysis, collection and constant comparison, we constructed the final results.

Results

We found that residents and supervisors achieved a shared understanding by adapting to one another in the process of providing patient care. Continuous changes in the composition of resident-supervisor dyads exposed them to many procedural variations, to which they responded by engaging in various adaptation patterns that included compliance by residents with supervisors' directions, negotiation by residents of supervisors' preferences, and the sharing of decision making. In the process, the resident played an increasingly key role as a member of the supervisory dyad. Additionally, experiencing these adaptation patterns repeatedly resulted in the creation of a working repertoire: an attuned working code used by the members of each supervisory dyad to work together as a team.

Conclusions

The development of shared understanding between residents and supervisors entailed experiencing diverse adaptation patterns which resulted in the creation of working repertoires. Seeing supervisory interactions as adaptation processes has essential theoretical and practical implications regarding workplace learning in postgraduate settings. Our findings call for further exploration to understand learning in postgraduate education as a social process.

Introduction

Learning in the workplace requires residents and supervisors to engage with one another successfully, a process that can be challenging¹⁻⁴. Such engagement often occurs in clinical encounters that hold powerful learning opportunities for residents.⁵ The primary objective of these interactions is to provide patient care, but, to achieve this goal, residents and supervisors need to build a shared understanding of how to work together⁴. However, how residents and supervisors arrive at such a mutual understanding of how to work together when providing patient care is an issue that has received limited attention in the current literature. Yet, we need to understand these social interactions between learners and supervisors better to successfully support workplace learning⁶.

One tool that might help us to understand residents' and supervisors' interactions in the workplace is the concept of intersubjectivity. Enjoying wide currency in fields such as psychology, cognitive sciences and philosophy^{7,8}, intersubjectivity has been defined by Zlatev et al.⁹ as 'the sharing of experiential content (e.g. feelings, perceptions, thoughts, and linguistic meanings) among a plurality of subjects'. In this view, the human mind is a shared mind in that people construct meaning through their social interactions. Billett went on to refine the concept by including a shared understanding, in this case between tutor and student, about the accomplishment of a common goal^{10,11}. He asserted that intersubjectivity helps learners to acquire the knowledge, attitudes and skills required to perform a craft while taking into account contextual challenges¹². According to Billett's co-participation theory, learning in the workplace necessarily entails achieving intersubjectivity, which seems to be the factor able to facilitate learners' engagement in the activities that supervisors afford to them^{4,10}. Using Billett's understanding of the intersubjectivity concept as a lens through which to explore resident-supervisor interaction in the workplace would allow us then to understand the potential of this crucial relationship.

To date, the concept of intersubjectivity has been theorised mainly in other fields and applied to settings outside medical education^{7,8,13-15}, with few exceptions. Billett, for example, contends that intersubjectivity is crucial for interdisciplinary teams to work efficiently when providing patient care and that it can be achieved if team members participate in joint problem solving and communicate their decision-making processes to one another¹⁶. Whether this holds true for pairs with asymmetrical levels of competence, such as supervisory dyads, is a premise that still needs to be explored. In a study by Sheehan et al.¹⁷, who identified the factors that influence medical interns' engagement in workplace activities within a team, intersubjectivity arose from prolonged interactions between interns and supervisors. Having a shared understanding allowed the interns to participate in patient care activities without continually having to negotiate what to do and how to do it within the team. To develop such understanding, interns required constant guidance and support from their supervisors. However, the study¹⁷ did not describe what intersubjectivity development entailed in students with a more

central role in patient care or the nuances of the processes involved in such development.

The purpose of this study, therefore, was to explore how residents and supervisors come to a shared understanding of how to jointly provide patient care and the processes that are involved in such development. To answer these questions, we designed a constructivist grounded theory study using data from focus groups and field observations with a group of residents and supervisors from an anaesthesiology residency programme.

Methods

Methodology

We used constructivist grounded theory to study the social processes that help residents and supervisors achieve intersubjectivity¹⁸. We chose this approach because the iterative collection and analysis of data allowed us to generate empirically grounded conceptualisations that could help answer our research questions¹⁹. In addition, it enabled us to integrate existing theory^{6,20-22}, with participants' and researchers' conceptions of the reality into the constructed theory. As well as following the principal constructivist grounded theory tenets of iterative data collection and analysis, constant comparison and theoretical sampling to ensure the robustness of our findings^{19,23}, we used diverse data collection methods to enhance the credibility of our conclusions²⁴.

Research team

We assembled an interdisciplinary team to broaden the range of perspectives from which to analyse the collected data. The research team consisted of an anaesthesiologist pursuing a PhD in health professions education (FMO-V), an anthropologist pursuing a Master's degree in bioethics (CG-Q), two educationalists, of whom one has expertise in learning environments (DHJMD) and the other in workplace learning (RES), and an obstetrician with expertise in workplace learning (PWT).

Reflexivity

Malterud described reflexivity as 'attending systematically to the context of knowledge construction, especially to the effect of the researcher at every step of the research process'²⁴. Regarding context, we follow a sociocultural approach to learning to inform and conduct this research^{1,25}, meaning that we believe learning arises from our social interactions within a specific context. Concerning the influence of the researchers upon the constructed results, we should clarify that the first author was a supervisor in the anaesthesiology department in which the study was conducted and therefore interact-

ed with participants during his working duties. The rest of the team can be considered as outsiders to the research field and only CG-Q had contact with the participants during the study. That FMO-V was an insider inevitably resulted in preconceptions about how residents' and supervisors' interactions usually unfold. Continuous exploration of his role as an insider within the research field through memo writing clarified and explored FMO-V's relation with and interpretations of the data. Achieving consensus and resolving disagreements about the interpretation of results within the team strengthened the robustness of our claims. For an example of this, please refer to Appendix 1, in which we include a memo co-constructed between FMO-V and CG-Q.

Setting

The study was conducted in the Anaesthesiology Department at Pontifical Xavierian University (Pontificia Universidad Javeriana), Bogota, Colombia, which has a 3-year anaesthesiology residency programme. In Colombia, students access residency upon the completion of undergraduate training (which includes an internship year) and a rural service period in which they work as general practitioners. The anaesthesiology programme enrolls six residents per year for a total cohort of 18 in any given year. Residents rotate through subspecialties according to a yearly individual rotation schedule, with only one resident participating in each rotation at a time. Most rotations, such as those in cardiovascular anaesthesia and neuro-anaesthesia, last 2 months, whereas the general anaesthesia rotation may span 1–5 months, depending on the resident's schedule. This programme has a one-on-one matching system: each resident is paired with a personal supervisor for any given patient case in supervisory dyads, which allows for rich and intense interaction between residents and supervisors. However, it is important to emphasise that this does not amount to longitudinal supervisory arrangements: all supervisory dyads change continuously, even within the same rotation. At the time of the study the department had 31 supervisors and 18 residents. Eleven residents and 18 supervisors were invited and agreed to participate in one or more parts of the study.

Data collection and analysis

We collected data employing focus groups and field observations. First, we held three focus groups: one with seven residents of different levels of training, and two with six supervisors each, also with various backgrounds and years of experience. We invited those participants based on purposeful and convenience sampling in order to gain a broad spectrum of perspectives based on the traits mentioned above. The residents and supervisors who did not attend the focus groups reported conflicting schedules as their reason for not participating. The focus groups allowed us to get a better grasp of how participants translated the intersubjectivity concept into day-to-day situations and to create preliminary categories that could inform our initial observations. To this end, we

created a questioning route for all focus groups (Appendix 2), which was based on the principal elements of Billet's definition of intersubjectivity¹⁶. The questioning routes were constructed in collaboration with all members of the team. While FMO-V moderated the focus groups, CG-Q acted as an observer and took notes of participants' reactions and interactions, which we used in the analysis²⁶. Briefly, after the focus groups, the two moderators met to discuss their impressions and to reflect on the influence of FMO-V upon participants' answers. Those discussions were further explored in FMO-V's memo writing as part of the reflexivity component of the study (Appendix 3). The focus groups were audiorecorded and transcribed verbatim. Subsequently, FMO-V and CG-Q independently analysed the transcripts using open coding techniques¹⁹. They discussed this first round of analysis and created preliminary categories using focused coding techniques. We used sensitising concepts from sociocultural learning models to inform the coding process^{1,20,22}, in line with the constructivist approach¹⁹. Preliminary categories informed the next phase of the study through a theoretical sampling of the participants.

What followed next was a 5-month observation phase, during which CG-Q observed interactions among six residents and 13 supervisors during daily patient care activities in various workplace settings (outpatient clinic, hospital wards, labour ward, pain service and operating room [OR]). As mentioned earlier, each resident was paired with a supervisor in what we call a 'supervisory dyad'. CG-Q performed the observations as he has received specific training and has previous experience in ethnographic methods. As an outsider, CG-Q could more easily see and question things an insider might take for granted. He was primarily concerned with observing and was never a caregiver. As an outsider to the workplace, the observer may have triggered participant reactivity^{27,28}, which we tried to minimise by making sure that he stayed in each setting for at least 1 month and by actively asking participants about their perceptions of being observed. We also included an analysis of these data²⁹.

We held two observation sessions per week on average, lasting about 6 hours each, for a total of 140 hours spread over 24 sessions and within various workplace settings. On each occasion, CG-Q presented himself to the supervisory dyad to be observed as a member of the research team, answered any clarifying questions about the research goals, and stressed that the observation was not an assessment exercise. He took notes and transcribed them into comprehensive field notes soon after the observation session. The field notes focused on situations related to our ongoing analysis and to incidents that caught CG-Q's attention. These resulted in detailed descriptions of clinical encounters in the workplace that FMO-V and CG-Q coded independently using selective coding (coding whole situations or scenes), which is more conceptual, instead of using the traditional line-by-line approach for interview transcripts²⁷. Both researchers used focused and axial coding to develop and consolidate the main categories¹⁹. The two researchers met once a week to discuss the preliminary findings, performing a constant comparison of previously collected and new data. In those meetings, they discussed in

detail *what* and *who* to observe in subsequent observations, sampling new supervisory dyads using theoretical sampling. This strategy included sampling residents at different levels of training, rotating in different settings and various types of rotation (i.e. obstetrics anaesthesia, neuro-anaesthesia, etc.). The protocol also included sampling of supervisors with varying years of experience and training. Written reports were shared periodically with DHJMD, PWT and RES, who helped to refine interpretations and facilitated reflection by questioning both the logic of the final analysis and its grounding in the data.

Finally, after the fifth month, theoretical sufficiency was reached³⁰. We organised and coded all focus group transcripts and field notes using atlas.ti for Mac, Version 1.0.18 (Scientific Software Development GmbH, Berlin, Germany). We also performed a member check by sending an English-language summary of the results to all participants and asking if they agreed with how we had presented the quotes and interpreted the findings, in response to which we did not receive any suggestions for change or withdrawal of any quotes.

Translation procedures

All data, including focus group transcriptions and observational field notes, were obtained in Spanish. FMO-V and CG-Q coded the raw data in English in order to be able to share interpretations with the rest of the team, to allow a more analytical approach to data analysis and to code more comfortably using gerunds³¹. FMO-V translated the transcripts used in the final draft of the paper. Intermediate drafts that were shared with the entire team were in English, including translated transcripts that were used in the analysis process. During member checking, we also asked participants to determine if the translations preserved their conceptual meaning.

Ethics

The research group obtained permission to conduct the study from the Research Ethics Committee of San Ignacio University Hospital (Hospital Universitario San Ignacio) and Pontificia Universidad Javeriana. FMO-V presented the study before starting data collection, including its objectives and methods, to the Anaesthesiology Department. Participants made no objections or suggestions. We obtained informed consent from each person who agreed to participate in the study. By anonymising all transcripts and replacing participant names with 'supervisor' or 'resident' as appropriate, we guaranteed the confidentiality of the data. All participants were free to withdraw from the study if they so desired and could request not to be cited in the final draft. Moreover, during the observations, they were able to ask the observer to leave the room or to stop taking notes at any point in the session, although such a situation never occurred.

Results

Intersubjectivity as adaptation

From the focus group analysis, we realised that, according to residents and supervisors, the development of intersubjectivity was a matter of adaptation. More specifically, to come to a shared understanding, the resident and supervisor needed to adapt to each other's preferences with regard not only to what to do (concerning the provision of patient care), but also to how to do it (concerning how to work together). Every supervisor had his or her own opinion of how a task should be performed, which created an environment in which supervisory dyads needed to come to agreements continually in view of the amount of procedural variation among their members. Table 1 presents the categories that emerged from the focus group data, illustrated by representative quotes.

Table 1. Preliminary categories with representative quotes from focus-group analysis.

Preliminary Category	Quotes
Adapting to each other	<p>"I think it is very subjective, adapting to each other, it's like finding commonalities between you and the other person, it's like building bridges that bring us together" (Supervisor 9)</p> <p>"The thing is that I'm a first-year resident, and you're in this process for the whole year, so, let's say I think that as everything is new to me, I'm just open to what comes, and I try and adapt to all my supervisors, because this is the way it is." (Resident 2, first year)</p> <p>"I think that we adapt to each other according to the circumstances. The way I talk to this month's resident is different from the way I did with the previous one; There might be a standard way to proceed, but there are nuances to each interaction." (Supervisor 5)</p>
Facing a lot of procedural variation	<p>"They [the residents] face like 30 forms of doing stuff, how I handle the syringes, how I cleanse the system; I think there is a lot of variabilities, and it is not easy to achieve an agreement on that fast enough" (Supervisor 3)</p> <p>"Sometimes you see good things in the supervisors, and you start to adopt those things in your practice; But what one considers as a good thing to copy from a supervisor, can be seen as a terrible idea by another" (Resident 6, second year)</p>

The observational data (including both within- and across-supervisory dyad data) allowed us to expand and more clearly describe the focus group categories, and thereby clarify how residents and supervisors developed intersubjectivity. Through the analysis of clinical encounters, it became clear that supervisory dyads mainly communicate about what to do and almost invisibly or tacitly acquire an understanding of how to do it while working together. We found recurrent processes in the data that reflect such interpretation, processes that we called 'adaptation patterns'. We identified three related patterns: residents complying with supervisors' directions; residents negotiating supervisors' preferences, and both parties engaging in shared decision making. Moreover, supervisory dyads might move between some of these adaptation patterns during a

single encounter, adjusting themselves to each step in the patient care process. We describe each of these patterns in detail.

