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BY
TINE LASS KLITGAARD

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AALBORG UNIVERSITY
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Dissertation submitted

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CV

Tine Lass Klitgaard graduated as an anthropologist from Aarhus University in 2014. Her master thesis focused on junior doctors' professional identity development. Since then, most her of work has been related to development and research within health care. Tine assisted a PhD student in an ethnographic fieldwork at a paediatric department concerned with workplace learning, in which she participated in the fieldwork, helped analysing data and co-authored a scientific paper. Furthermore, Tine has experience with developing and evaluating health care offers from a preventive health care project in Randers, "Tjek dit Helbred" which was a cooperation between the Randers Municipality, the general practitioners, and Aarhus University.

Tine has been employed by the Department of Postgraduate Medical Education at Aalborg University Hospital since 2016. Aalborg University Hospital initiated the project due to concerns about the work and learning environment among the youngest doctors at the hospital. The study unites Tine's interest and experiences within ethnographic research and participatory developments.

ENGLISH SUMMARY

The transition from medical school to working clinically as a doctor is known to be both challenging and overwhelming. Newly graduated doctors (NGD) enter a complex and busy hospital setting, where learning takes place in a context often dictated by a high workflow. This means that even though the learning process of becoming a doctor is a legitimate purpose, there is often not sufficient time to support the NGDs in this transition. Consequently, the NGDs risk high levels of burnout, sick leaves, delayed entry to specialties, and career breaks-out from clinical medicine. The health care system requires and is dependent on competent doctors, and since doctors' well-being influences their performance in general, deficits in this domain can potentially affect the health care system at large. This PhD thesis aims to explore how an ethnographic and participatory research design can be used to generate new knowledge of the NGDs' work and learning environment to develop and implement initiatives to support the NGDs in their first months of practice. The thesis consists of two studies: one exploratory, and one interventional.

Study 1 was an exploration of the first month of work as an NGD, including how the NGDs experience this period and how the hospital organisation and collaboration with colleagues influenced their experiences. For this purpose, an ethnographic fieldwork was conducted at Aalborg University Hospital including 135 hours of observations and 6 interviews (both groups and individual) with the NGDs. Their first months of work were characterised by an overwhelming feeling of responsibility, lack of local knowhow, insufficient sense of time, and highly complex collaborations. The theoretical framework of *Cultural-historical activity theory* was applied, and this abled the identification of several key components within the hospital organisation which all influence the NGDs' experiences. These included physically remote placements of work, missing overlap between new and experienced NGDs, limited time for the introduction period, and affiliation of the NGDs with several departments. The study showed that collaborators should be devoted more attention, and that factors within the hospital organisation may negatively affect the NGDs' experiences in their first months of practice.

In Study 2, we designed a CL process to develop initiative to support the NGDs during their first month of work. The CL process consisted of six sessions and included both NGDs, junior doctors coordinating postgraduate medical education, and consultants responsible for postgraduate medical education across 8 medical departments, including the A&E, at Aalborg University Hospital. The results from Study 1 were used to inform the CL process, which allowed for a mutual understanding of the challenges across and between the involved departments. The process resulted in the development of two concrete initiatives that were also implemented into practice: *a NGD introduction day* and a *monthly NGD forum.*

Together, the two studies offer a comprehensive perspective on the NGDs' first months of practice and provided an example of how to work with and actively include relevant stakeholder in a participatory process. By taking the local context into account and engaging the participating doctors across departments and seniority levels, we in collaboration with the participating doctors succeeded in developing and implementing initiatives to support the NGDs during their first months of practice.

The results of this project represent a powerful demonstration of how to use qualitative research to change practice. The combination of ethnographic fieldwork and a CL intervention process can be a method for working with challenges across departments and seniority levels in future studies across several healthcare disciplines working within the field of workplace learning.

DANSK RESUME

Transitionen fra medicinstudiet til arbejdet som læge er kendt for at være både udfordrende og overvældende. Den nyuddannet klinisk basisuddannelses læges (KBU) arbejde foregår i en travl og kompleks hverdag på hospitalet, hvor det ofte er det høje arbejdstempo, der sætter dagsordenen. Det betyder, at selvom KBU-lægen er under uddannelse er der ikke nødvendigvis tid til at støtte KBU-lægen i transitionen. Konsekvensen heraf er, at der er risiko for udbrændthed, øget sygefravær og orlov fra virket blandt KBU-lægerne. Sundhedsvæsnet både kræver og er afhængig af kompetente læger, og da lægernes velbefindende påvirker deres performance, kan mistrivslen potentielt få konsekvenser for kvaliteten af den behandling patienterne møder. Denne ph.d.-afhandling har til formål at diskutere hvordan et etnografisk og participatorisk design kan bruges til at udvikle viden om KBU-lægernes uddannelses- og arbejdsmiljø samt udvikle og implementere initiativer til at støtte dem i de første måneder som nyuddannet. Ph.d.-projektet består af to studier: Et eksplorativt studie, og et interventionsstudie.

Studie 1 var et eksplorativt studie af de første måneder som KBU-læge, der både fokuserede på, hvordan KBU-lægerne oplevede perioden og hvordan organiseringen af deres arbejde og samarbejdet med kollegaerne påvirkede deres oplevelser. Studiet omfattede et etnografisk feltarbejde på AAUH bestående af 135 timers observationer og 6 interviews med KBU-læger (både gruppe- og enkeltinterviews). De første måneder var karakteriseret ved en overvældende følelse af et pludseligt ansvar, en mangel på lokal viden, en manglende fornemmelse for tid og et komplekst samarbejde med kollegaer. For at udforske organisationens betydning, blev teorien *Cultural-historical activity theory* (CHAT) anvendt, og gennem den var det muligt at identificere faktorer der har afgørende betydning for KBU-lægens oplevelser. Dette inkluderede blandt andet KBU-lægens fysisk afskårne placering, et manglende overlap mellem nye og afgående KBU-læger, begrænset tid til introduktion, og KBU-lægens tilknytning til flere afdelinger. Studiets resultater peger på, at KBU-lægens samarbejde med kollegaer bør få mere opmærksomhed, og at faktorer inden for hospitals-organisationen kan have en negativ indvirkning på KBU-lægens oplevelser af deres første måneder som læge.

I Studie 2 omfattede en Change Laboratory (CL) interventions proces for at udvikle konkrete initiativer for at støtte KBU-lægerne i deres første måneder som nyuddannede. CL processen bestod af seks sessioner, hvor både KBU, uddannelses-koordinerende yngre læger og uddannelsesansvarlige overlæger på tværs af otte medicinske afdelinger på AAUH deltog. Resultaterne fra Studie 1 dannede udgangspunkt for CL processen og blev inddraget for at skabe en fælles forståelse for de udfordringer, KBU-lægerne møder på tværs af og mellem afdelingerne. Processen resulterede i udviklingen og implementeringen af to initiativer: En KBU-

Introduktionsdag og et månedligt KBU-forum. Begge initiativer blev løbende tilpasset, og i den sidste session, blev initiativerne evalueret positivt.

Tilsammen udgør de to studier et omfattende perspektiv på KBU-lægernes første måneder som nyuddannede læger, og præsenterer et eksempel på hvordan det er muligt at arbejde med og aktivt involvere relevante interessenter i en participatorisk proces for at optimere KBU-lægernes uddannelses- og arbejdsmiljø. Projektet understreger vigtigheden af at tage den lokale kontekst i betragtning når praksisser skal udvikles samtidig med at der skabes rammer for at etablere et fællesskab – både for KBU-lægerne, men også for de uddannelsesansvarlige læger så de fortsat har mulighed for at udvikle uddannelsesmiljøet på afdelingerne.