Complying with supervisors' directions

This pattern refers to residents following supervisors' orders as to how to perform a task. The supervisors took the lead, showing the residents how to do things and imposing their preferences. Sometimes, but not very often, supervisors articulated the reasons behind their choices. At times, the resident explicitly asked how the supervisor wished to proceed. We observed this pattern of behaviour in supervisors who interacted with first-year residents and with residents who had just started a new clinical rotation, regardless of their training level. The following transcript exemplifies this pattern:

"The resident and the supervisor are preparing the OR for a new patient. He is a first-year resident, 14 days into his obstetrics anaesthesia rotation. She has been a clinical supervisor in the labour room for the past 25 years. [...]

The supervisor is clear while imposing her preferences: 'We always notify the nurse that we are going to start the anaesthesia induction'; 'Organise the syringes and don't forget to label them', 'We always put the anaesthesia machine near to us'. The resident concurs. 'Three or five electrodes?' [Electrodes are used to monitor heart rhythm during surgery] the resident asks the supervisor. The latter answers: 'Five! Three only with younger patients!' with a tone of determination in her voice. The resident complies with the instruction [...]

The resident looks less proactive than he had in the morning while working with another supervisor; he now asks questions and avoids formulating any clear proposal. [...]

The surgery goes as planned until suddenly the monitor registers an increase in the airway pressure. 'The pressure is up, let's see, what would you do?' asks the supervisor. 'I can put her on manual or perhaps I can administer an additional dose of the muscle relaxant,' answers the resident in a trembling and hesitant voice. 'Do the latter,' orders the supervisor."

Resident 2 and supervisor 13, observation, labour ward

As this excerpt shows, the resident assumed a more passive role within the dyad, obeying the supervisor's orders and asking for directions. The pattern of their interaction was marked by the attitudes of each actor: the supervisor used a tone of determination when talking to the resident, whereas the latter answered with hesitation.

Negotiating the supervisor's preferences

This pattern builds upon the previous one in that the resident tries to change the supervisor's course of action by proposing an alternative. The residents assumed a more

active role within the supervisory dyad by challenging supervisor preferences and exposing their own. The negotiation did not necessarily result in a change in the course of action. The following transcripts are good examples of instances in which residents tried to modify a supervisor's decision by putting forward their suggestions.

“The resident is a third-year student in her thoracic anaesthesia rotation. Unlike the labour ward supervisors, this supervisor is young and quite proactive. As soon as she enters the room, she takes over what the nurse assistant was doing while saying: ‘I can finish this for you, please go to the pharmacy for the Remi in the meantime.’ [Remifentanyl is an opioid used during general anaesthesia.] [...]

Everybody is running around preparing the OR for the next patient. The nurse assistant brings in the patient and helps him to lie down on the operating table. The supervisor works side by side with the resident; she shows herself to be affable and collaborative with the resident, who, in turn, displays a determination to assume a more active role in all team duties; the supervisor talks the patient through what they are going to do next, calming him down, while the resident attaches the leads necessary to monitor the patient's vital signs, obtains i.v. access and then starts to administer oxygen through a face mask. [...]

At 09.20 hours another patient is lying on the operating table when the supervisor enters the OR. The resident is on the left side of the patient trying to locate a good i.v. access when the supervisor gives her an instruction: ‘Let's try a 16 [the size of the venous catheter].’ The resident nods, but responds tersely: ‘We can put in an 18, but we should have a 16 ready to hand in case we need it, don't you think?’ The supervisor seems to disagree initially but then concedes calmly: ‘OK, but... let's use an 18 if you want, he has small veins’.”

Resident 9 and supervisor 8, observation, OR

In significant contrast with the previous pattern, the interaction in this example was marked by the collaborative manner of the supervisor, which created the opportunity for the resident to assume a more active role in taking care of the patient. Even when the supervisor articulated a clear preference regarding some choices, the resident felt empowered to propose an alternative, which is first contemplated and subsequently agreed by the supervisor.

Sharing decision making

In this adaptation pattern, the resident and supervisor make a joint effort to solve a problem during the delivery of patient care. This pattern differs from the previous one in that both actors propose alternative courses of action or complement each other's intentions. Both actors work together, deciding on how to proceed jointly. Moreover,

the supervisor takes the resident's suggestions more seriously. We observed this pattern in senior residents and intermediate residents at the end of clinical rotations:

"This is the second month of her [the resident's] neuro-anaesthesia rotation. She has spent most of the time with the same supervisor. They seem to get along well; the resident looks relaxed while they work together; in fact, the resident often addresses the supervisor with 'tu' [an informal pronoun used in Spanish, the formal version of which, 'usted', is used by most residents to speak to their supervisors] while talking about work-related issues. [...]

Today they're working together on a patient who needs delicate surgery to remove a brain tumour. As usual, they seem to work fluently together while preparing the patient. The resident is positioned behind the operating table and is holding the breathing mask to the patient's face, and the supervisor is to the side administering the drugs. [...]

The patient seems to be stable after the anaesthesia induction. The resident says: 'I think we can put in a little bit more fluids.' The supervisor replies: 'Are you sure, why?' The resident replies: 'The urine output is low, and he is young, I think it'll work.' The supervisor looks up the anaesthesia record, and, confirming what the resident has just said, says: 'You're right, let's do that.' [...]

After being outside the OR for about 30 minutes, the supervisor returns to hear a report from the resident about the patient's condition during her absence. The supervisor listens carefully. 'I decreased the remifentanyl dose [an opioid drug used during general anaesthesia] and put a saline bolus, but the pressure is still low,' says the resident. They are both looking at the monitor screen, analysing the problem. 'What are you going to do next?' asks the resident, in a way that seems to reverse their roles. The supervisor answers immediately: 'I'll put in some epinephrine [a vasopressor drug used to increase blood pressure]'. The resident makes a gesture of approval while nodding."

Resident 7 and supervisor 12, observation, OR

In this excerpt, the interaction shows a condition of equality between the resident and supervisor, which is illustrated by their use of the familiar form of the pronoun with which they address each other. They both focused their attention on a patient problem and engaged in a collegial conversation to find a solution. Further, the resident felt comfortable enough to ask questions to the supervisor, not with the intention of following an instruction but to access her opinion and verify whether they shared a common understanding of the possible solution.

Intersubjectivity as a working repertoire

From our analysis of the observational data, we also inferred that by repeatedly experiencing the adaptation patterns previously described, each supervisory dyad established

a mutually attuned working repertoire. We called this a 'repertoire' in order to emphasise both its rehearsal nature and its flexibility with regard to the facing of new challenges. Working repertoires could emerge within a week of repeated interaction between members of a supervisory dyad, but we also observed them in dyads that included senior residents in the course of one observational session. The following transcripts give examples.

"They [the supervisor and resident] have to take care of yet another patient, and it happens very quickly, in a hurry. The patient is there to have a caesarean delivery. The resident takes the patient's history, along with the undergraduate student. Then, the resident and the supervisor enter the OR and, following protocol, mark every syringe, prepare the anaesthesia machine, set up the monitor and the breathing circuit and calculate the drug doses. The nurses bring the patient to the OR. The resident and supervisor place the monitor cables on the patient and position her on her side to perform spinal anaesthesia. On this occasion, the resident acts more freely and the supervisor does not provide any new indications and locates himself at the back, always paying attention to the monitor."

Resident 2 and Supervisor 3, observation, labour room

"'Are we going to set up [provide anaesthesia] this one?' asks the resident. The supervisor answers in a hurry: 'We are going to set this patient up.' Each seems to know exactly what to do, including preparing the anaesthesia drugs, setting up the anaesthesia machine, the monitors, the breathing circuit and the fluids that will allow them to provide the entire anaesthesia."

Resident 7 and supervisor 12, observation, OR

"Everything happens really fast; they have five surgeries scheduled for the day. The resident and supervisor work together to prepare the OR for the first patient. The resident explains to me the reasons why they prepare everything before the patient is brought into the OR. The supervisor says to the resident: 'I'll go for a warm blanket.' Despite all the hurry, resident and supervisor look synchronised. They both do different but apparently corresponding tasks. They barely speak to each other but they manage to have everything ready by the time the patient enters the room."

Resident 9 and supervisor 8, observation, OR

These examples depict situations in which resident and supervisor have acquired a shared understanding of what should be done and how it should be done. As a result of this concordance, the resident and supervisor work fluently together without much talking or needing to engage in any of the adaptation patterns described earlier. By establishing a working repertoire, both members of the supervisory dyad intuitively disentangle the elements of a given situation, sense what is required of them at each

step to resolve any incidents and move along. The transcripts correspond to the same three residents in the same scenarios we used to illustrate the adaptation patterns in order to give the reader a broader context for these last transcripts. We use this strategy to underpin how working repertoires result from the experiencing of the adaptation processes described earlier. Figure 1 gives a visual summary of the process whereby supervisory dyads achieved intersubjectivity.

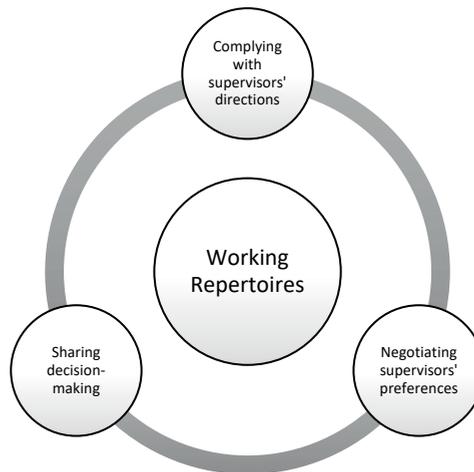


Figure 1. The process whereby supervisory dyads achieved intersubjectivity: by engaging in various adaptation patterns which resulted in the consolidation of shared working repertoires.

Discussion

In the present study, we sought to better understand how supervisors and residents interact in the workplace to achieve the common goal of providing patient care. We used Billett's definition of intersubjectivity as a theoretical lens through which to analyse this process. We found that interaction within a supervisory dyad was mostly a process of continuous and, as their relationship matured, mutual adaptation, which resulted in the development of a shared working repertoire. In previous studies, this adaptation process has often been reported to be unidirectional: either residents adapt to their supervisors^{32,33} or supervisors adapt their practices to their resident's level of training^{34,35}. We contend that the adaptation process in residency training is a bidirectional one in that both members of the supervisory dyad adapt to each other's preferences as the relationship between them matures. Consequently, both members must change their practices to work together, thereby transforming the meaning of their practice as their relationship gradually develops. Some dyads might require more adaptation from the supervisor than from the resident or vice versa as both parties work

towards meeting each other's preferences, but not necessarily at a halfway point. The ability to move between adaptation patterns provided a flexible set of tools that residents and supervisors could use to move back and forth in response to challenges posed by the unpredictable workplace setting. This 'dance' has also been described as a resource in the context of negotiation between clinical supervisors and senior residents on how to provide teaching and supervision to students and interns³⁶, and in that of collaborative interpretation of visual cues to difficult laparoscopic findings³⁷.

Understanding the resident's and supervisor's interaction as a process of adaptation has important theoretical implications. As Apramian et al.³⁸ describe, clinical supervisors' and residents' preferences may differ to various degrees. Residents whose preferences are better matched with those of their supervisors may appear to be more competent and vice versa. We add to this the discovery that working together allowed residents and supervisors to adapt to each others' preferences and to reach a mutual understanding about how to provide patient care. Theoretically, the supervisor's assessment of the resident's competence may then change depending on the stage of their relationship; the more time they have to adapt to each other, the closer their preferences will become.

Our results can also be related to a broader literature on workplace learning. Understanding residents' and supervisors' interactions as the development of intersubjectivity and the associated evolution of their working repertoires as described in this study builds upon Wenger's theory of communities of practice¹. We provided evidence about how communities of practice create shared repertoires through the development of intersubjectivity, in this case within individual supervisory dyads. Furthermore, the developmental trajectories of the supervisory dyads seem to follow common patterns in which the practice of jointly providing patient care leads to a reification of the relationship between the members of the dyad²¹. Using the concept of intersubjectivity not only gave us the appropriate lens through which to elucidate the development of supervisory relationships, but also allowed us to uncover such reifications.

Our study also complements the findings of Brown et al.⁵ about help-seeking supervisory encounters in senior general practice trainees. We found similar patterns of interaction, but we also add details about how such patterns contribute to the development of working repertoires. Some of the difference may be explained by differences in the settings of the two studies: we analysed intense and long-lasting interactions, whereas Brown et al.⁵ observed ad hoc help seeking and therefore brief encounters. It may be that working repertoires are more palpable in our type of encounter, whereas in ad hoc situations residents just decide not to seek help because they already know how the supervisor will proceed.

Our findings indicate several practical implications for exploration. Firstly, maximising the potential of clinical encounters seems to require that residents and supervisors understand how working side by side constitutes an effort to build bridges between the two members of the dyad. Secondly, it may be useful for both parties to understand all the

possible adaptation patterns they could use to arrive at a common understanding, from compliance with the supervisor's orders to the sharing of decision making. Thirdly, recognising that there is a group of tools available for their use might ease the way the interaction develops during day-to-day activities. Some circumstances will require the supervisor to take the lead, whereas other contexts will enable both the resident and supervisor to work as equals, giving the resident a more pivotal role within the dyad.