Resultaterne fra projektet repræsenterer en tydelig demonstration af hvordan kvalitativ forskning kan bruges til at skabe forandringer i praksis. Kombinationen af det etnografiske feltarbejde og CL interventionsprocessen er en yderst anvendelig metode til at arbejde med udfordringer i organisationer, der rækker ud over de enkelte afdelinger, og hvor daglige krydspunkter ikke eksisterer.

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Also, I want to thank the JDEs (UKYL) and CREs (UAO) for participating in Study 2. Despite of your heavy workload, I always experienced a strong commitment and a great involvement in my project. Both in the developing phase in the sessions, and afterwards when the initiatives were to be implemented. Without your support, this project could not have been completed.

Over the last years, I have learned a lot – a lot of it thanks to my amazing team of supervisors, who with their diverse backgrounds have all helped and supported me along the way. I wish to thank my main supervisor, Susanne Nøhr. Your commitment to me and the project has been indisputable. You introduced me to the field of medical education and research and shared your great dedication and experiences with me. Thank you for believing in the project and me and for keeping me on track, when I got "lost" in the data. Thank you for your competent feedback and for many valuable moments during this research.

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During my work on this project, I have benefitted from being a part of the small, albeit still important, Department of Postgraduate Medical Education at Aalborg University Hospital. Lotte Hoelgaard quickly became both my colleague and friend. Thank you for answering my many "stupid" questions about PGME, for the many pages of English proof-reading, listening to my endless considerations about my project, tons of coffee breaks, and good laughs. Sofie Gjessing assisted the CL process in Study 2. Thank you for committing yourself to my project in such a fantastic manner. You are a highly gifted researcher and you definitely helped improving the CL process.

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Tine Lass Klitgaard
November 2021, Aalborg

LIST OF PUBLICATIONS

1) Klitgaard, T.L., Stentoft, D., Skipper, M., Grønkjær, M. and Nøhr, S.. (2021) 'Struggling to fit the white coat and the role of contextual factors within a hospital organisation - an ethnographic study on the first months as newly graduated doctors', *BMC Medical Education*, 21(1), p. 74. doi: 10.1186/s12909-021-02493-2.

2) Klitgaard, T.L., Stentoft, D., Johansson, N., Grønkjær, M. and Nøhr, S. 'Collaborators as a key to survival: An ethnographic study on newly graduated doctors' collaboration with colleagues'. Manuscript in preparation for submission to *BMC Medical Education*, expected December 2021

3) Klitgaard, T.L., Gjessing, S., Skipper, M. and Nøhr, S. 'Becoming a doctor – The potential of a Change Laboratory intervention'. Manuscript submitted for publication to Medical Education, November 2021

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ABBREVIATIONS AND DEFINITIONS

NGD	Newly graduated doctors. When I use “first months of practice”, I refer to the NGDs’ first six month of their foundation year, which take place at a hospital
PGME	Postgraduate medical education
CRE	Consultant responsible for postgraduate medical education. Each department is required to appoint a CRE. In collaboration with the head of the department, the CRE has the overall responsibility for the specialist training
JDE	Junior doctors coordinating postgraduate medical education. The management of the departments can appoint a junior doctor as JDE, who assists the CRE in relation to PGME
RN	Registered nurse
A&E	Accident and Emergency department
CHAT	Cultural-historical activity theory. The theory applied in Study 1
CL	Change Laboratory. An intervention model used in Study 2

1. INTRODUCTION

> However, I do believe the first shock came on my first day. I completely shut down. I couldn't grasp the concept of having the responsibility. […] For me it was truly brutal coming from studying and then to real life. And the first shift I had … just to carry the phone (stretches out her shaking hands), I was just like that (Jacob giggles), I was really shaking and nervous and then it goes off, and it's a potential meningitis, and I need to head to the A&E, **I don't even know how to find it**! … and then **I call my attending** and say: 'it's a potential meningitis'. 'Well then you need to do a lumbar puncture'. And I had seen it once before, it didn't go well, and **then I had to be there by myself** (David growls: hmmm) Well I was so nervous, and then the world collapsed, because **the patients just kept piling in** and that … I ended with completely breaking down and crying in the A&E (Maria, Group interview)

This quote is from an interview during my PhD project where a group of newly graduated doctors (NGD) discussed their experience of the first months of work. Maria's description gives us as readers an insight into some of the challenges NGDs face during their first months of work and how the organisation of their work influences their experiences (highlighted). This PhD thesis aims to explore how an ethnographic and participatory research design can be used to generate new knowledge of the NGDs' work and learning environment and to develop and implement initiatives to support the NGDs in their first months of practice.

The project had its origin in 2015, at a meeting of the Post Graduate Education Committee at Aalborg University Hospital. Members of faculty, especially senior doctors, raised concerns about the work and learning environment and the wellbeing of the youngest doctors. They described great challenges among the NGDs, which led to notifications of illness and difficulties in retaining and recruiting staff. In response to these descriptions, the committee sent a notice to the extended management of the hospital, and the members of the committee found a need to investigate the NGDs' work and learning environment in order to be able to act on their concerns. Accordingly, the medical coordinator of postgraduate medical education initiated the project.

The descriptions and concerns raised at the committee meeting were not unique to NGDs at Aalborg University Hospital but echoed a general challenge in medical education: the transition from medical school to the clinical work is known (both in public and in research) to be overwhelming, challenging and stressful. As described below, studies report how this leads to burnout and sick leaves, delayed entry to into specialties and career breaks out of medicine [1]. This challenge is not only important in order to ensure well-being among NGDs, but also because excellent postgraduate medical education is paramount in ensuring doctors are competent, and thus providing

the highest quality of care for the patients. Research emphasises that when working with and developing medical education, it is important not only to put focus on *how* but also on *where* the doctors practice and learn [2]. Thus, when exploring NGDs' first months of work, there is a need for an understanding of organisational factors and the environment in which their learning and clinical practice is embedded.

However, an exploration of NGDs' first months of work, including a focus on its context, is not necessarily synonymous with making changes to support the NGDs. How to secure changes in practice on the basis of the research? Research states that a practical understanding of the real world context is important [3,4], but it is also crucial to involve the practitioners if interventions are to be successful [3,5,6].

On the basis of these considerations, I raise two research questions, which are presented below.

1.1. AIM AND RESEARCH QUESTIONS

The overall aim of this PhD project was to explore the NGDs' work and learning environment and the use of a participatory research design to develop and implement initiatives to support the NGDs during their first months of practice.

The research questions addressed in the PhD project are:

- How do NGDs experience their first months of work, and how do the hospital organisation and the collaboration with colleagues seem to influence this? (Paper I and II)
- How can a Change Laboratory intervention process be used to develop initiatives to support the NGDs during their first months of practice? (Paper III)

The project started with ethnographic fieldwork focussed on how the NGDs experience their first months of practice, and how the hospital organisation and collaboration with colleagues seem to influence this (Study 1, Papers I and II). This knowledge was used in Study 2, in which we designed a Change Laboratory intervention process aimed at developing concrete initiatives to support the NGDs (Study 2, Paper III). Thus, the thesis is methodologically and theoretically positioned at the intersection of ethnography, medical education, and organisational development. I hope it will be addressed with this in mind.