This study, however, was not without limitations. Firstly, seeing residents' and supervisors' interactions as an adaptation process is the result of our use of Billett's concept of intersubjectivity¹⁶ to unravel such interactions. We may have overlooked certain aspects of the supervisory dyads' interactions, such as the reasons behind their decisions to adapt to each other, or why some supervisors seem to rely more on a certain adaptation pattern. Secondly, observational research inherently harbours the risk for participant reactivity. In the present study, participants may have perceived the observation sessions as evaluation exercises, which may have caused them to behave differently and created an artificial environment. This, in turn, may have led to the absence of difficulties or tensions between participants, influencing the emerging theory. To minimise this risk, we followed best practices in observational research by explicitly attending to participants' reactions to the observations, asking them proactively about their feelings²⁹ and by conducting long sessions and making sure the observer stayed in each setting long enough. Finally, the context of the intensive resident-supervisor contact inherent in anaesthesiology training raises doubts about how the present results might be transferred to other types of supervisory arrangement, including those in which supervisors work with a group of residents or when contact between residents and supervisors is scarce or occurs at a greater distance.

Our study has raised new questions that future research might seek to address: How do intersubjective relations evolve? Do these working repertoires hold in the long term or does this depend on the adaptation pattern used? Are these working repertoires unique to individual supervisory dyads or do they reflect the whole community's working repertoires? We also managed to understand how supervisory dyads arrive at a shared understanding of what to do when providing patient care but failed to explain why they decide to come to such understanding. Another question concerns whether this intersubjectivity model can be extrapolated to interdisciplinary collaborations and peer interactions, whether the same adaptation patterns are in place and how organisational infrastructures influence interdisciplinary working repertoires.

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Appendix 1

Co-constructed memo FOV and CGQ

First impressions from residents' focus group.

FOV - When we started talking about mutual understanding, residents started talking about the amount of autonomy that supervisors provide to them. Residents also worded mutual understanding as a process of adaptation and empathy. For intermediate and senior residents, supervisor/resident interactions were related to the amount of autonomy; for junior residents, it was about adapting themselves to variations in supervisors' preferences.

Achieving a mutual understanding was a balancing act, residents disclosed that approaching to each supervisor was different, and depended on how safe the learning environment was perceived, and how open that supervisor was in changing or at least trying residents suggestions on how to do stuff. Mutual understanding was achieved through some strategies:

1. The resident can propose a plan up front and then engage in a negotiation with the supervisor to reach a mutual understanding of how to proceed.

CGQ - The commitment to negotiation depends upon the age of the supervisor. The older supervisors are more reticent to receive resident's opinion or argument because they are accustomed to using specific techniques and avoid alternatives. Conversely, younger supervisors are "more open". Some elderly supervisors, according to residents, feel challenged when they propose some alternative to their anesthesiology schedule. A resident remark: "A supervisor told me: "To make the record is like my sign". This negotiation is also related to the residents' grade: "it is not the same acceptability for an intermediate than a senior resident". Beginners and intermediate must adapt to each supervisors' methods. They describe this kind of relationship as paternalistic in which supervisors try to "guide us in the best way". Residents agree to be subdued to the supervisor's agenda.

Some supervisor only watched and only if it was necessary to interfere (when there is a better way to do it or when the resident is making a mistake). Although this behaviour gives autonomy to the resident, this is not a completely valuable strategy for residents who are beginning their training and require more tracing and surveillance attitudes.

FOV - 2. The resident can ask for specific directions, and if what is planned by the supervisor differ from their preferences, the residents negotiate once again a middle point with the supervisor. 1 and 2 need open dialogue between resident and supervisor.

CGQ - When supervisor allow the resident to propose, and according to the residents training level, mutual understanding is achieved through the residents' purposes and

questions, although the supervisor is "the owner of the room" so he always decides. Nonetheless the conventional way is that resident first listens and then propose (if supervisor allows it: this is related to his age and the residents' grade).

FOV - 3. They can also observe attentively how the supervisor acts and perform the procedures so that residents can imitate the supervisor preferences in future occasions.

CGQ - Feeling sure or safe allows the resident to perform his skills in the best way. This "security" is felt even by the way supervisor talks ("not imposing" and talking in a "strictly non-labour conversation"; "when not scoffing" or saying: "it's your last chance"). About the "last chance", there's seems to be a difference between a senior and an intermediate resident experiences. The latter assures that to assert the "last chance" implies frustration and produces insecurity. Meanwhile, the senior resident thinks that in anesthesiology you will be in front of situations in which "you have only one opportunity to do things well", so he thinks this an excellent methodology to teach and learn.

This feeling is also achieved when residents realised that the act of providing anaesthesia is performed by both supervisor and resident: "they asked what should be done". This kind of questioning is perceived not as an evaluation but as a way of taking into account the resident's knowledge and experience. Residents remarked that they are never alone, they feel supported by supervisors, faculty and hospital members. Even further, they think that type of questions about their feelings made by supervisor create a link and a degree of confidence because it is a way by which residents are treated as a person in a whole sense.

A resident argued, achieving a mutual understanding is necessarily taking on the anesthesiologists' role by losing the fear and releasing themselves. Residents underline face-to-face teaching and objection made by the supervisor. These complaints, as usual, are done when resident make "a serious mistake".

Personhood features furnish better ways of communication which enables to achieve better mutual understanding. Interest, attitude and receptivity are features remarked by residents to achieve mutual understanding: "One exhausts way, one observes, repeated as they like, and then question and propose something back."

FOV – Achieving a mutual understanding might entail having a prolonged engagement with the supervisor.

What factors determine the distinctive "click" between resident and supervisor, independent of how much interactions they might have? It was imperative for residents to feel that they're safe, safe regarding disclosing insecurities or making mistakes without severe consequences. It was also crucial for residents to have a mutual understanding to think that they are part of a team, by being included in the decision-making process, or being presented as part of a team and not as a subordinate to the patient. Once again, it was also essential to be able to have an open dialogue with supervisors. It was

important for supervisors to have a genuine interest in the resident as a person, not only as a student.

Struggling with achieving a mutual understanding was related by residents to supervisors that castrate their autonomy, with adverse environments where was challenging to approaching the supervisor, so they prefer to avoid confrontation and be compliant/submissive. "You have to choose your battles," they say.

Compare to the supervisors' focus group I think is valuable that all the residents' types described by the supervisors were present as part of residents' strategies of dealing with supervisor variations.

It was also worthy of notice that residents identify verbal cues about having a good understanding with the supervisor, but also non-verbal cues. Non-verbal cues could be negative and positive. Negative cues were specific facial expressions or "zapatear", positive ones where "pat in the back", or perhaps a single thumbs up. Either way, some residents try their best to force verbal means of achieving a mutual understanding by asking how they do stuff.

It also captivated my attention how in some circumstances both residents and supervisor just stop verbal communication in situations when both were struggling with achieving a mutual understanding. Each seems to give up on each other or are just afraid of initiate a confrontation.

It is important to explore more in-depth during participant observation those non-verbal cues; it seems essential both silence as mechanisms or signs of intersubjectivity.

Although strategies to achieve intersubjectivity are more evident from the resident vantage point, it is essential to understand both verbal and non-verbal strategies and their implications.

Why does each actor decide to stop communicating if it is the first disclose strategy to achieve intersubjectivity? Why they give up on each other?

Appendix 2

Questioning route for the three focus groups

Focus group with clinical supervisors

Introductory question:

1. Could you present yourself by telling us your name, in which rotations you are involved, and for how long you have been working as a clinical supervisor in the anaesthesiology department?

Transition questions:

2. How do you experience your interactions with residents? (Quickly move on to the next question)

Key questions:

3. How do you come to a mutual understanding with the resident about how things should be done under your supervision?
4. How can you tell when you have arrived at that mutual understanding?
5. What cues/tasks/activities are involved in achieving that mutual understanding?
6. How do you recognize if a resident is struggling in that respect?
7. How do you manage that situation?

Wrap-up question:

8. Would you like to add something to the things we have discussed previously?

Focus group with residents

Introductory question:

1. Could you present yourself by telling us your name and in which year of residency you are so far?

Transition questions:

2. Could you tell us more about your interactions with clinical supervisors during clinical rotations? (Quickly move on to the next question)

Key Questions:

3. How do you come to a mutual understanding with your supervisor about how things should be done during clinical supervision activities?
4. How can you tell when you have arrived at that mutual understanding?
5. What cues/tasks/activities are involved in achieving that mutual understanding?
6. Could you give examples of specific situations in which you felt you were struggling in that regard?
7. How did you manage that situation?

Wrap-up question:

8. Would you like to add something to the things we have discussed previously?

Appendix 3

Reflexivity Memo FOV

Moderating residents' focus group.

Seeing myself as a researcher while also seeing me as a clinical supervisor. I chose to be a researcher in medical education BECAUSE I was a supervisor. My practice as a clinical supervisor is the source of my research queries, about my doubts regarding findings, my constant struggle to articulate and discuss the experiences that are shared with me. Today I moderated a focus group with MY residents. Carlos observed and took notes. I have interacted with every single one of them during our workplace activities. It is fair also to say that our interaction could not be described as intense; I'm not in charge of any specific rotation and based on my working schedule I do not have a resident with me most of the time, and when I have it only for a couple of hours. It is also important to say that they talked about experiences with those that were too MY supervisors, as I receive my training in the same department. Gladly, no one spoke directly about their experiences with ME. I'm also not a naïve person; I do understand that ME being present could be the reason for that. I do recognise most of the residents' experiences while interacting with their supervisors, both as my own with them and those I experienced myself while being a resident in this department. Everybody looked very relax and upfront. Carlos noted it too. On a first level, it seems that my presence as moderator didn't hold my residents back. They shared both positive and negative experiences. I do believe our questioning route delve into powerful things. Carlos and I also recognised how my familiarity with the reality we were exploring could have resulted in superficial descriptions of the experiences, well, perhaps not superficial but not that detailed. Carlos didn't interrupt us during the focus group, but later he asked me to clarify some jargon and terms we all used during the discussion. ME being part of this community entails that I speak their same language and perhaps that hinder my ability to ask for a more jargon-free, understandable, detailed description of the experiences. I have to work on that. Perhaps Carlos as moderator could have asked for clarification because he is an outsider of our community. I think it is then a good idea to take a closer look to Carlos filed notes in the next phase to have a better idea about how new eyes see what seems natural to me, allowing me to distance myself of the data to spot how much of me is in it.

Chapter 5

Disentangling residents' engagement with communities of clinical practice in the workplace

Submitted

Abstract

Background

Maximising the potential of the workplace as a learning environment entails understanding the complexity of their members' interactions. Although some articles have explored how residents engage with supervisors, nurses and pharmacists individually, there is little research on how residents enter into and engage with the broader community of clinical practice (CoCP).

Methods

We designed a constructivist grounded theory study that took place at Universidad Javeriana in Bogotá, Colombia. We conducted semi-structured interviews with 13 residents from different training levels and disciplines during the first weeks of their new rotations. During the interviews, we used the Pictor technique as a visual aid to collect data. Using iterative data collection and analysis, constant comparison methods and theoretical sampling, we constructed the final results.

Results

When entering a CoCP, residents experienced recurring and intertwined processes including: understanding their position and role within the community; identifying the relevant CoCP actors; and determining how these actors could assist their successful engagement with the CoCP. The residents entered a CoCP with the intention of either having a central or a peripheral position in it. The final position and subsequent resident role resulted from negotiations between the resident and the CoCP members.

Conclusion

How residents engaged with CoCPs depended on the tension between how they wanted to position themselves in the CoCP and how the CoCP members positioned them. Understanding such nuances could be key to maximising the learning potential of workplace settings because learning affordances could be tailored according to residents' position within a CoCP.

Introduction

Workplace learning is critical to the process of becoming a medical professional¹. However, as learning environments, clinical workplaces are unstructured, which often results in residents missing learning opportunities that are afforded to them in the clinical setting². Other professionals' lack of acceptance of residents as participants within the healthcare team constitutes one reason for this problem^{3,4}. Understanding how residents enter and engage with the members of communities of clinical practice (CoCP) is therefore crucial to maximising workplace learning⁵⁻⁷.

Optimising the workplace as a learning environment requires mapping the complexity of its members' interactions, a challenge that could be approached by understanding learning as a social endeavour^{2,8,9}. Lave and Wenger, for example, asserted that learning is a social process that involves negotiating different forms of participation within communities of practice⁹. These authors understand learner participation as active engagement with the practices of those communities¹⁰, either as apprentices interested in an inbound trajectory towards full participation or as passing visitors who aim to remain on the periphery of the community¹¹. The participation of newcomers is legitimised when it is supported and approved by the existing and more experienced members of a community^{10,12}, who could choose to either create or withhold learning opportunities for the newcomers⁴. Given that residents enter different CoCPs as part of their training, they continuously face the challenge to participate in and engage with various and dissimilar healthcare teams⁵⁻⁷.

Entering and engaging with CoCPs entails collaborating with the diverse members of the healthcare team, including supervisors, peers, nurses and, for instance, administrative personnel. Much of the existing literature has focused on how residents learn in the workplace from their interactions with clinical supervisors¹³⁻¹⁸, with few studies delving into the role of other actors, including nurses^{19,20} and pharmacists²¹. Moreover, there is no empirical literature on how residents engage with the broader CoCP. In an attempt to better understand interprofessional collaboration, a number of papers have studied how healthcare teams work together from a sociocultural approach, including studies conducted in operating rooms^{22,23}, intensive care units (ICUs)²⁴, outpatient clinics²⁵ and in a combination of these settings^{26,27}. What transpires from this work is the fact that interprofessional healthcare teams constitute complex systems that continually negotiate their responses to day-to-day, contextually bound challenges while trying to address unstable membership and continuously changing roles. Although most of this literature includes residents as members of the team, the primary focus is on how members of the team collaborate with each other and not how residents enter such teams and engage with team members.