1.2. OUTLINE OF THE THESIS

The thesis builds on three papers. Paper I is published (Appendix A), Paper II is in preparation (Appendix B), and Paper III is submitted (Appendix C0). Qualitative research is always situated in context, which is why *thick description* [7] is necessary so the reader too can grasp the whole picture [8]. However, the papers were written out of an ambition to get involved in and add to the field of medical education, and this was done best by targeting journals in this field. In this thesis, I have the opportunity to expand the descriptions of both the methods used and the empirical and analytical fields relevant to my work. Chapter 1 introduces the reader to the thesis and present the research questions. Chapter 2 both presents the background on the process of becoming a doctor and highlights the existing research on the first months of practice. Chapter 3 introduces the guiding philosophy behind the research, addresses reflexivity, and presents the studies and the theoretical framework. Chapter 4 presents the setting, methods, and results of Study 1. Chapter 5 shows the connection between Study 1 and Study 2. Chapter 6 presents Study 2: the theoretical framework of the Change laboratory intervention model, the planning of the sessions, and the results. Chapter 7 provides a discussion of the findings across the two studies and of the applied methods. Finally, chapter 8 concludes and describes future perspectives.

2. BACKGROUND

In this chapter, I will first provide background information on postgraduate medical education in Denmark, to give the outside reader insight into the formal framework of such education, including the organisation behind it. Afterwards, I will outline the state of the art concerning the NGDs' first months of work and research on the same topic with a participatory approach. Also, the theoretical framework chosen for this thesis will be presented in the following.

2.1. POSTGRADUATE MEDICAL EDUCATION

Standing with the diploma from medical school in hand, newly graduated doctors (NGDs) enter the postgraduate medical education. This is described as a decisive phase in the doctors' careers: it both focus on learning the doctors the independent practice of medicine and at the same time plays an important role in shaping the new doctors' habit, behaviours, attitudes and values [9] where their fortitude to work in their new profession is tested [10]. All of this takes place in a complex clinical setting where work or service is a prerequisite for learning. As the Danish Health Authority describes the overall aim of the one-year foundation year (FY) program:

> Told in a different way; it is about being a doctor, making "the white coat fit" […] The doctor must acquire the ability to learn at a workplace where the number one priority considerations for the patients (my translation) [11].

NGDs learn primarily from situations encountered in their clinical work, where they have to balance the demands, needs and expectations for delivering clinical service and the need for learning and achieving competences [12]. This balance is often challenged as an important premise of workplace learning is that it is situated in a setting which is primarily designed for practice [13] and in which the most important learning is informal [12]. Informal learning is often defined as forms of knowledge and skills that are learned from contexts not intended for learning [14,15], while formal learning often takes place in an organised framework and is defined as a process of internalising generalised concepts [15].

In Denmark, NGDs are required to undergo a one-year foundation year (FY) program before they receive their authorisation to work independently as medical doctors and begin their specialist training (see Figure 1 for an overview over medical education in Denmark). For many doctors, this is their first employment in a clinical setting. The FY frames the NGDs' transition from the university to the clinical work, and the overall purpose is for them to *learn to be doctors* by applying their medical skills in a clinical setting [16]. On one hand, the NGDs are expected to carry on the experiences

and routines for acquiring theoretical knowledge they learned in medical school, and on the other hand, they are expected to make considered clinical decisions even though the basis for these decisions might be insufficient [11,17].

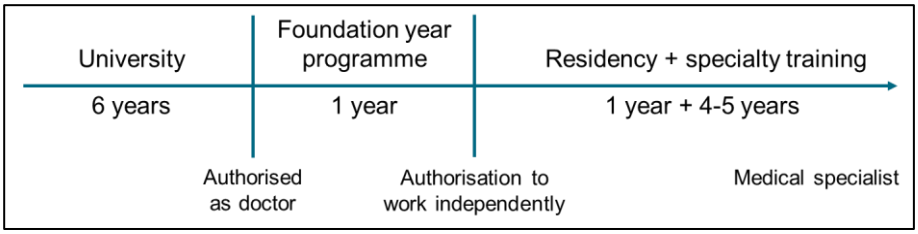

Figure 1. Overview of medical education in Denmark (adapted from the Danish Health Authority) [17]

The FY comprises two six-month rotations: the first at the hospital, to develop competences in acute illness and those associated therewith, and the second in general practice is primarily concerned with developing competences in chronic illness. In this study, the focus is on the first six months of the foundation year.

The organisation of postgraduate medical education (PGME) is complex, and involves many stakeholders [18]. The Danish Council on Postgraduate Medical Education is the overall advisory body on postgraduate medical education in Denmark [19], and advises the Danish Health Authority. The Danish Health Authority formulates national regulations and guidelines which frame the education (KBU målbeskrivelse), describe the purpose of it and outline what competences the NGDs must gain. The regional management of postgraduate medical education is handled by a regional council (there are three in Denmark). At most of the hospitals, the medical coordinator(s) of postgraduate medical education, together with the medical director, has the overall responsibility for PGME. The Post Graduate Education Committee (described in the introduction) is a forum across departments, aiming to develop PGME at the hospital. The committee refers to the medical director. Each department is required to appoint a consultant responsible for PGME (CRE). In collaboration with the head of the department, the CRE has the overall responsibility for the specialist training, which includes promoting a positive educational climate and ensuring the quality of specialist training [18,20]. The management of the departments can appoint a junior doctor as the junior doctor responsible for postgraduate education (JDE), who assists the CRE in relation to PGME [21]. The CRE develops the educational programmes that describe the PGME in the various departments and how the junior doctors obtain the required competences [19].

2.2. RESEARCH ON THE FIRST MONTHS OF PRACTICE

In order to provide an overview of the topic and the existing literature, I initially performed a systematic literature search in collaboration with a librarian at the Medical Library in Aalborg University Hospital. The search covered Web of Science, PubMed and Embase. I used PICo to identify relevant literature, and combined relevant search terms such as 'newly graduated doctor', 'transition', 'first month of practice', 'experience', 'interprofessional collaboration', 'clinical environment', 'hospital organisation' and 'postgraduate medical education'. I repeated the literature search during the project, and I received weekly updates from selected journals in order to find newly published studies. Furthermore, I conducted additional literature searches concerning the use of the Change Laboratory intervention method in study 2, where I added search terms such as 'change laboratory', 'action research', 'intervention', 'participatory research' and 'organisational development'.

It quickly became evident that the transition from medical student to newly graduated doctor (NGD) has received much national and international attention. The period is described as an important experience during which the NGDs learn about responsibilities, tasks and risks [22–25]. However, studies also report the NGDs find the transition overwhelming and stressful [10,23,25–36], and burnout levels indicate that they may be facing bigger challenges than they can handle [30,36–38]. A Danish investigation from 2021 shows how one out of five junior doctors score pathologically anxious [39]. Various factors have been identified as contributing to the NGDs' feelings of stress and burnout. This includes challenges in decision-making [40,41], a high levels of responsibility [23,26,30,41–44], a heavy workload [26,42–44] and a lack of support [10,26]. A well-known challenge of learning in the clinical environment is the fact that it takes place in a setting which is primarily organised for work. The NGDs are therefore not only learning and developing their new role as a doctors, they are also employees who are expected to provide high levels of patient-safe care [45,46]. On one hand, literature has highlighted advantages within this constellation: Lessons learnt within a workplace setting is often very useful for those involved in the learning process, as it will be implemented in similar settings as they were learned [47]; the knowledge is of more situated and contextualised character [48] and the workplace can contribute to the development of a professional identity [49,50]. On the other hand, research has shown there are also challenges: Education is secondary as workplaces are primarily organised for practice [51,52]; learning can go unnoticed and be non-formalised [53], which can make it hard to plan; and even though it is referred as 'education' the NGDs are expected to contribute to the workforce within the first few weeks [37,54]. In any case, within the concept 'workplace learning' lies a responsibility on the part of the hospital organisation to focus on how to plan the work and learning environment in order to take both patient safety and learning into account [55].

When working with and developing medical education, there is a need to develop a wider focus on and an understanding of organisational factors and the context in which clinical practice is embedded [2,4,19,45,56–59]. In doing so, a theoretical framework which extends the individualistic theories of learning and instead offers a systematic analysis of the interactions and a visualisation of the complexity is needed, as the hospital contains interactions between and among both patients and professionals. For this purpose, I oriented myself towards socio-cultural theories where experiences and learning are considered as located in social milieus rather than the heads of individuals [9]. Two main perspectives are prominent: *situated learning* and *activity theory*. The *situated learning* theory was developed by Lave and Wenger [48], and states that learning cannot be separated from the workplace, as it happens through participation in a *community of practice*, and is thus *situated*. They describe a community of practice as a relation between a group of participants. Knowledge is in the relations, and thus the acquisition of it happens by participating in social practice. The term *legitimate peripheral participation*, meanwhile, describes the process by which novices become members of the community of practice [48]. Communities of practice theory was developed mainly as a heuristic tool to explore and understand learning outside the formal structures of educational institutions, and might therefore neglect or underestimate the influence of the surrounding organisation [60]. *Cultural-historical activity theory* (CHAT) was developed by Engeström [61], and is an analytical framework through which to describe and explore a complex activity system. An example of such a system would be the hospital as a workplace, including the employees and the organisation. CHAT stipulates that learning is collective, social, and situated in participation in practice, and that the relationship between 'subjects' and 'objects' is mediated by 'tools', 'rules', 'community' and 'division of labour'. These six interconnected components are depicted as a triangular activity system model. I chose CHAT as my analytical framework, as it can render visible the complexity of organisations by identifying the components, the relationship between them, and contradictions within the activity. Through CHAT, it will be possible to systematic explore how different components within the hospital organisation influence the NGDs' experience and how these are interrelated. Lately, there has been an increasing interest in activity theory within medical education research [62–64], and CHAT has previously proven helpful in exploring medical education in complex hospital settings [41,55]. CHAT will be described in detail under section 4.1.4.

2.3. CHANGING PRACTICE

In both under- and postgraduate medical education, educational leaders and faculty have been working on minimising the highlighted challenges when NGDs enter the workforce from medical school. A recently published review [65] describes how PGME programs lately have begun exploring resilience-based interventions as a consequence of the "burnout epidemic". This review aims to synthesise the available

research evidence on the efficacy of such efforts and conclude the need of initiatives to overcome systemic challenges in the clinical work to curve physician burnout and foster well-being. Focusing more broadly, interventions range from curricular development on the medical school side to structural changes and problem-solving interventions on the postgraduate side [29]. In a review, Teunissen et al. [23] state that most interventions appear to lead to an increase in confidence and performance among junior doctors.

However, many of the studies on the transition often stop at the descriptive stage, and the problems observed are recorded but often not (to the best of my knowledge) used to facilitate change. Numerous researchers generate considered recommendations based on research (e.g. Locke et al. [66], but these are not implemented initiatives and thus illustrates the long-term challenge in uniting research and practice [4,67]. How to ensure changes in practice on the basis of the research? Eve et al. [4] state that without a practical understanding of the real world context in which clinical practice is embedded, the degree of change that can be achieved will always be marginal. Kajamaa et al. [3] suggest that the immersion of the researcher in the practice environment can reduce the gap between research and practice through qualitative studies in a local context. Furthermore, the literature states it is crucial to involve practitioners when developing initiatives that aims to change practice [3,5,6]

Many theories and methods concerned with problem-solving interventions have evolved from Kurt Lewin's work and his approach to action research in which he advocates for stakeholders to combine research and development [68]. We chose to design a Change Laboratory (CL) intervention process in order to develop concrete initiatives to support the NGDs during their first months of work. CL is an intervention method introduced by Engeström and colleagues in the 1990s [69]. CL aims to support *expansive learning* in which the research team works together with practitioners in order to analyse existing practices in depth and create new ways of working within their organisation [5,69]. CL builds on CHAT, which is the theoretical framework in Study 1 and this accentuation on different components involved in an activity, makes it possible to search for the underlying systemic structure of the core source of problems in the activity [5]. An important part of CL is to involve practitioners in order to question the existing practices, and to envisage new work activities within the organisation [5,69,70]. This brings the redesigning of work activities closer to the 'daily shop floor practice' [71], which is necessarily to facilitate changes [4]. The fact that CL builds on the theoretical framework of Study 1 made it an obvious next step in the process. Lastly, has CL previously proven successful in medical education [63,72]. CL will be described in detail in section 6.1.

3. RESEARCH AND REFLEXIVITY

The choice of design in any research should be determined by the problem, aim and research question [73]. In this section, methodological choices are described and explained. The section consists of 1) a description of the guiding philosophy behind the research; 2) the research design, including aim, participants and methods (study 1 and study 2); and 3) Reflexivity on my own position as researcher

3.1. THE GUIDING PHILOSOPHY BEHIND THE RESEARCH

The philosophical underpinnings are found in a pragmatic position. There are many forms of pragmatism, and in the following I will briefly introduce the most central ideas, including their relevance for this thesis.

Pragmatism originated in the United States around 1870, and was initiated by Charles Peirce, William James and John Dewey. One of pragmatism's fundamental theses is that practice is primary, and that the interactions between the human and the environment constitute the foundation of knowledge. According to Dewey, inquiry transforms a problematic situation into a defined situation one can master. Thus, the first step is to search out the constituents of the problematic situation so as 'to find out what the problem or problems are […] is to be well along in inquiry' [74]. Pragmatism became a method to continually ask questions about the world by engaging oneself in it and becoming aware of the results of one's acts. Theories should help us conceptualise empirical data rather than empirical data serving as anecdotes to illustrate the theories' correctness [75,76]. The value of theories and the choice of them are determined by their real-life potential and ability to solve problems [76,77]. In practice, researchers using this worldview will often use different theories and perspectives at the same time based on how well those work in solving problems. Furthermore, they will focus on the practical implications of the research, and will emphasise the importance of conducting research that best addresses the research problem [78].

Since pragmatism focuses on real-world problems, it demands that anthropologists consider a question: Which sort of problems should we be working with? According to Whyte: "[…] we should set about defining problems, which are – or should be – someone's problems" (my translation) [76]. The starting point of my project was the challenges – or problems – faced by the NGDs when transitioning from medical school to clinical practice, which led to notifications of illness and difficulties in retaining and recruiting staff. However, the challenges faced are not only a problem for the individual doctors, but potentially also the whole health care system, as it depends on competent doctors who can treat patients as efficiently as possible.

Furthermore, the aim of the project was not to 'settle for' thick descriptions, but to be useful. In order to make changes, knowledge of the problem was imperative, and therefore I used different theories, methods and perspectives [76,78]. The focus on 'real' problems, the need to understand them, and the aim of addressing them underpin the appropriateness of pragmatism to this thesis.

3.2. PRESENTATION OF THE TWO STUDIES

This section will not present the methods and theories in depth – these are found later in the thesis.

This PhD study is divided into two studies:

- Study 1: An ethnographic fieldwork
- Study 2: A Change Laboratory intervention study

Study 1 is an exploration of the first month of work as an NGD, with a specific focus on how the hospital organisation and collaboration with colleagues seem to influence this. To explore this, I designed an ethnographic fieldwork in which I observed and interviewed NGDs during their first months of work. By choosing ethnography as a method, I was allowed both to explore how the NGDs experienced their work and what they thought of it retrospectively (interviews), and also to explore their practices, surroundings and taken-for-grantedness in the situation (observations). In the fieldwork, I found a high level of organisational complexity and many interactions across departments, professions and seniority, and I therefore needed a theoretical framework that offered a systematic analysis of the interactions and a visualisation of the complexity. I therefore chose Cultural Historical Activity Theory (CHAT) as an analytical lens [61]. It is important to note that CHAT was not used as a deductive framework in the fieldwork and did not inform the data generation. I used it in the analytical process as a conceptual tool to render visible the complexity of the hospital organisation by identifying factors and tensions in the organisation. CHAT will be described in detail in section 4.1.4.