The purpose of our study is therefore to understand how residents enter CoCPs and engage with CoCP members, which includes how residents address the complexity of the interactions within such communities. To this end, we designed a constructivist

grounded theory (CGT) study in which we interviewed residents from different disciplines and levels of training using a visual aid called the Pictor technique.

Methods

Methodology

We chose CGT as our methodology because it allowed us to construct empirically grounded conceptualisations of the data, enabling us to make theoretical constructions using participants' experiences, researchers' beliefs and sensitising concepts drawn from socio-cultural theoretical frameworks²⁸. By using CGT, we intend to not only describe residents' experiences but also unveil the social processes that lead to residents' workplace learning through their interactions with an interprofessional health care team²⁹. We followed the principal tenets of CGT, including iterative data collection and analysis, constant comparison techniques and theoretical sampling, to ensure the strength of our findings²⁸⁻³⁰.

Research Team

The interdisciplinary research team included an anaesthesiologist pursuing a PhD in health professions education (FOV), two educationalists with expertise in learning environments (DD) and workplace learning (RS), an obstetrician and medical education researcher in the field of workplace learning (PT), an anthropologist pursuing a master's degree in bioethics (CGQ) and a fourth-year medical student (CER). We took advantage of this diversity by broadening the perspectives through which we analysed the data and constructed our results, including arriving at consensus and negotiating our disagreements³¹.

Reflexivity

Our research is informed by a social constructivist paradigm. Social constructivism states that learning is the result of students' social interactions within a specific context, a paradigm that is aligned with our research question. Regarding the influence of the research interest, we clarify that the first author is a clinical supervisor in the research setting and as such, held a power position with the participants of the study. To mitigate this influence, most of the invitations to participate in the study were extended by CGQ, who also conducted most of the interviews. When FOV conducted the interviews, they were held outside the hospital in more neutral contexts. CER was a fourth-year medical student during the data collection and analysis, which resulted in her being part of a CoCP at the same time as some of our participants. The rest of the team were outsiders to the study setting with no previous contact with the participants. FOV's and

CER's memo-writing allowed them to explore and clarify their influence on the data, highlighting preconceptions about how residents interact with other actors in the workplace.

Setting

This study took place in Bogotá, Colombia. The participants were residents at Pontificia Universidad Javeriana University rotating at Hospital Universitario San Ignacio. Residency programmes have varied lengths from three up to five years. In Colombia, medical students have access to residency after completing six years of undergraduate training that includes an internship year and a rural service period in which they work as general practitioners paid by the government. Rotations are mostly scheduled in blocks of two months. Each residency programme has a fixed number of rotations within its domain but also includes rotations outside its discipline.

Data Collection

We used semi-structured interviews supported by a visual method called the Pictor technique as our primary tool for data collection. The Pictor technique assists participants in exploring and reflecting on their reality and how this reality is constructed by interacting with other people in specific contexts³². The Pictor technique has been used successfully in medical education research³³, along with other visual aids—such as drawings—that could help to uncover the complexity of social interactions³⁴. The technique consists of using arrow-shaped figures to represent participants' experiences within a social group. These visualisations were then used to guide the interview and as a source for the data analysis.

We selected residents from general surgery and internal medicine using purposive and convenience sampling and invited them to participate in the study. We purposefully sampled a clinical and a surgical discipline from the start to have a broad range of experiences from different medical cultures, including different settings within the workplace. Based on the ongoing data analysis, we shifted to a theoretical sampling of residents from other disciplines including plastic surgery, gynaecology and obstetrics, anaesthesiology, geriatrics and emergency medicine (see Table 1). The most important reason to sample these disciplines was differences in the data analysis between residents rotating within their own disciplines and those rotating in foreign disciplines. All the interviews were conducted within two weeks after a resident started a new rotation to capture the social processes involved in entering a community as a newcomer.

We designed a questioning route for the interviews (see appendix 1) that was informed by the primary goals of the study and extensively discussed within the research team. We started the interviews by asking the residents about the nature of their job and their goals when entering the new rotation. During the interviews, the residents constructed a Pictor chart that reflected their experiences when entering the CoCP,

including their interactions with various members of those communities. CGQ conducted ten interviews, and FOV conducted three interviews due mostly to residents' variable availability. The interviews were scheduled outside the hospital but within the university campus. All the interviews were audiotaped and transcribed verbatim for the data analysis. We scanned all the Pictor charts and anonymised all the personal data, changing names for role titles and identifying residents by their discipline and the rotations they were in at the time of data collection. We used Atlas.Ti v10 for Mac to organise and analyse the transcripts and the charts.

Data Analysis

Constant comparison techniques and iterative data analysis of these pairs of charts/interviews assisted us in constructing an emerging theory²⁸. FOV, CGQ and CER open coded the data independently and held meetings to discuss the findings, including conducting focused coding to identify preliminary themes and axial coding to refine and develop the main categories²⁸. FOV prepared intermediate reports of these meetings to be discussed with the broader research group including DD, RS and PT. These discussions informed the focus of subsequent interviews and the theoretical sampling of new participants. After thirteen interviews, we reached theoretical sufficiency and stopped data collection³¹. A summary of the results was sent to all the participants asking them if they agreed with the findings, if their experiences were reflected accurately and if the quotes preserved their meaning after English translation. We received positive comments and no disagreements.

Translation Procedures

All the data, including the transcribed interviews and Pictor charts, are in Spanish. The anonymised Pictor charts were translated into English by FOV. FOV, CGQ and CER coded the raw data in English to share the constructed interpretations with the rest of the team, which also allowed us to adopt an analytical approach to the data and to code more comfortably using the gerund³⁵. FOV and CER translated the transcripts used in the final draft of the paper. All intermediate drafts used to discuss the findings with the entire team were in English.

Ethics

The research team obtained permission to conduct the study from the Research Committee of Hospital Universitario San Ignacio and Pontificia Universidad Javeriana. The committee recommended that we avoid any communication that could be taken as coercion by the residents and to be reflexive about including anaesthesiology residents as participants given FOV's position as clinical supervisor of that department. In line with the recommendations, we obtained informed consent from each participant, mak-

ing it clear that their participation would not affect their assessment or disturb their interactions with the workplace actors. The data were stored so that only the researchers had access to it. We also anonymised all the personal information within the interviews and the Pictor charts.

Table 1. Baseline participants' characteristics

Level of training	Residency programme	Rotation	Gender
Junior	Anaesthesiology	Respirology*	F
Junior	Internal Medicine	Inpatient Ward	M
Junior	Plastic Surgery	Head and Neck Surgery*	F
Junior	Emergency	Anaesthesiology*	M
Junior	Geriatrics	Geriatrics	M
Junior	Internal Medicine	Rheumatology	F
Junior	Internal Medicine	ICU	M
Junior	Internal Medicine	ICU	F
Intermediate	Gynaecology & Obstetrics	ICU*	F
Senior	General Surgery	Gastrointestinal Surgery	F
Senior	General Surgery	Thoracic Surgery	F
Senior	General Surgery	Trauma	F
Senior	Anaesthesiology	Cardiac anaesthesia	M

*Residents who were rotating outside their discipline. ICU: Intensive Care Unit. F: Female. M: Male.

Results

For the residents, entering a new CoCP was characterised by several recurring processes: understanding their position and role within the community; identifying the relevant CoCP members in the environment; and understanding how these members could assist their successful engagement with the community's practices and, therefore, their learning. These three processes were intertwined, occurred almost simultaneously and influenced each other, which brought complexity to the residents' engagement. To illustrate the complexity of our findings, we will present the results by describing two fictional stories that capture the essential elements of our analysis. We use two non-fictional Pictor charts as the primary structure of the stories while showing excerpts from various interviews within the narrative. These stories represent two poles of the potential positions that residents took in the data. The names are all fictional, while the quotes are numbered according to the process of anonymisation.

Story 1: The Apprentice

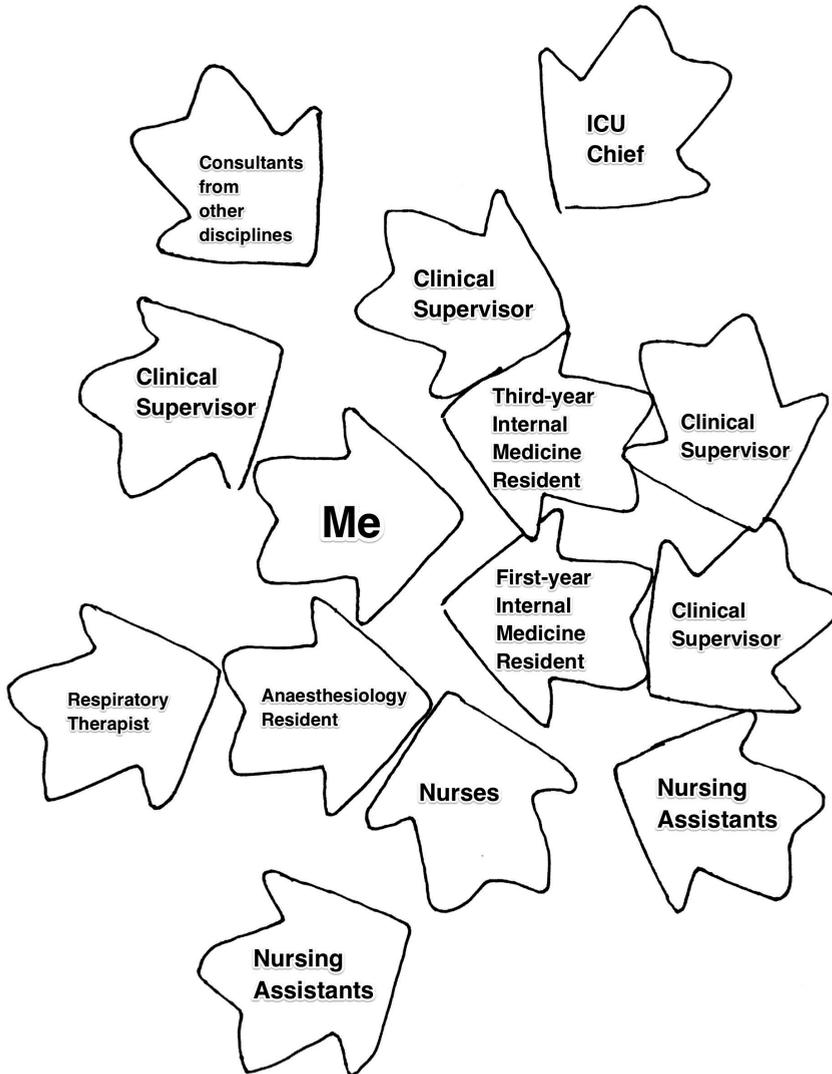


Figure 1. First-year internal medicine resident beginning his ICU rotation

Carlos was a first-year internal medicine resident in his first weeks of an ICU rotation (Figure 1). This was Carlos' final rotation before being promoted to the second year. Carlos had already rotated through the inpatient ward, the emergency room and some internal medicine departments including respirology and cardiology. He felt ready to tackle the challenges of critically ill patients, and he was excited about the ICU rotation, as he hoped to become an intensivist in the future. During the first days, he worked in

one of the ICU subunits that had 24 beds for patients with mainly respiratory-related diseases. Unlike the other rotations, the ICU had multiple members from different disciplines who worked together clustered in subunits. On the first day of his rotation, Carlos was introduced to his ICU subunit team, which comprised a clinical supervisor, residents from various disciplines, respiratory therapists, nurses and nurse assistants. He rotated with three other residents: a third-year internal medicine resident, a second-year anaesthesiology resident and a third-year emergency medicine resident. The team of residents distributed the patients evenly among themselves; when any of the residents were post-call, the others took over his or her patients. As Carlos put it,

"The work in the ICU is centred on the residents, and we all have the same responsibilities, the same duties; we work together all the time" (R8).

One of Carlos' peers was the internal medicine chief resident, and this was the second time he had rotated in the ICU. The chief resident helped Carlos understand the processes involved in the daily work schedule, including how to deal with the different CoCP members:

"Being in the same group with the chief resident is the best. He knows a lot about how to handle things around here, such as problems with other residents, with nurses, difficulties with patients, how to work with each supervisor. Because each person is different, you should know how to talk to them, what to say, how each one liked things to be done" (R12).

Carlos' job was quite straightforward: he was directly in charge of his assigned patients; he received each new patient, assessed his or her condition, established a plan and performed daily follow up until the patient could be transferred to the inpatient ward. Carlos described his role within the community as "central", meaning that without his participation, the workflow would be disrupted. Carlos worked with a clinical supervisor who oversaw his work while being responsible for teaching tasks:

"The attendings are always with you, that's why I put them like surrounding us [in the Pictor chart]; we never take a big decision alone, you always talk it through with them, they guide you so you can do your job correctly" (R7).

"Each attending contributes to your professional training. They give you key information that allows you to learn the craft: Conducting rigorous follow up for the patients, doing night shifts, stuff like that. They highlight the importance of working as a learning tool here in your discipline" (R2).

On occasions when the workload was unusually high, the clinical supervisor helped the residents by working side-by-side with them. Experiencing and realising the complexity of critically ill patients, Carlos soon understood how crucial all members of the team were to successfully providing care to this type of patient. For example, he described the role of nurses in dealing with his new challenges:

"The nurses have a lot of experience. They all have a postgraduate degree in intensive care, so they are experts in what they do. Quite often, mostly in the first days of the rotation, they help you a lot by advising you about how to handle a difficult patient. They also talk you through some practical things, like if they have to administer a drug, then I have to ask them what sort of supplies they need so that I can prescribe the right supplies in the system" (R7).

The role of nurses was dynamic and included executing what Carlos and the clinical supervisor agreed to regarding patient care. Nurses were also crucial to the continuous monitoring of patient changes, and they alerted Carlos when something was wrong so that he could respond appropriately.