In **Study 2**, I designed a Change Laboratory (CL) intervention process in order to develop concrete initiatives to support the NGDs during their first months of practice. The process consisted of 6 CL sessions in which NGDs, JDEs and CREs participated across 8 departments. The results from Study 1 formed the foundation for Study 2, and this knowledge ensured that the CL process focussed on current and essential challenges. The results from Study 1, provided me with thorough knowledge about the NGDs' experiences and the hospital organisation enabled me to discuss and interact with the practitioners in the process [5].

In Table 1, an overview of aims, participants and methods are presented.

Table 1. Overview of studies

	Study 1	**Study 2**
Project aim	To explore the NGDs' work and learning environment and the use of a participatory research design to develop and implement initiatives to support the NGDs during their first months of practice.	
Study aim	To explore how newly graduated doctors experience their first months of work and how the hospital organisation and collaboration with colleagues seem to influence this	To explore how a Change Laboratory intervention process can be used to develop and implement initiatives to support the NGDs in their first months of work
Methods	Ethnographic fieldwork including observations and interviews	Sessions with doctors from medical departments and A&E
Theoretical framework	Thematic analysis and CHAT	CHAT and the Change Laboratory intervention model
Participants	NGDs	NGDs, JDEs and CREs
Data generation	Fieldnotes, transcripts from interviews and policy papers	Work sheets and transcriptions recordings from sessions

3.1. REFLEXIVITY

> *The seen is always dependent on the seer, and this fundamental factor calls for reflection in itself* [79].

Reflexivity is (or should be) a characteristic of qualitative research, and is about the interaction of the researcher with the research and the participants [79]. A central premise of qualitative research is that researchers, as humans studying other human lives, are inevitably and inextricably implicated in what they study [80]. Therefore, it is crucial for the researcher to be explicit about their own role in the research [8,81].

Being an anthropologist in the medical landscape put me at first in a position of being an 'outsider' [81]. I knew basically nothing about diseases, examinations, medicine, etc., and the medical vocabulary was strange to me. However, due to my master's thesis about junior doctors' professional identity development, I was not completely unaware of the organisation of the medical education and NGDs' experiences of the transition from medical school to the clinical work. Furthermore, I am married to a doctor who, at the time of my fieldwork, had gone through his FY only a few years prior, so I was also exposed to the topic privately through him and our social sphere. So even though I might be positioned as an 'outsider' to the field, I still have both professional and private experiences of it. Another aspect which is relevant to highlight is the fact that the research was done in collaboration with the medical coordinator of postgraduate medical education who, together with the medical director, is the one overall responsible for the PGME at the hospital. Furthermore, the fieldwork was planned with and accepted by the management of the departments. This potentially put me in a special position among the NGDs: Was I a representative of the management?

Halloway [8] highlights how the researcher should address how one's assumptions do not unduly influence the ways data are collected or analysed. Throughout the fieldwork, I assured them anonymity, and I carefully explained my presence and that the aim of the research was not to evaluate the doctors' competences, but to describe and explore their everyday work. During the days of observations, I often shared my reflections, aiming to demystify my presence and build trust. Furthermore, I had a close collaboration with my supervisors throughout the project. These supervisors had different backgrounds and experiences included medical doctors, a registered nurse and an individual with an MA in English and International Relations. Several of them had experience with higher education and learning processes. All of them provided perspectives on the project and challenged me on the methods, data generation, analysis and results. Lastly, I kept a reflective diary to make the ongoing self-reflexive practice explicit. The diary contained personal experiences and reflections about the possible influence I had on the data.

4. STUDY 1 – EXPLORATION

This chapter describes the method used in Study 1. The results are presented in Papers I and II. This chapter supplements the papers by presenting the many thoughts, considerations, and choices behind. The aim of Study 1 was to explore how newly graduated doctors (NGD) experience their first months of work, and how the hospital organisation and the collaboration with colleagues seems to influence these (Papers I and II).

4.1. METHODS

4.1.1. ETHNOGRAPHIC FIELDWORK

I designed an ethnographic fieldwork study to explore and describe the NGDs work and learning environment. The task of ethnography is to understand the perspectives, practices and social lives of the people being studied in their own settings by sharing the everyday lives of those people [79,81–84]. Ethnographic fieldwork is "a form of inquiry in which one immerses oneself personally in the ongoing social activities […] for the purpose of research" [85].

The methods used were participant observations and interviews. We chose to conduct observations as they make it possible to experience peoples' everyday lives and to uncover the 'taken-for-grantedness' [79] of them by:

> […] participating, overtly or covertly, in people's daily lives for an extended period of time, watching what happens, listening to what is said, and/or asking questions through informal and formal interviews, collecting documents and artefacts – in fact, gathering whatever data are available to throw light on the issues that are the emerging focus of inquiry [82]

Participant observations aim to explore social life as it unfolds, including what people feel, what they do and their reasons for doing it, in the context of their daily lives [81]. Despite its popularity, it is not agreed what 'participant observation' exactly entails, and every research needs to adjust the use of both participation and observation [86].

In ethnography, interviewing, listening, and observing are all continuous activities [81]. However, to gain insight into the NGDs' perception of their work, I also conducted interviews. The interview is a social situation in which the researcher and the participants create reflections and interpretations together [81,87]. Through these interviews, I got to know the participants and got insight into their experiences, and everyday lives.

4.1.2. SETTING AND PARTICIPANTS

The study was conducted[1] at Aalborg University Hospital, which is the largest hospital in the North Denmark Region, servicing a population base of approximately 300.000 inhabitants. The hospital is responsible for a wide range of highly specialised functions, both within the region and in Denmark as a whole. Approximately 70 NGDs are employed at the hospital annually.

Since 2013, the Accident and Emergency Department (A&E) has been the common entry to Aalborg University Hospital and is responsible for the initial assessment and treatment of most acute patients admitted. It has several subsections (including a level I trauma centre) and two wards (AMA I and AMA II). Patients with specific illnesses are attended to by the relevant medical specialists; however, many patients are brought in without any referral and admitted via the prehospital emergency system ('1-1-2 patients'). Annually, 21,000 acutely ill patients are admitted via the emergency department. The A&E is divided into an emergency section where mainly acutely ill orthopaedic patients are handled and a medical section focusing on medically ill patient (including patients from the abdominal surgical department). Thus, the doctors working in the A&E tend to many different categories of patients. During the day, it is the A&E-NGDs who attend the '1-1-2 patients', but during evenings and nights, the management is shared by the A&E's and the other medical departments' doctors. This formal work-community spanning the A&E and medical departments became the setting (and the limitation) for this project.

Participants in this study were NGDs in the first six months of their foundation year program and employed either in the A&E or in one of the medical departments. Even though NGDs share the task of attending to patients in the A&E, there are several important differences in their assignments, which is why I will present them separately. The number of NGDs employed in the given departments depends on the number of graduated students, the distribution between specialties, leaves of absence, etc. Before the implementation of the A&E as a separate department (FAM) in 2013 during a national health care reform [88], all NGDs were employed directly at the different medical or surgical departments. Thus, more NGDs were employed at the medical/surgical departments before the reform.

There are typically between 1 and 3 NGDs employed simultaneously in each of the medical departments. They are affiliated with their own departments, where they participate in conferences, meetings, medical education, etc. Besides ward rounds and outpatient clinics, one of the NGDs' tasks is to be on call for day or evening/night shifts. The NGD on call is primarily responsible for seeing acute and elective patients within their own department's medical specialty, but also to care for a broad range of

[1] The following descriptions of Aalborg University Hospital and the NGDs' work and learning environment reflect how they were organised during the fieldwork.

unselected acute medical patients in the A&E. On call, the NGDs take care of many ad-hoc tasks in the departments, but also take part in several team tasks. For example, they are part of the in-house cardiac arrest team. During evenings, nights and weekends/holidays, there is a formal work community spanning the medical departments. This entail that the NGDs cover a minimum of two medical departments besides the acutely admitted patients in the A&E. For instance, an NGD in the department of nephrology will also be responsible for attending to patients admitted to the departments of endocrinology, rheumatology, geriatrics, and the A&E after dayshifts. When they are in need of supervision concerning patients in the A&E, there is a senior doctor/resident present, but when they are in need of supervision in one of the medical departments, the senior doctor/resident is on call (usually at home). The A&E and the medical departments are located at opposite ends of the hospital, resulting in the NGDs needing to cover substantial walking distances between them.

In the A&E, there are typically between 8 and 14 NGDs employed at the same time. During the daytime, the NGDs primarily do ward rounds in the wards of the A&E (AMA I and AMA II), and attend to the acutely admitted patients in the medical part of the A&E. These wards are located on three different floors in the same building. During the nights, the A&E NGDs take over from the NGDs in the abdominal surgical department, and also see all acutely referred patients within this specialty. Thus, during night shifts, the A&E-NGDs spend most of their time in the A&E. Like the NGDs at the medical departments, the A&E NGDs are part of the in-house cardiac arrest team which covers all departments at the hospital.

All NGDs go through formalised introductions to their specific departments (typically 1-5 days), to the hospital in general (2 days), and to the hospital's IT systems (1 day). Furthermore, they have to pass a 2-day course on handling and treating acutely ill patients (the first part of a mandatory 'acute course' about acute treatments, communication etc.), which is typically scheduled in the first 14 days of their employment, before they can do nightshifts.

4.1.3. DATA GENERATION

Access to the field

To gain access to the field, I cooperated with the medical coordinator of postgraduate medical education at the hospital. The coordinator conveyed the contact to the consultants responsible for medical education (CRE) in each of the medical departments. The departments received written information about the project and were asked to forward this to all the doctors. Additionally, the departments were offered an opportunity to invite me to a morning conference for more information, which 3 departments did. The CREs forwarded work plans (or sent me the name of the person in charge) and they helped informing new NGDs about the project.

Acceptance by and collaboration with the management were necessary, but not enough, as the NGDs themselves were gate-keepers of their own lives [79,89]. I needed to negotiate access with the NGDs throughout the fieldwork, as my participation depended on their consent and their willingness to participate [90]. This highlighted the importance of creating a relationship of trust between me as a researcher and the participating NGDs [81,83].

Following the NGDs

A total of 135 h of participant observation was carried out from June 2016 to March 2017. Based on the working plans of NGDs, I planned a schedule to cover as many departments and functions as possible. I typically showed up before the morning conference and made arrangements to follow someone. I chose participants on the basis of availability (residents on duty on observation days) and I attempted to balance gender, medical school, department of employment and prior clinical experiences. I planned the observations at different times of the day and week. When including new NGDs, I clarified that the aim of the research was not to evaluate the doctors' competences, but to describe and explore their everyday work. Despite being explicit about the purpose of the research, I found it was not always clear to the doctors. For example, one of the doctors presented the project and me at a meeting, saying 'it is about something like communication and stuff like that' and a NGD on a day of observation commented that she was 'not sure what to tell me' and what I 'would get out of it'. These comments often became an opening to discuss the project, aims and methods with the participants, and reminded me to be explicit about my research and reasons for being present.

During the fieldwork, I followed the NGDs and observed them in their everyday work and practices: at conferences, in patient examinations, when conferring with collaborators about patients, on coffee breaks, etc. I observed how shakily they answered the telephone and beeper the first times, how they carefully examined patients and how they dictated patient histories. I tried to keep up with them as they hurried to find a doctor when in need of help or when they rushed to a cardiac arrest at the other end of the hospital. When interacting with staff and patients, I remained in the background and to patients, I either introduced myself or was introduced by the NGDs, typically very briefly as 'one observing our work'. However, tagging along was not only an opportunity to observe and listen, but also to engage in informal conversations [91]. Through these, I could casually ask questions about situations observed, and I experienced how the NGDs used the opportunity to share their reflections with me.

During the observations, I wore a doctor's uniform – white trousers, a dark blue t-shirt and a white coat – both for hygienic reasons and in order to blend in and not make too much 'noise'. Wearing the uniform had its advantages: I suddenly had access to the

medical space at the hospital and I did not cause a stir: I became a part of the group visually. When I tagged along with the NGDs, I entered an already existing role as a medical student. Doctors, other health care professionals and patients were followed by medical students, and thus it was natural to fall into this role. This natural way of blending in raised ethical considerations, which will be discussed in section 4.1.5.

In ethnographic fieldwork, the acquisition of knowledge is dependent on the relation between the researcher and the people constituting the field of investigation [79]. People do not necessarily act naturally to a passive observer, which is why it is crucial trying to participate and establish trust [83,92]. In the fieldwork, I therefore attempted to both participate and contribute (e.g. by passing papers and Dictaphones or getting coffee) and to convey a desire to be part of the field. Comments like "now, I really hope this is anonymous" and "it has been cosy" to have me "tagging along" illustrated how the NGDs appeared to accept my presence.

Ethnographic record

The majority of ethnographic records consists of written fieldnotes [83]. During the fieldwork, I always kept a small notebook in my white coat, in which I continuously wrote down my observations and informal conversations. Often, the scratch-notes were written in the moment or immediately afterwards, e.g. when the NGD was dictating or prescribing medicine. The note writing somehow felt easy, as the NGDs themselves did the same thing: they also kept notebooks in their pocket, and when attending to patients or consulting collaborators, they wrote down information too. In this way, I did not experience the note writing as drawing much attention to me. However, to demystify my writing and the research, I sometimes left the notebook open, such as when I was getting coffee. After each day of fieldwork, I immediately filled in details in a document at the computer, and the scratch notes served as useful reminders for this purpose.

In the beginning of the fieldwork, I made what Spradley calls *descriptive observations* with detailed notes, trying to get an overview of the field [83]. This meant that I tried to record as much as possible with general questions in mind, e.g. 'what is going on here?', 'how do they act?' and 'what do they say?' [83]. This included descriptions of the physical surroundings, the (NGDs' use of) artefacts, and who they interacted with. I also drew a map of the location. However, writing fieldnotes is necessarily selective: one simply cannot observe and write down everything [81,83]. Note-writing is a result of selective observation, and thus becomes an interpretation [81,93]. This is why repeated descriptions are so important: through them, it become possible to see patterns in the complexity of social situations [83]. And this was what I did: I wrote and I wrote, describing recurrent activities over and over again.

However, my fieldnotes did not only contains descriptions of the things observed. On each page, I reserved a column for making reflective notes, both about initial analytical considerations and about my personal reflections and experiences of doing the research. These cues for reflections were elaborated in my logbook, which contained personal experiences, ideas, confusions, and frustrations alongside with a description of the progress of the project, decisions made and plans for the fieldwork. This recording became important when I needed to recall the process.