"The nurses! They are your eyes and ears. They monitor the patient up close, so they tell you like 'the blood pressure is low', 'this patient is too sedated' [Referring to the level of patient alertness]. They interact a lot more with the patient than you, so they follow up their progress across the different shifts" (R8).

Carlos also worked with a respiratory therapist who taught him how to programme the ICU ventilators. As with the nurses, the role of the therapist was dynamic and changed according to the situation, from teaching Carlos specific skills to carry out his orders to alerting Carlos about patients' respiratory problems.

Carlos made a great effort to establish good relationships with all members of the ICU, as he quickly understood the importance of each person on the team:

"At the end of the day, it is all about how you establish connections with other people and how much of the success in patients' outcomes is determined by the team effort; you know that you haven't achieved all that by yourself. When the patient is in a critical condition, you might focus on a particular aspect, but then someone else comes along and gives you a different perspective, and you see that the patient condition improves because of that input. Then you realise that is better to have other people supporting you in this job" (R13).

Story 2: The Visitor

Natalia was 26 years old and beginning her second year as an anaesthesiology resident when she rotated into the respiratory unit (Figure 2). The goal of this rotation was for Natalia to gain a deeper understanding of the respiratory pathologies she might encounter in patients undergoing surgery while improving her knowledge about perioperative assessment and preparation for this type of patient. She felt like a foreigner in a strange land, as the respiratory unit was part of the internal medicine department. Natalia rotated with three other residents from the internal medicine programme and a respiratory fellow. The existing members of the CoCP included a group of four clinical supervisors, two nurses, four nurse assistants and four respiratory therapists.

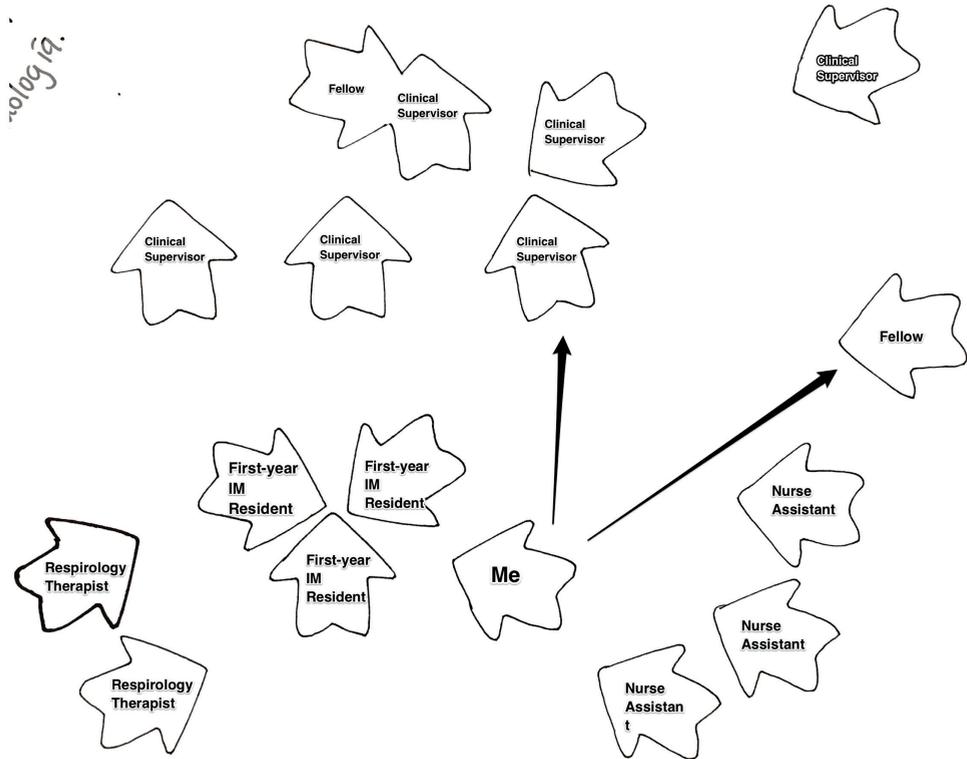


Figure 2. Second-year anaesthesiology resident beginning her respirology rotation. IM: Internal Medicine

Although her goal as an anaesthesiology resident in an internal medicine rotation was clear, her role was not. When asked about how she felt as a member of this team, she said,

"I don't think my role here is indispensable, but I'm of help to them [peers and clinical supervisors]. I assist them with whatever they need" (R4).

During the first weeks, she seemed to complete tasks while trying to figure out how to make the best of the rotation. For example, the supervisors assigned "easy" patients to her as a way to acknowledge she was not part of the internal medicine programme, while the rest of the residents assumed most of the workload. At the same time, some supervisors treated her as if she was an internal medicine resident, demanding that she acquire knowledge that was not of interest to her:

"From my discipline's point of view, some things are not really important for us to learn, but sometimes they [the clinical supervisors] want us to learn things that are not relevant to us. Like learning about lymphomas [a type of cancer that at-

tacks the blood], I do not have to know all the details related to managing patients with lymphoma, but that is what they asked me to know, so I ended up learning it. That knowledge is not really fixed in my mind; I'll forget it in a month" (R9).

Experiencing this tension, she had to quickly determine how to work with the team. She reached out to the fellow asking for details about how the CoCP worked:

"When I started, I was completely lost, they [the other residents] were already there for almost a month, they knew the place for everything, how the department worked. So, she [the respiratory fellow] was the one who explained those things to me. Well, to tell you the truth, she didn't help me, it was more like me asking her, maybe forcing her a little. I had to find out what my job was in this rotation" (R1).

Natalia also enlisted the help of one clinical supervisor who seemed to have a clearer idea of her goals in this rotation, as she described in the next excerpt:

"So, I built a good relationship with my clinical supervisor, Dr Gonzalez. He was the one who actually understood my role here; he had a broader picture of the reason for me being here. The rest of the attendings kind of undermined my discipline, but not him. He was like: 'At this point, we should ask for the anaesthetist's opinion; this is what an anaesthetist must know; you as an anaesthetist must learn this" (R1).

Natalia's interactions with nurses and nurse assistants were also different compared to her anaesthesia rotations. The nurses and nurse assistants did not teach her any specific skills, as she was not interested in learning the procedures of the respiratory unit. Instead, Natalia helped them with whatever task they needed to complete:

"In this rotation, I have a different type of contact with nurses. I help them do their job. Perhaps the clinical supervisor asks them for something, and if I know how to do it, I'll give them a hand: like going to the pharmacy to get a drug or perhaps transferring a patient to a different location" (R4).

As illustrated in the stories, entering a new CoCP entailed residents understanding their position and subsequent role within the community. We use the term 'position' to describe the type of resident participation within a CoCP. In story 1, for example, the resident described his position as central and located himself accordingly in the Pictor chart. The centrality of his position was also reflected by how he deemed his job to be indispensable to the functioning of the CoCP. This contrasts with story 2, in which the resident assumed a peripheral position in both the story and the Pictor chart while describing her job as inconsequential to the functioning of the CoCP. These positions reflect the extremes of a continuum, as some participants displayed aspects of being both an apprentice and a visitor.

The residents' position influenced how they negotiated their role within the community: a central position resulted in a clear role, while a peripheral position tended to result in a vague role leading to more uncertainties. In story 1, Carlos and the ICU CoCP members seemed to align concerning his intention of having a central position, a situation that influenced how he engaged with the different members of the CoCP to consolidate a team that could contribute to a successful patient outcome. This effort to be engaged with the entire CoCP was reflected in how Carlos located the arrows pointing towards him in the chart while also reflecting cohesion among its members (Figure 1). The apprentices' interactions were also dynamic and rich regarding the purposes of such interactions. Nurses, for example, made suggestions about how to solve patient care problems; they also taught specific skills while following patient care orders.

The opposite situation occurred in story 2: Natalia's intention to have a peripheral position was in direct conflict with the intention of some of the CoCP members, who believed that she should have adopted a central position. She dealt with this lack of alignment by negotiating her role with different CoCP members in an attempt to remain on the periphery while also being accepted in the CoCP. Such dynamics are reflected in how Natalia located herself as detached from the CoCP within the Pictor chart (Figure 2). We also noticed that the visitors' interactions patterns changed because of these tensions; the interactions seemed to be more fixed, while experiencing different purposes compared to those held in apprentice-type of residents. The most salient case is that of the nurses: In Carlos' story, interactions with nurses had varied and dynamic purposes, while in Natalia's had single, fixed one.

The residents' position seemed to be semi-deliberate; on the one hand, how they positioned themselves within the CoCP depended initially on their own goals and interests regarding the new rotation. Their ultimate position and subsequent role within the CoCP, on the other hand, resulted from a negotiation between the residents and the CoCP members. The residents' engagement with the CoCP was then determined by the tension between how they wanted to participate in the CoCP and how the CoCP members wanted to position them. Concrete examples regarding how CoCP members positioned the resident in story 1 included how supervisors interacted with Carlos to help him learn from his practice and how his peers aided him in understanding how the CoCP members preferred to work. In story 2, the examples included how supervisors demanded that Natalia learn things unrelated to her goals and intentions and how she forced the fellow into helping her to cope with the new CoCP.

Discussion

This study set out to explore how residents engage with a CoCP at the start of a new rotation. The residents engaged with a CoCP through complex and interrelated processes that included understanding their position and subsequent role within the communi-

ty, identifying the members of the CoCP and interacting with them to engage in the community's practices. The residents seemed to ascertain their position within a CoCP, which could vary on a continuum from central to peripheral participation. How the residents positioned themselves depended on their motives and interests when starting a new rotation. Continuous interactions and negotiations with CoCP members regarding a resident's position determined the resident's role within that CoCP. Interactions were rich and dynamic when the residents and the CoCP are aligned concerning the residents' position, resulting in a clear and straightforward role. The opposite seemed to be the case for residents experiencing more fixed interactions and struggling to clarify their role within the CoCP.

Much of the workplace learning literature seems to imply that learners have a central role within a community and that they all tend to be interested in a centripetal trajectory within such communities^{15,36-39}. According to our findings, residents' trajectories into a CoCP seemed to be more nuanced than that, as some of the residents preferred to remain on the periphery of the community. Communities of practice and landscapes of practice theory recognises different participatory patterns including both inbound trajectories and peripheral trajectories^{10,40} that are more in line with recent and interprofessional apprenticeship arrangements such as learning in clinical settings⁴¹. For example, Bannister et al. found that some paediatric residents were not interested in attempting particular clinical skills while rotating in the emergency department because they did not envision themselves as future emergency paediatricians⁴. We add to those findings that residents' position affects not only how they engage with members of a CoCP but also what their role within that community could be. Bunniss et al. also found that healthcare teams exhibited exclusion and inclusion behaviours that determined who was empowered to act upon a patient, positioning their members either in the centre or on the periphery of the community²⁷. We add to these findings that residents could also intentionally position themselves in peripheral positions to learn only partial aspects of that community's knowledge in an effort to balance this position without being excluded from the CoCP.

Based on our findings, workplace learning in postgraduate education results from a balance between residents' agency and how they participate in CoCP practices. Residents' agency resulted from their interest and personal goals when entering a new rotation, which was reflected in how they wanted to be positioned within the CoCP. This decision triggered different interactions and negotiations with CoCP members, yielding varied learning experiences. This line of reasoning resonates with Billett's co-participation theory, which argues that learning arises from the negotiations between individuals' agency and social affordances². Teunissen also describes this balance between learners' agency and social learning in his practice-based learning framework: at the end, the learner's trajectory is marked by the experiences he or she accumulates throughout his or her training, and each experience is ultimately shaped by the learn-

er's agency¹. Choosing a central vs. a peripheral position results, as we discovered, in living different social experiences at the beginning of a rotation.

Some practical implications arise from our results. Recognising the variety of residents' roles within a community based on their positioning could help us understand how to maximise the learning potential of workplace settings. Tailoring workplace affordances to different residents' trajectories, either central or peripheral, could be the key to decreasing the number of learning opportunities that are considered to be lost. Our results also imply a challenge to our traditional way of understanding residents' agency in workplace learning. Understanding that residents' role is fluid and influenced by negotiations between the residents and the CoCP they are entering is a starting point for new conceptualisations of workplace learning. Future research could explore how to better incorporate residents into a CoCP depending on their participation type, how they decide what and what not to learn, and whether they have the tools to make these decisions. Additionally, research could explore how we can assist supervisors in ascertaining what roles residents intend to adopt and what specific intentions they have when initiating a new rotation. Clarifying that issue could aid supervisors in more thoroughly promoting residents' exploration of learning goals.

Some limitations should be mentioned. Although we gathered an in-depth picture of the explored process using the Pictor technique, we collected data only from the residents' point of view. We believe this approach answered our research questions; however, it is also essential to examine how community members decide to engage with a resident. How do established members deal with the high rate of resident rotation? To what extent does the community determine the role of the residents and their type of participation? How do such disruptions change the workflow and the continuity of practice itself?

Conclusion

CoCP members' acceptance of residents participation influences how and what residents learn in clinical settings⁴. While exploring how residents enter and engage with a CoCP, we found that this engagement depends on how residents negotiate their position with CoCP members. Based on the residents' agency, residents interact with CoCP members to clarify their role within the new CoCP, a process that is fluent and clear when both parts are aligned but is vague and full of tensions when the parts conflict. Understanding the nuances of residents' trajectories while engaging with a new CoCP could assist us in maximising the learning potential of workplace settings.

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Appendix 1

Questioning route

Introductory question:

1. Please introduce yourself by telling me your name, which year of residency you are in and what rotation you are starting currently.

Transition questions:

2. What is your job in this rotation? What does it entail?
3. What do you think your role is as part of your work team?
4. How are you experiencing these first weeks in this new rotation?

Directions:

Can you think back to your first week and create a list of people you have interacted with during the beginning of your rotation? Please note their role title within each arrow-shaped sticker. Please be as inclusive as you can. You are free to choose different colours for different actors if you feel that would help you tell your story.