Semi-structured interviews – groups and individual

Three months into my fieldwork, I began to conduct semi-structured interviews with the NGDs: in total four group and two individual interviews (n=21). As I aimed to explore both how the NGDs experienced their first months of practice and how the hospital organisation seemed to influence this, I chose group interviews as my primary interview method, as in these interviews, 'people are encouraged to talk to one another: ask questions, exchange anecdotes and comment on each other's experiences and points of view' [94]. Through group interviews, it is possible to explore various perspectives and different nuances, and discover conflicting ideas [81]. Depending on the author, the terms *focus groups* and *group interviews* are both used to describe interviews with more than two informants. Morgan [95] takes an inclusive approach when defining focus groups as 'a research technique that collects data through group interaction on a topic determined by the researcher'. O'Reilly [81] distinguishes the two terms clearly: a focus group is typically a group of between 4 and 12 people, often strangers to each other, who are selected because of their relation to the topic. The interview is conducted in unfamiliar settings. A group interview, on the other hand, includes any number of participants. The participants are likely to be a naturally occurring group who know each other beforehand and have a relation to the topic because they are already a part of the context of the ethnographic research. The group interview is usually conducted in a familiar setting. Following this clear definition, I use the term 'group interview' when writing about the interviews, even though I refer to literature that uses the term 'focus group'.

For practical reasons, two individual interviews were conducted as well. These were with NGDs who could not participate in the group interviews, but who showed an interest in contributing. Choices within ethnographic research should always be theoretically informed, but may have to be made on the basis of practical limitations [81]. Group and individual interviews are two very different methods, and typically generate different types of knowledge. Group interviews aim to generate discussions and bring in many different experiences, whereas individual interviews typically aim to get depth and details on the topics [81,87]. I chose to use (almost) the same interview guide, with the same themes and questions, in both the group and individual interviews. Despite the different settings, I observed several similarities and patterns across the different interviews. The group discussions were detailed, and participants

shared very personal stories from their first months of practice, e.g., stories of them crying because of challenging situations at work. In the same way, NGDs in the individual interviews described challenges and advantages with their divisions of labour, and qualified their own descriptions by saying, 'I heard that it is organised completely differently in the xx department'. Even though I did not design the study with individual interviews, they had a positive effect, and the two NGDs got the opportunity to contribute, as they expressed a wish to do.

When planning the interviews, I compared all the working schedules across departments, trying to find the day when as many NGDs as possible could participate. During the fieldwork, I asked both the NGDs and CREs about the most suitable time of the day to conduct interviews. There was some discrepancy, but they agreed the interviews should be held during working hours. After deciding the date, I sent out information about both the project and the upcoming interviews to NGDs, CREs, and JDEs.

All the interviews (both groups and individual) were conducted at the hospital, lasted between 1 and 2 hours, and were audio-recorded. The interview guide was based on themes, and the questions were open-ended (Appendix D). The themes were developed on the basis of both my knowledge from policy papers and my observations, such as those about NGDs' collaborations with colleagues and the division of labour. Examples from the observations were included to get the NGDs to relate to the themes. In the initial framing of the interview, I introduced the NGDs to the setting of the group interview. As a moderator, I presented themes they should discuss with each other, and in the guide I had formulated concrete questions if it became necessary with further input. The interview themes included experiences with the transition, collaborators, the learning environment, and the organisation of their work. Throughout the interviews, I summed up the NGDs' discussions about the themes in order to give them an opportunity to reflect on what had been said and elaborate on their discussions. I experienced how the NGDs both supported and challenged each other, debating the themes and at the same time gathering the threads across the themes.

See Table 2 for an overview of the participating doctors in both observations and interviews.

Table 2. Overview over the participating doctors

	Gender	Observation	Group interview	Individuel interview
NGD1	F	x	x	
NGD2	F	x	x	
NGD3	M	x	x	
NGD4	M	x		
NGD5	F	x		x
NGD6	M		x	
NGD7	F		x	
NGD8	F		x	
NGD9	M	x	x	
NGD10	M		x	
NGD11	F	x	x	
NGD12	F		x	
NGD13	F		x	
NGD14	F		x	
NGD15	F		x	
NGD16	F		x	
NGD17	F		x	
NGD18	F	x	x	
NGD19	M	x		
NGD20	F		x	
NGD21	M		x	
NGD22	M		x	
NGD 24	F	x		
NGD 25	F	x		x

4.1.4. ANALYSIS

In ethnography, analysis is an ongoing process [80,81,83], and is what Wadel calls a 'circular dance' between theory, method and data [93]. In this case, the 'ordering' of the material began at the start of the fieldwork, when I, in my scratch notes, made recordings of analytical reflections and possible points to pay attention to. During the fieldwork, I continuously read and reread the field notes and transcripts to familiarise myself with the data. All material (field notes and interview transcriptions) was coded using the software programme NVivo.

Anthropologist Lou [96] breaks with the common description in qualitative literature that themes 'emerge' from the data, as if something magical happens if we just look hard enough. Lou argues instead that such emergence happens in a process of decision-making where some ideas and themes are further pursued, and others are dismissed. With inspiration from the thematic analysis [97] and through NVivo, I coded the data systematically. The first round of coding was an open coding ('free nodes' in NVivo), when the first days of observations were coded. New perspectives or themes continually made me create new codes. This created a list of different codes with hierarchical levels ('parent' and 'child' notes in NVivo). After I coded these observations, I read the codes, restructured, and further developed them in order to secure adequate ones. This process was continued with the rest of the field notes, as I created new codes on new perspectives. I reviewed and continuously discussed passages from the materiel with my main supervisor. After we selected the codes to be included in the final coding ('coding tree'), I recoded the documents. I discussed the themes and findings with all my supervisors.

Besides this inductive coding, I also coded more deductively. In the fieldwork, I found a high level of organisational complexity and many interactions across departments, professions and seniority, and I therefore also read the data with a *selective attention* [98]. I used the Cultural Historical Activity Theory (CHAT) as an analytical lens in this reading [61]. In section 2.2, I describe my arguments for choosing CHAT as my theoretical framework.

CHAT has its roots in Soviet cultural psychology (among others Vygotsky, Leont'ev and Luria) and has been developed through three theoretical generations [61]. The theory stipulates that learning is collective, social, and situated in participation in practice. The first generation centred around Vygotsky (in the 1920s) and his attempts to overcome the dualism between stimulus and respons by introducing mediating tools and signs between the individual and its surroundings [99]. This idea is illustrated in his famous triangular model expressing the triad of subject, object and mediating artefact. The second generation was largely inspired by Leont'ev, who abandoned the first generation's insistence on the individual as the unit of analysis. Leont'ev differentiated between a collective *activity*, an individual *action* and operations, and turned the focus to complex interactions between the individual subject and the surrounding community [100,101]. It was in the second generation that the notions of

rules, community and division of labour were introduced, and Engeström expanded the triangular model to an activity system (see Figure 2) [61]. The *object* of an activity is defined as the aim that motivates the participants' actions, and the object is what distinguishes one activity from another. The *subject* is the acting individual or group (e.g. NGD). *Tools or artefacts* can be material items or symbolic artefacts (e.g. language) which mediate the activity, and through this enable the subject to achieve the outcome. Human activity always takes place within a *community*. It is a group of individuals who share an involvement in the same object. *Rules* are implicit and explicit regulations, norms and conventions. Finally, the component *division of labour* is the division of tasks between members of the community - a horizontal division of tasks and a vertical division of power [102]. A key concept of CHAT is *contradiction* which denotes a 'tension' between opposing elements within an activity. These tensions are experienced as dilemmas or conflicts, and in an attempt to overcome these, people change their activity system and thus expansive learning occurs. Therefore, contradictions should not be seen as problems, but instead opportunities for development [61]. Contradictions can both occur *within* and *between* elements of an activity system and *between different* activity systems (third generation) [5,70].