Please place the arrows on this sheet in a way that could help you describe the different relations you have established during this new rotation and their dynamics. You can give different directions to the arrows, use different colours, place the arrows at various distances, etc.

Key questions:

5. Please explain this chart to me; why do you portray these relations like this?
 - a. Why did you choose these colours for these actors?
 - b. Why did you orient the arrows like this?
6. How do these different actors work together?
7. How did getting to know all these people influence the way you work with them?
8. How did these relations help you find your role or your place in this rotation?
9. In what ways do you think your inclusion on this team has influenced the way the team members work together?
10. How are you adapting to working with these people? How are they adapting to you?
11. Could you tell me about specific situations when you felt you were struggling in that regard?
12. How have you managed that situation?

Wrap-up question:

13. Would you like to add anything to what we have discussed so far?

Chapter 6

Discussion

Discussion

Workplace learning in postgraduate settings results from residents' engagement in learning opportunities^{1,2}. Such engagement depends on a complex arrangement of factors that include learners, existing healthcare team members and context factors³, which explains why learning outcomes are often unpredictable and variable⁴. Therefore, optimising workplace learning necessarily entails understanding how residents interact with members of healthcare teams within specific clinical contexts^{3,5}. The present PhD thesis sets out to investigate the following research questions:

How do residents learn by interacting with the members of healthcare teams in the clinical workplace?

- a. How do residents learn by interacting with their clinical supervisors?
- b. How do residents learn by interacting with the entire healthcare team?

The first sub-question is addressed in Chapters two, three and four, while the second question is explored in Chapter five. Chapter two highlights residents' preferences regarding their interactions with clinical supervisors through the lenses of the cognitive apprenticeship teaching methods⁶, revealing how such methods can be attuned to residents' training level. In Chapter three, we uncover the tensions residents perceive between receiving support from their supervisors and being afforded autonomy in clinical practice. We describe how residents respond to these tensions as they aim to obtain an appropriate amount of support and autonomy while capitalising on their learning opportunities. Chapter four examines how supervisory dyads achieve a mutual understanding of how to jointly provide patient care. We describe how, through constant processes of mutual adaptation, the supervisory dyad follows joint trajectories that result in the development of shared working repertoires. These shared repertoires help supervisory dyads work closely together even as they face challenging patient care situations. Finally, in Chapter five, we broaden the scope of the possible workplace interactions through which residents learn by disentangling how residents enter and engage with the various healthcare team members at the beginning of their rotations. We find that this engagement depends on continuous negotiations between residents and healthcare team members concerning the type of participation the residents aim for when entering the community of clinical practice.

In the present chapter, we discuss the significance of this thesis and how the results can be positioned within the ongoing conversation about workplace learning in postgraduate settings. Then, we suggest future research directions and the implications for practice and finally conclude with a section on the strengths and limitations of this thesis.

How do residents learn by interacting with clinical supervisors?

Based on the findings discussed in **Chapter two**, we assert that supervisory interactions constitute a source of learning to the extent that clinical supervision is sustained while dynamically changing the nature of the interactions. According to residents' perceptions, residents and supervisors' interactions could be sustained through the entire postgraduate training, as the nature of their interactions change according to resident's training level: from using teaching methods that vest more power in the clinical supervisor initially (such as modelling and coaching) to those that vest more power in the resident towards the end (such as articulation and reflection). Our findings are consistent with the clinical supervision model proposed by Stalmeijer et al. for undergraduate training^{7,8} concerning how clinical supervision can be configured using cognitive apprenticeship teaching methods to match learners' development. The progression from intense modelling to promoting learners' self-directedness and reflection is also in line with developmental models of supervision for counselling and psychotherapy students⁹. The findings of Brown et al. also support our claims, as these scholars find that senior general practitioner trainees interact dynamically with their supervisors to maximise the learning potential of their encounters even during the late stages of training¹⁰. Our findings move beyond traditional clinical supervision tenets that assume that residents and supervisors' interactions are meant to cease once residents have gained a predetermined level of competency¹¹. Residents and supervisors' interactions could be sustained throughout the resident learning trajectory by attuning the configuration of the teaching methods used according to the residents' training level.

Having asserted the necessity of ongoing residents and supervisors' interactions throughout residency training, it is also important to note the consequences of these sustained interactions. In **Chapter three**, we describe how residents and supervisors' interactions are sources of tensions between the amount of supervisor support and the residents' autonomy. However, by also exploring how residents react to these tensions, we unravel the importance of the bidirectional nature of supervisory interactions and how this influences residents' learning. By 'bidirectional' we mean that interactions include both the supervisors' affordances to the residents and the latter's engagement with such affordances². Several articles describe various developmental models of clinical supervision in postgraduate training, with the objective of helping supervisors tailor their teaching strategies to residents' training level^{12,13}. However, it has been noted that it is difficult to put these recommendations into practice¹⁴. We argue that research efforts should not be placed on refining the existing models of progressive development but on understanding how residents and supervisors' interactions are aligned with these models. Despite residents' perceptions that they experience tensions, they respond to them by using these experiences as learning opportunities. This finding leads us to conclude that workplace learning not only arises from the way clinical supervisors tailor their supervision affordances according to residents' needs but also from how residents engage themselves with these affordances.

In **Chapter four**, we disentangle residents and supervisors' joint trajectories by examining how they adapt to each other while providing joint patient care. Residents and supervisors develop working repertoires by experiencing diverse adaptation processes. We understand such repertoires to be reifications or concretisations of their adaptation efforts in the form of attuned codes that help them work together as a team. In addition, residents' role in the supervisory dyad becomes increasingly central as their relationship matures over time. Supervisors and residents' joint trajectories have been increasingly explored in the medical education literature, including residents and supervisors' collaborative interpretation of visual cues during difficult laparoscopic procedures¹⁵ and residents' and supervisors' accounts of how residents' performance is highly coupled with and dependent on that of the supervisor¹⁶. Based on this growing body of literature and our findings, we assert that residents' workplace learning entails not only dynamic and bidirectional interactions with their supervisors but also the joint effort of sharing a common trajectory that increases residents' participation in clinical settings. Therefore, examining residents' learning as a function of their interactions with their supervisors entails understanding such interactions as the intersection between residents' and supervisors' trajectories¹⁷. This claim contrasts with the traditional understanding of residents' learning as an individual trajectory from novice to expert as defined by the achievement of predetermined competencies^{11,18,19}. The role of the supervisor in supervisory interaction seems to move beyond assisting residents' individual learning trajectories^{1,20} or acting as a role model whose preferences should be emulated by the residents^{21,22}. Instead, residents should strive for strong, interdependent interactions with their supervisors rather than just independent, individual practice.

How do residents learn by interacting with the broader healthcare team?

Workplace learning in postgraduate training depends on how residents enter and engage with the entire healthcare team. In **Chapter five**, we find that residents' interactions with the healthcare team are influenced by how the former negotiates an intended participatory trajectory with the latter. Although medical education research has for a long time embraced the discourse of learning as a trajectory aimed at full participation²³⁻²⁵, our results indicate that there are additional trajectories that we need to be mindful of and better understand. In the original communities of practice (CoP) theory, learning is framed as a centripetal trajectory from the periphery to the centre in rather mono-professional CoP^{26,27}. As highlighted by Fuller in her CoP critique, this approach falls short in describing the different participatory trajectories seen in modern apprenticeship arrangements, in which a newcomer can hold a central position from the beginning of the trajectory, as observed in cases of companies that hire outsiders as chief managers²⁸. In **Chapter five**, in addition to describing how residents interested in an inbound trajectory towards full participation interact with healthcare team members to work together, we also describe how residents that rotate outside their own discipline interact and negotiate with these members to trace a peripheral trajectory. We called

the former type of residents 'apprentices' to highlight the intention to have a full, central participation in the community of clinical practice, whereas we call the latter type 'visitors', to underpin their intention to have a transitory, peripheral type of participation within the community of clinical practice. This more peripheral type of participation is also described in a study by Bannister et al.³, where some residents did not attempt specific procedures in a paediatric emergency department because they were not interested in practising in similar clinical settings in the future. Peripheral trajectories pose, however, specific challenges to residents and healthcare team interactions, as they all have to find a way to ensure residents' participation in the community of clinical practice while avoiding residents' exclusion from it. Bunniss et al. describes how healthcare teams adopt inclusion and exclusion behaviours to determine who is directly involved in patient care provision and who is excluded from it²⁹. These team configurations imply that excluded members cannot contribute anything valuable to the team regarding the provision of patient care, restricting valuable participation opportunities for excluded members. We observe that visitor-type of residents reach out to strategic healthcare team members that can help them find and clarify their role in the team to avoid such exclusion. In this way, residents seize learning opportunities that suit their goals without having to follow a centripetal trajectory to full participation. Learning from interactions with the entire healthcare team arises from observing how the healthcare team and the residents negotiate the residents' intended learning trajectory. Residents who seek to follow a centripetal trajectory interact purposefully with the different members of the healthcare team to be a central actor within the team. Negotiating a peripheral trajectory, instead, allows the resident to participate in the healthcare team without being essential to it while capitalising on learning experiences that align with the residents' goals.

Suggestions for future research

Our line of research moves from focusing on residents and supervisors' interactions towards exploring the role of the whole healthcare team in workplace learning, which is a dimension that still needs to be further examined. As adaptive expertise³⁰ constitutes a crucial skill for residents to develop, the rotational nature of training during residency will unlikely change in the future. This rotational nature invariably results in constant exposure to different and complex healthcare teams throughout the residency training. Future research could examine how this continuous rotation through different healthcare teams influences learning, both from the resident's and the healthcare team's vantage points. Although new conceptualisations of CoP theory consider how learners nurture their trajectories through navigating a landscape of multiple CoP³¹, these frameworks fall short in describing the tensions within such CoP and how their members address constant changes in their members. Activity theory (AT) and its sub-

theory, knotworking, seem to be suitable for answering these queries³². AT provides complex conceptualisations of the social interactions and relationships within activity systems, such as interprofessional teams³³, while knotworking theory explores how team members collaborate with each other in situations involving continually changing combinations of individuals distributed over time and space³⁴. Both theories have been used to study interprofessional healthcare team collaboration in the past^{29,35}; however, these frameworks have not been used to explore residents' learning in such teams.

Additionally, we suggest taking into account the role of spaces and artefacts in workplace learning. Sheehan et al.³⁶ has already highlighted the role that material elements (such as the physical space and patient records) play in undergraduate medical training, a work that should be further expanded. Actor-network-theory (ATN) offers a framework that takes into consideration the contribution of material elements in knowledge construction³⁷. ATN asserts that people and material elements are actors that possess no inherent knowledge; instead, knowledge is produced by the purposeful interaction of these actors within complex networks³⁸. Ajjawi and Bearman, for example, described how residents use artefacts to create and resist power tensions during bedside teaching interactions with clinical supervisors³⁹. In **Chapter four**, we note how supervisory dyads use material elements, such as the anaesthesia machine, as the focus of their interactions because these elements mediate their engagement with patient care problems. Therefore, integrating material elements into workplace learning conceptualisations could open new and uncovered layers of complexity to the ongoing research on this matter.

Practical implications

Understanding the intricacies of workplace learning as a social endeavour bounded in specific contexts has some practical implications. Maximising workplace learning entails understanding how it arises from a complex arrangement of factors that include residents' agency in deciding how to engage with workplace affordances, what is afforded to them from existing healthcare team members, and the interplay between these elements^{2,3}.

Residents can maximise their workplace learning by being aware of the potential that lies in every single interaction they experience in the clinical setting⁴⁰. If residents understand their learning trajectory as only the acquisition of specific unique competencies, then they may underestimate the influence that these interactions have upon their learning⁴¹. Members of the healthcare team not only possess the knowledge, skills and attitudes residents' intend to develop, but they also understand how the healthcare team works together and legitimise residents' diverse forms of participation within the team^{3,5}. Failing to reach out to the different healthcare team members could result in being excluded from the team or losing precious learning opportunities^{3,29}. Being mind-

ful of the potential that lies in interacting with the entire healthcare team requires residents to rebuff the traditional conception of striving for independence. Instead, residents should aspire to achieve interdependent practice¹⁶. Such effort requires residents how their performance is bound to that of the healthcare team.

Clinical supervisors can optimise residents' workplace learning by understanding how supervisory interactions are dynamic and bidirectional. Supervisors can improve their supervisory efforts by trying to understand how residents engage with the opportunities provided to them and considering their interaction to be a joint learning trajectory of mutual adaptation. If residents see supervisory relationships as unidirectional forms of adaptation and engagement their efforts to capitalise on the learning opportunities that are afforded to them by the supervisors may be hindered^{21,22}. Residents influence supervisory practices only to the extent that supervisors are willing to learn from them⁴².

The healthcare team can help residents follow a diverse array of learning trajectories by tailoring, where possible, their learning affordances to the residents' intents and goals when starting a new rotation. Excluding residents because of their intentions may deny them significant learning opportunities that could enhance their learning trajectories^{3,5}. Interactions related to patient care may also have different purposes beyond teaching residents' specific knowledge, skills and attitudes⁴³. These interactions can help residents understand specific healthcare team repertoires and how to use them to provide patient care as a team so they can understand the varied roles that can be embraced when becoming a part of the team³⁵.

Strengths and limitations

Several features strengthen the quality of this PhD thesis. First, our line of inquiry is consistent regarding its constructivist paradigmatic research view and its use of a clear sociocultural theoretical framework. This consistency assures coherence among the studies and enhances their methodological rigour⁴⁴. Second, we use a combination of research methods: mixed-methods and qualitative research designs. In addition, we use both quantitative and qualitative forms of data analysis and various forms of data collection: questionnaires, interviews, focus groups, non-participant observation and visual aid techniques. This combination of research methods increases the credibility of our findings⁴⁵. Third, in line with the constructivist research paradigm, the results reflect the constant negotiation among the members of the research team regarding their understanding of the data. Fourth, we assure the trustworthiness of our findings through a constant exercise of reflexivity, as is palpable throughout the chapters^{44,46}.

It is important to specifically highlight some of the limitations of this PhD thesis. There are essential contextual features that make the transferability of our findings uncertain. As explained in **Chapter three**, Colombian residents do not receive formal

financial reimbursement for their work, and they have to pay tuition fees during their training, which is in sharp contrast with residencies in North America and Europe. Therefore, residents rely on large bank loans, personal savings and family support to complete their training. We do not know how this issue influences our results as we did not explore this relationship in the individual studies. However, the unique financial circumstances surrounding residencies were not mentioned during data collection. Additionally, Colombian residency programmes still use a traditional curriculum design rather than the competency-based design that currently dominates training in North America and Europe. Future research should explore the transferability of our findings by collecting data in residency programmes built on the principles of competency-based medical education.

Additionally, as I discussed in **Chapter one**, my experiences as a resident, clinical supervisor and member of a healthcare team influence how I conducted this research, interpreted the data and constructed the final results. My role as an insider has positively influenced the research: it enabled access to most of the participants, it allowed me to understand their point of view as we work in the same environment, and was in many ways the very source of my inquiries. However, being an insider required me to have a clear understanding of my role, my motives, my preconceptions and how these all helped to shape the results⁴⁷. It is one thing to co-construct the results based on my experiences and another to impose these experiences onto the participants and the data. This awareness was a constant and often unfinished endeavour. The strategies I used to achieve this awareness included reflective memo writing and team analysis that included researchers that were outsiders to our research field. Additionally, on some occasions, it was preferable for an outsider to conduct the interviews or perform the field observations. This combination of strategies helped me understand how my role as an insider could have a negative impact on the way we, as a team, analysed the data. For example, I wrote some memos about the extent to which the interviews I conducted differed from those conducted by my anthropologist colleague, who assisted in data collection during Chapters four and five. I noticed how residents tried to be more detailed and how they used more jargon-free language when explaining their experiences to an outsider, who, in turn, asked for more details in their descriptions which would have been taken for granted by me as an insider. This analysis pushed me to create some distance from my participants to obtain richer data for a single interview, for example, by asking them to explain specific expressions and to elaborate on their reactions while proving them through their explanations.

Conclusion

Understanding workplace interactions and their role in residents' learning is vital for improving clinical settings as learning environments in postgraduate training. Sociocultural learning theories provide a suitable framework for exploring these interactions while advancing the research in this field. Widening the lens from a focus on the resident and supervisor dyad to a focus on the broader healthcare team is an important next step in understanding and optimising workplace learning.

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Summary

Chapter 1: Introduction

This PhD thesis started with the need to better understand complex workplace interactions during postgraduate training, as they are a source of residents' learning. Traditionally, workplace learning research has used cognitive and behaviourist theories to explain and explore learning in this setting. However, the importance of using socio-cultural approaches in this regard has been stressed. According to these theories, learning arises from residents' interactions with different healthcare team members in clinical contexts. Being mindful of how these interactions influence learning is of paramount importance since they seem to determine both the quality and quantity of residents' learning experiences. Research on workplace interactions has focused on the exploration of residents and supervisors' relationships but focused less on the interactions that residents have with the rest of the healthcare team. Consequently, the central research questions for this thesis are as follows:

How do residents learn by interacting with the members of healthcare teams in the clinical workplace?

- a. How do residents learn by interacting with their clinical supervisors?
- b. How do residents learn by interacting with the entire healthcare team?

Chapter 2

Chapter two explores residents and supervisors' interactions through the lens of the cognitive apprenticeship model. In this study, we investigate which teaching methods that use the cognitive apprenticeship model are preferred by residents at different levels of training and the reasons for these preferences. We use the Maastricht Clinical Teaching Questionnaire as the primary data collection tool; 215 residents of different training levels and disciplines completed the questionnaire. We find that residents have strong preferences for all the cognitive apprenticeship model teaching methods regardless of their level of training. Additionally, when exploring the reasons for such preferences, we discover that junior and intermediate residents prefer teaching methods that are supervisor-directed (such as modelling and coaching), whereas senior residents prefer those that are resident-directed (such as reflection and articulation). Based on these findings, this chapter questions the need to decrease the amount of clinical supervision as residents progress through their training. Instead, supervisory interactions could be sustained by using different configurations of the cognitive apprenticeship teaching methods according to the residents' training levels.

Chapter 3

Having determined that residents prefer to have sustained and dynamic interactions with their supervisors throughout their training process, in Chapter three we investigate the tensions that residents experience between receiving supervisors' support and encouragement for residents' autonomy and participation and how the residents worked with their supervisors to maximise their learning opportunities. Using a con-

constructivist-grounded theory design, we conducted three focus groups and ten semi-structured interviews with a total of 27 residents of different training levels and disciplines. We find that tensions arise between the level of autonomy and the practice opportunities afforded to the residents by their clinical supervisors. Residents act upon these tensions depending on how safe they perceive the learning environment that is created by the supervisor to be. When autonomy and practice opportunities are restricted, the residents either negotiate for more participation or become passive observers. When given excessive autonomy and practice opportunities, residents enlist the help of either their supervisors or their advanced peers. Learning from each type of resident response to the varied tensions was subjected to the level of intersubjectivity displayed by the residents and supervisors. In this study, intersubjectivity refers to the extent to which participants share a common understanding about achieving a common goal. Based on our findings, we argue that although clinical supervision is fraught with tensions regarding the proper balance between resident autonomy and support, the residents' responses to these tensions are actually attempts to restore the balance and maximise their learning opportunities.

Chapter 4

In Chapter four, we take a closer look at how residents and supervisors interact in the workplace to develop a shared understanding of how to jointly provide patient care. Using a constructivist-grounded theory design, we conducted three focus groups with residents and clinical supervisors of an anaesthesiology department, followed by 140 hours of non-participant observation of supervisory interactions in different settings in the workplace. The participants of this study included 11 residents and 18 supervisors. We find that supervisory dyads achieve a shared understanding by adapting to each other. The necessity of such adaptation arises from continuous changes in the composition of supervisory dyads and high procedural variation not only among supervisors but also between residents and supervisors. A mutual adaptation is achieved through different adaptation patterns that include complying with supervisors' directions, negotiating supervisors' preferences and sharing the decision-making process. As supervisory dyads experience these adaptation patterns repeatedly, they also develop a working repertoire. Residents gain an increasingly crucial role in patient care provision within the dyad as this relationship matures, showing how residents and supervisors share a trajectory.

Chapter 5

In the final study, we broaden the scope of our queries to include how residents interact with the broader healthcare team. Notably, few studies consider how residents enter in and engage with these teams during their training process. We design a constructivist-grounded theory study incorporating the Pictor technique that included interviews with 13 residents of different training levels and disciplines to explore how they interact with the communities of clinical practice they were entering in at the start

of their rotations. We find that residents entering a new community of clinical practice experience several recurring and intertwined processes that include the following: understanding their position and role within the community, identifying the relevant existing members of the community and determining how these members can assist their successful engagement with the community of clinical practice. Residents' interactions with the existing members are influenced by negotiations with the members regarding the type of position the resident intends to have within the community of clinical practice. Such positions vary from an inbound, centripetal trajectory towards full participation (apprenticeship) to a peripheral trajectory that eventually leads residents out of the community (visitor). These types of participation influence how residents interact with the various members of the community. We conclude that it is essential to understand and be mindful of these variations and how they influence the way residents interact with the healthcare team; therefore, learning opportunities can be tailored to residents' intended type of participation.

Chapter 6: Discussion

In Chapter six, we synthesise the research from the previous chapters and discuss the evidence in relation to the existing literature, providing recommendations for practice and future research and underpinning the strengths and weaknesses of this thesis. In this chapter, we provide an answer to the central research question: "How do residents learn by interacting with the members of healthcare teams in the clinical workplace?". Our results suggest that workplace interactions are dynamic and bidirectional, and these interactions are influenced by the different potential learning trajectories that residents follow during their training. Some conclusions are drawn regarding residents and clinical supervisors' interactions. First, residents and supervisors' interactions can be sustained throughout postgraduate training by attuning different teaching methods to the residents' training level. Second, it is inevitable that tensions will arise between providing the right amount of support while encouraging resident autonomy; however, residents' responses to such tensions are meant to ease the tension while capitalising on them as learning opportunities. Third, residents and supervisors' interactions entail a constant process of mutual adaptation to achieve a shared understanding regarding how to provide patient care together. Through adapting to each other, residents and supervisors share a learning trajectory that helps them work together as a team. Concerning residents' interactions with the rest of the healthcare team, the main conclusion is that how residents enter and engage with these teams is greatly influenced by how they negotiate their intended position within these teams. Learning trajectories vary from an inbound trajectory towards full participation to a peripheral trajectory. Supporting these diverse learning trajectories can maximise residents' learning while also respecting their agency. We note that more research on the broader interactions between residents and the members of healthcare teams is needed, while proposing alternative conceptual frameworks to undertake such research.

Samenvatting

Hoofdstuk 1: Introductie

Dit proefschrift begon vanuit de behoefte om complexe werkplekinteracties tijdens de vervolgopleiding beter te begrijpen, omdat deze voor aiossen een bron zijn van leren. Het onderzoek op het gebied van werkplekleren heeft van oudsher gebruik gemaakt van cognitieve en behavioristische theorieën om het leren in deze setting te verklaren en te onderzoeken. Het belang van sociaal-culturele benaderingen is in deze context echter ook benadrukt. Volgens deze theorieën komt leren voort uit de interacties tussen aiossen en verschillende leden van het zorgteam in klinische contexten. Het is van het grootste belang dat we ons bewust maken van de invloed die deze interacties hebben op het leren, want zij lijken zowel de kwaliteit als de kwantiteit van de leerervaringen van aiossen te bepalen. Onderzoek naar interacties op de werkplek heeft zich tot op heden voornamelijk bezig gehouden met het in kaart brengen van de relaties tussen aiossen en begeleiders, maar in mindere mate met de interacties die aiossen hebben met de rest van het zorgteam. De overkoepelende onderzoeksvragen van dit proefschrift luiden daarom als volgt:

Hoe leren aiossen van hun interacties met zorgteamleden op de klinische werkplek?

- a. Hoe leren aiossen van hun interacties met hun klinisch begeleiders?
- b. Hoe leren aiossen van hun interacties met het hele zorgteam?

Hoofdstuk 2

Hoofdstuk twee onderzocht de interacties tussen aiossen en begeleiders vanuit het oogpunt van het *cognitive apprenticeship model* (cognitief leermeester-gezelmodel). In deze studie onderzochten we voor welke onderwijsmethoden van dit model aiossen uit verschillende jaren van hun opleiding een voorkeur hadden en waarom. Voor de dataverzameling gebruikten we een in Maastricht ontwikkelde vragenlijst waarmee opleiderskwaliteiten gemeten kunnen worden, namelijk de *Maastricht Clinical Teaching Questionnaire*. De vragenlijst werd ingevuld door 215 aiossen uit verschillende opleidingsjaren en disciplines. We constateerden dat aiossen, ongeacht hun opleidingsniveau, een sterke voorkeur hebben voor alle onderwijsmethoden van het cognitive apprenticeship model. Bij het achterhalen van de redenen voor deze voorkeuren ontdekten we bovendien dat aiossen die aan het begin en halverwege de opleiding waren een voorkeur hadden voor begeleidergestuurde onderwijsmethoden (zoals modelling en coaching), terwijl laterejaarsaiossen juist de voorkeur gaven aan aiosgestuurde methoden (zoals reflectie op en articulatie van kennis en kunde). Op basis van deze bevindingen concludeert dit hoofdstuk dat de noodzaak om de klinische begeleiding af te bouwen naarmate aiossen in de opleiding vorderen, discutabel is. In plaats daarvan zou het contact met begeleiders behouden kunnen blijven door voor elk opleidingsniveau een andere configuratie van de onderwijsmethoden van het cognitive apprenticeship model toe te passen.

Hoofdstuk 4

In Hoofdstuk vier gingen we dieper in op de vraag hoe aiossen en begeleiders met elkaar omgaan op de werkplek om tot een gemeenschappelijk begrip te komen van hoe zij gezamenlijk zorg zullen verlenen aan patiënten. Aan de hand van een constructivistische-gefundeerde-theorieontwerp hielden we drie focusgroepen met aiossen en klinisch begeleiders van een anesthesiologieafdeling, gevolgd door 140 uur niet-participerende observatie van interacties met begeleiders in verschillende werkpleksettingen. Aan deze studie namen 11 aiossen en 18 begeleiders deel. We constateerden dat aios-begeleider dyades tot een gemeenschappelijk begrip kwamen door zich aan te passen aan elkaar. Deze noodzaak tot aanpassen ontstond doordat de samenstelling van aios-begeleider dyades voortdurend wisselde, maar ook doordat begeleiders elk een andere aanpak hanteerden waardoor de werk-procedure van dyade tot dyade verschilde. De dyades kwamen tot wederzijdse aanpassing door verschillende, zich herhalende aanpassingsgedragingen aan te nemen, waaronder het volgen van het protocol van de begeleider (door de aios), het bieden van tegenwicht aan de voorkeuren van de begeleider (door de aios) en het gezamenlijk deelnemen aan het besluitvormingsproces. Aangezien aios-begeleider dyades deze aanpassingsgedragingen herhaaldelijk toepasten, ontstond er op den duur een gezamenlijk werkrepertoire. Naarmate de relatie tussen aios en begeleider voortduurde, kreeg de aios binnen de dyade een steeds prominentere rol bij het verlenen van zorg aan patiënten, wat aantoont dat aiossen en begeleiders samen een traject hadden afgelegd.

Hoofdstuk 5

In de laatste studie breidden we de focus van ons onderzoek uit door ook te kijken naar hoe aiossen omgaan met het hele zorgteam. Het valt op dat weinig studies zich verdiept hebben in de manier waarop aiossen tot het team toetreden en met het team samenwerken tijdens het opleidingsproces. We ontwierpen een constructivistische-gefundeerde-theoriestudie waarvoor we interviews afnamen met 13 aiossen van verschillende opleidingsniveaus en disciplines met het doel te onderzoeken hoe hun contact verloopt met de communities of clinical practice¹ waartoe zij toetraden bij aanvang van elke stage. Daarbij maakten we gebruik van de Pictor-techniek om de interviews te sturen. We kwamen tot de bevinding dat aiossen die tot een nieuwe community of clinical practice toetreden, verschillende, zich herhalende en door elkaar lopende processen doormaken, waaronder de volgende: begrijpen wat hun positie en rol is binnen de community, vaststellen wie de huidige, relevante leden van de community zijn, en beoordelen hoe deze leden de aios kunnen helpen de samenwerking met de community of clinical practice zo vlot mogelijk te laten verlopen. De manier waarop aiossen met de bestaande leden omgingen werd beïnvloed door de mate waarin zij erin slaagden hun gewenste positie binnen de community of clinical practice bij de leden af te dwingen. We onderscheidden twee verschillende

¹ * Een *Community of Clinical Practice* is een netwerk van verschillende zorgverleners die gezamenlijk hetzelfde doel nastreven, namelijk een optimale gezondheid van de patiënt.

posities waaraan aiossen de voorkeur gaven: een positie als “stagiair”, waarbij de aios het middelpunt vormt en geleidelijk aan volledig aan de zorgverlening deelneemt, en een positie als “bezoeker”, waarbij de aios een meer ondergeschikte rol aanneemt waardoor hij/zij op den duur niet meer bij de community hoort. Deze twee manieren van participatie zijn van invloed op de wijze waarop aiossen met de verschillende leden van de community omgaan. Tot slot concludeerden we dat het van essentieel belang is dat we deze verschillen en de invloed ervan op de manier waarop aiossen met het zorgteam omgaan begrijpen en er rekening mee houden. Zodoende kunnen leerkansen afgestemd worden op de manier waarop de aios wenst te participeren.

Hoofdstuk 6: Discussie

In Hoofdstuk 6 vatten we het onderzoek uit de voorgaande hoofdstukken samen en bespraken we hoe het bewijs zich verhoudt tot de bestaande literatuur, waarbij we aanbevelingen deden voor de praktijk en toekomstig onderzoek en de sterke en zwakke punten van dit proefschrift belichtten. In dit hoofdstuk gaven we antwoord op de overkoepelende onderzoeksvraag: Hoe leren aiossen van hun interacties met zorgteamleden op de klinische werkplek? Onze resultaten maken aannemelijk dat interacties op de werkplek dynamisch zijn en van twee kanten komen en dat deze interacties beïnvloed worden door de verschillende mogelijke leertrajecten die aiossen tijdens hun opleiding volgen. We trokken enkele conclusies met betrekking tot de interacties tussen aiossen en klinisch begeleiders. De eerste conclusie was dat interacties tussen aiossen en begeleiders tijdens de gehele vervolgopleiding behouden kunnen blijven door de verschillende onderwijsmethoden af te stemmen op het opleidingsniveau van de aios. De tweede conclusie was dat er onvermijdelijk spanningen zullen ontstaan tussen de taak om de aios de juiste hoeveelheid begeleiding te geven en hen tegelijkertijd aan te sporen tot zelfstandig werken; de strategieën die aiossen gebruiken om met dergelijke spanningen om te gaan zijn echter bedoeld om ze te verminderen en ze tegelijkertijd als leerkansen te benutten. De derde conclusie was dat de interacties tussen aiossen en begeleiders een continu proces van wederzijdse aanpassing teweegbrengen met het doel tot een gemeenschappelijk begrip te komen van hoe zij gezamenlijk zorg zullen verlenen aan patiënten. Door zich aan elkaar aan te passen maakten aiossen en begeleiders samen een leertraject door dat hen hielp om als team samen te werken. Wat de interacties van aiossen met de rest van het zorgteam betreft, was de voornaamste conclusie dat de manier waarop aiossen tot een team toetreden en met het team samenwerken in grote mate wordt beïnvloed door de manier waarop zij hun gewenste positie binnen deze teams weten af te dwingen. De verschillende leertrajecten die aiossen kozen varieerden van een naar het middelpunt bewegend traject richting volledige deelname tot een perifeer traject. Door deze diverse leertrajecten te ondersteunen kan het leren van aiossen zoveel mogelijk worden bevorderd, zonder dat zij daarbij in hun eigen keuzevrijheid worden beperkt. Tot slot stipten we aan dat er meer onderzoek nodig is naar de interacties tussen aiossen en de leden van zorgteams in bredere zin en stelden daarbij alternatieve begrippenkaders voor waarmee dergelijk onderzoek kan worden verricht.

Valorisation

High-quality health care is the ultimate aim of training our future medical workforce. As workplace learning is and will continue to be the backbone of postgraduate training, a more in-depth exploration of this process is crucial. This PhD has provided me with a better understanding of the mechanisms through which social relationships hamper and stimulate workplace learning. Dynamic and bidirectional relationships with members of the healthcare team can create learning opportunities with which residents can engage; however, this requires specific awareness and attention from the parties involved. In this sense, this PhD provides the stepping-stones to be used by directors of postgraduate training programmes, supervisors, members of healthcare teams and residents to better orchestrate learning in the clinical workplace. Enabling social relationships to act as catalysts for workplace learning includes two approaches: re-addressing the structure of clinical workplaces and training the involved stakeholders.

Traditionally, clinical supervision has been structured in a way that allows progressive residents' independent practice while decreasing supervisor support according to residents' training level. However, the complexity of the workplace as a learning environment might collide with this overarching aim, as residents face new and challenging tasks even at senior levels. Our findings, for example, point to the importance of encouraging continuous and long-lasting interactions between residents and clinical supervisors. For this continuity to be fruitful regarding resident learning, supervisory interactions need to be dynamic and bidirectional, meaning that clinical supervisors should use an array of teaching methods while engaging with their residents to find the right balance between resident autonomy and support. Programme directors could create opportunities for supervisory interactions in the later stages of training to allow residents and supervisors to interact during their daily activities. For instance, in an anaesthesiology programme, operating room schedules could include supervisory dyads to be assigned to a surgery programme for an entire day. In the case of a surgical programme, senior residents could be paired with supervisors during a case so that the supervisor could act as an assistant during the surgery. This promotes supervisory dyads to try and figure out how to work together as a team and downplays the traditional supervision encounter. In our anaesthesiology department, we have encouraged supervisors to think about their encounters with residents in this particular way, emphasising the need for promoting residents' self-directed learning while formulating new and challenging learning goals. Additionally, we also promote open dialogue between supervisors and residents to negotiate the structure of their encounter and to determine how their interaction could assist them in achieving common goals concerning patient care while nurturing residents' unique learning needs.

In addition to promoting longitudinal and continuous supervisory encounters, programme directors and clinical supervisors should also encourage residents' engagement with the broader healthcare team. Nurses, nurse assistants, pharmacists, therapists and physicians from different disciplines have an enormous influence on residents' learning. The more social relationships residents can consolidate, the more acceptability they will

have and the more learning opportunities they will experience. I frequently advise my residents to engage with all members of every new team they enter while determining those members' roles within the team. This includes introducing themselves to all the members, promoting open dialogue about their work and understanding how that person could nourish their learning agenda.

As we explained earlier, re-structuring the clinical setting configuration to allow for more longitudinal and continuous supervisory encounters is just one step towards optimising workplace learning. For such strategies to succeed, the stakeholders involved (residents, supervisors, members of the healthcare team) should be mindful of how such sustained relationships could assist residents' training. This involves formal training in how residents and the other members of the healthcare team could initiate and orchestrate purposeful interactions during their daily routines. Continuous professional development programmes aimed at the supervisory skills of physicians could be further improved to include other members of the healthcare team and even the resident themselves. Such programmes could emphasise the social dimensions of workplace learning. This includes the teaching methods that could be used based on residents' training level, such as coaching for intermediate residents and reflection for senior ones. It also includes teaching about the way residents and supervisors could adapt to each other to learn how to work together as a dyad and how they can negotiate a proper balance of autonomy and support. The rest of the healthcare team could also consider the ways in which they are integrating new residents into their daily activities, and how this type of participation is helping residents to achieve their own learning goals. Not all residents are interested in full inclusion within the team, which means that some residents are interested in participating in those clinical team activities that are of special interest to their learning trajectories. Our faculty is currently working on a professional development programme for members of the different hospital healthcare teams, using sociocultural learning theories as a framework. We are planning reflection sessions in which members of a given healthcare team think about and discuss their roles within the team and how they are currently assisting residents' training. The tutor will help them understand how their interactions with the residents could be hindering or enabling residents' workplace learning. The sessions will end with specific tasks to be applied to their daily activities to optimise workplace learning, with follow up sessions created to assess and refine such activities.

By improving residency training, we are ultimately improving healthcare. Our results provide innovative starting points to achieve this goal by purposefully exploring the subject from a sociocultural learning vantage point. Along with several scholars from around the globe, we contribute to an on-going dialogue about the complexity of workplace learning in residency learning. Unravelling this complexity could not be attained by relying solely on cognitivist theories of learning but by exploring learning as a social phenomenon. Our thesis might assist new researchers in medical education interested in sociocultural workplace learning approaches in formulating and conducting their own

research. Understanding workplace postgraduate learning as participating and interacting with other members of healthcare teams also opens up new ways of improving residency training. Instead of thinking and focusing on how residents acquire predetermined outcomes, it is essential to realise how members of the healthcare team influence the attainment of these outcomes. Demonstrating the value of using a wider lens when looking at these interactions provides avenues for improving interprofessional collaboration and learning in the workplace.

Acknowledgements

An attentive reader might have noticed that I have used the personal pronoun "we" consistently throughout this thesis. The first reason for doing this is that I intend to convey a sense of researcher agency to the reader. I want to make it clear that we, as a research team, conducted the core studies of this thesis and that we own the responsibility for our findings and conclusions. The second reason, and perhaps the most important one, is my desire for the reader to understand that this thesis is the result of a joint effort between my research team and me. It would be inconsequential to say the opposite, as I have claimed throughout this thesis that I understand learning from a sociocultural vantage point. I see my PhD learning trajectory as a joint trajectory traced with my supervisors and collaborators in which we have attained collective achievements, such as providing new knowledge to an ongoing conversation on workplace learning in medical education. Consequently, 'we' seems to be a more suitable personal pronoun to use. Using 'I' or depersonalising the sentences would negate the fact that I could not have done this work without their collaboration.

In accordance with that line of thinking, I would first and foremost like to thank my dear supervisory team. Diana, you believed in me, even when I did not believe in myself. I cherished all of your advice and your pragmatism when we faced difficulties over these four years. Moving forward with and finishing this project is my way of respecting the time you dedicated to me and to repay your efforts. Pim, you have served me as a role model as the type of researcher I will like to become. Your clear mind and insightful criticism took my analytical stances to another whole new level. I deeply admire your professionalism and patience. Renée, you introduced me to this fantastic research world. You have given me the strength to keep going and surpass any problem, even from afar. I love you as a friend but treasure you as a coach. You have pushed me to be the best version of myself. Do not forget that much of what I am right now is because of you.

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Biography

A couple of years ago, I read a childhood friend's excerpt on his LinkedIn profile. He explained to the reader how changing jobs on his professional journey determined the type of person he was. He described himself as a biologist, a chemist, and even a blogger. He described himself as having a combination of identities that have shaped who he was at that moment and what he could offer as an employee. I remember how his description rubric resonated so much me that I used it too in all my CVs. True qualitative researchers are always reflective about who they are and where they are in relation to their research. Therefore, it seems only fair to provide some more detailed insight into my professional journey, which is why I decided to distance myself from the traditional CV presentation and present my biography instead.

Being reflective about my professional journey boils down to a simple question: who am I? I can argue that I am a husband, a son, a brother, a friend, an athlete, a gamer and a writer. I can also say that I am a physician, an anaesthetist, a clinical teacher, an educationalist, and now, I am becoming a researcher.

I was trained as a general physician at Pontificia Universidad Javeriana. Happily, my training included a mandatory clerkship in Anaesthesiology, where I started to trace an inbound trajectory within that community, starting at the periphery, in that precious moment when I successfully intubated a patient for the first time, to the centre, when I finally became a specialist. Earning my general physician diploma with high honours helped me find quickly a position as an anaesthesiology resident and allowed me to continue my professional journey.

Soon after finishing residency training, I was appointed as an attending in Hospital Universitario San Ignacio, where I automatically became a clinical supervisor since the hospital was an academic centre. That implies that my job included attending tasks but also teaching responsibilities. I have had contact with students at all levels of training since then, from undergraduate students to residency trainers. At this point, I have spent almost 20 years in the same hospital and university.

A year after I was appointed attending, I decided to enrol in the Master's in Health Professions Education at Maastricht University to become an educationalist. I made that decision because it was clear to me that I did not want to pursue further training as a fellow in anaesthesiology, there were few people with formal training in medical education in my local context, and more importantly, because it is a subject that ignites a real passion in me. I love being an academic and clinical teacher. During this period, I was also appointed as coordinator of the undergraduate and internship anaesthesiology clerkships, where I had opportunities to refine and apply my skills as an educationalist.

It should not come as a surprise then that workplace learning became my favourite subject during my Master's training. I also had the fantastic opportunity to find the right mentors who introduced me to qualitative research methods. This combination of factors pushed me to enter the PhD programme in the School of Health Professions Education at Maastricht University almost 4 years ago. This thesis marks the ending of this last professional stage and the most precious achievement of my professional career