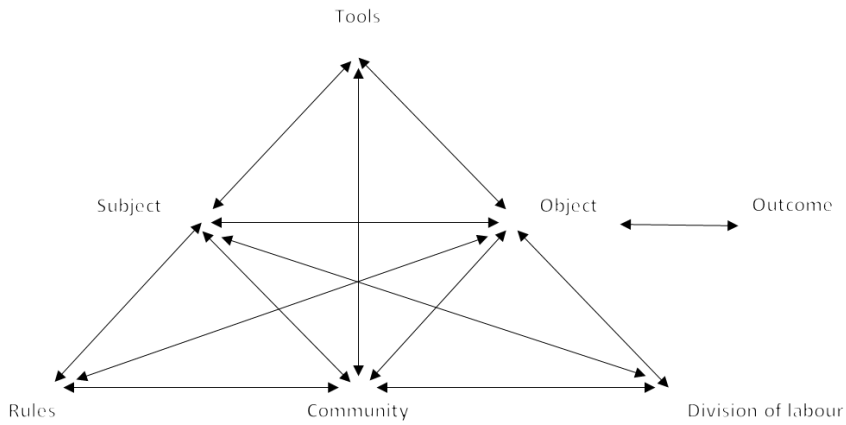

Figure 2. Activity system model. Adapted from Engeström [61].

However, the basic model of the second generation (Figure 2) could not engage with the complexities found within and between institutions, and thus a **third generation** developed. Within the new model, the basic model is expanded to include a minimum of two activity systems, and the focus is on how these interact with each other with overlapping, but never completely engulfing objects [61].

Central to an activity is the subject (e.g. the NGD) attempting to bring about change (the object, e.g. skills) in order to reach a goal (the outcome, e.g. becoming a doctor). In this study, the theory enabled us to identify different, but interrelated aspects within the hospital organisation [103].

4.1.5. ETHICS

The Regional Ethics Committee of the North Denmark Region ruled that no formal ethics approval was required for this study (2016–000615). However, the study was still planned in accordance with the EU General Data Protection Regulation. When I followed new NGDs and at the beginning of each interview, the participating NGDs were asked to sign a consent form signifying their agreement to participate and to have their data used. They were informed about their right to withdraw from further research at any time. All quotes, written materials and identifying information were fully anonymised.

Within ethnography, there is an agreement that ethical considerations are embedded in all aspects of the research, from deciding on topics, generating data and handling it afterwards [104]. As Madden put it, 'at every phase of ethnographic research there is an ethical backdrop' [105]. Thus, the American Anthropology Association's code of ethics [106] was followed both in the design and throughout the fieldwork. Even though these guidelines at first seem obvious and intuitive to follow, ethical dilemmas can quickly arise during the fieldwork [107]. As mentioned in section 0, the natural way of blending in as a medical student, and thus my position as ethnographer, were not always apparent. This raised issues concerning ethical considerations and an important balance within ethnography: on the one hand, the researchers aims to be open about and explain their research, but on the other hand they hope that the participants will forget about them being there and act naturally [81]. In this case, it was not my intention to work 'under cover'. In the beginning of my fieldwork and when entering new departments, I presented the project and myself at morning conferences, I hung up written notices in the break rooms, I had email correspondence with the heads of departments and principal nurses, and I wore a name badge with the status 'anthropologist'. However, I was still confronted as if I was 'one of them'. For example, when staff asked me questions as if I was a doctor (showing the way or asking for results, patient's journals etc.) or when I was finding my way to the break room alone (e.g., when an NGD needed to go to the toilet), I felt uneasy. The many medical questions made it obvious that the NGDs' collaborators were not always aware of my presence and that it was impossible to inform everyone (and make them remember) when the NGDs worked across several departments and interacted with many collaborators on every shift. This is why anonymisation of both participants and departments and the confidentiality of all data gathered were crucial.

When the NGDs interacted with patients, I either introduced myself or was introduced by the NGDs, typically very briefly as 'one observing our work'. Often the patients in the A&E were acutely ill, and after discussing it with both my supervisors and management of the A&E, we agreed that that setting was not appropriate for a thorough introduction. However, if patients or relatives asked, I clarified and explained the purpose of my presence. When NGDs interacted with patients, I remained in the background.

Being an anthropologist in the medical landscape put me in the position of being an 'outsider' [81]. When health care professionals do qualitative research within their own fields, they sometimes experience ethical challenges concerning their wish to be researchers and their responsibilities as health care professional, e.g. intervening when concerns about patient safety are raised [19,108,109]. While I did not experience dilemmas like these, I experienced how I – when new NGDs arriving the departments – became a person with knowledge about the hospital and location of both equipment and departments, such as which shortcuts to use when rushing to a cardiac arrest.

4.2. FINDINGS

Detailed descriptions and quotes from the fieldwork are presented in Papers I and II.

4.2.1. THE NGDS' EXPERIENCES

We found that the NGDs experience their first months of practice as an important learning period, but one with a very steep learning curve. They describe the transition as 'stressful', 'like turning on a dime', 'truly brutal', 'overwhelming' and 'pure survival'. In the analysis, we presented the results in four main themes: responsibility, local know how, time management and collaborators (see Figure 3). The findings presented below are a summary of Paper I [103].

Figure 3. The NGDs' struggles, adapted from Paper II

Responsibility describes how the NGDs were overwhelmed by the sudden feeling of responsibility. This was especially the case when the NGDs were assigned patients they did not feel capable of handling. Throughout medical school, the NGDs were taught about potential consequences when making mistakes, and this made them fearful of forgetting something and doubting whether they were doing their jobs well enough. The feeling of responsibility also made them experience difficulties and uncertainty in decision-making. In the interviews, the NGDs described how they had difficulties making decisions, and in the fieldwork, I observed how the NGDs often consulted other doctors with their plans 'just to be absolutely sure'. The NGDs expressed how there was a huge difference between making the plans and realising them.

Local know how describes how the NGDs were struggling with local knowhow as a prerequisite for their work, and how that affected their pace of work, as everything took extra time. It quickly became evident, that knowledge about local procedures and the facilities was crucial, and the NGDs expressed frustrations about not holding this key yet, as it prevented them from doing their work as doctors, such as when they used lots of time figuring out the computer systems, ordering tests, etc.

Time management describes how the NGDs felt a shortage of time. Their work was characterised by a heavy workload with many interruptions, which caused stressful situations and a feeling of often being behind. This sometimes made them call for help more quickly, and the NGDs expressed concerns about how this occurred at the expense of possible learning situations, as they did not feel they had enough time to investigate and reflect on it themselves. In general, the NGDs struggled with time management and they described how the time felt 'fluffy' to them. Firstly, the NGDs expressed how they as newcomers lacked a sense of time. Everything was new, and thus time flew. Secondly, when unfamiliar with the tasks, patients and local knowhow, the NGDs had difficulties in estimating how long the tasks were supposed to take.

Collaborators describes the collaboration between the NGDs and their colleagues (both doctors and registered nurses). The NGDs were dependent on their collaborators when struggling to fit their white coats. The collaborators often knew the procedures, patients and 'how thing are normally done around here', and thus the NGDs sought them out when in need of help. However, the same collaborators could be a challenge. Although patient care was the overriding objective for all staff, different agendas and priorities appeared when demands on patient flow and a high work pace challenged the NGDs.

4.2.2. CONTEXTUAL FACTORS WITHIN THE HOSPITAL ORGANISATION

In the second round of the analysis, we employed CHAT as a theoretical framework to point to contextual factors within the hospital organisation and help us clarify how various elements of the activity system caused changes in the others, as well as how the challenges this created could be addressed. In Paper I, we link the contextual factors directly to the NGDs' struggles to show the connection between them. See Table 3 for details.

These factors were highly intertwined and influenced by each other, and the contextual factors sometimes influenced various themes. For example, the division of labour meant the NGDs covered several departments at the same time. This affected their time management, as there were often several patients waiting in different departments, and this, in turn, generated repeated calls from collaborators with little knowledge of when the doctor might return. Thereby, it also affected their collaborations with colleagues who were the staff in the departments. Furthermore, each department had its own staff, rules, and expectations, and the NGDs had to navigate these depending on which department was represented. It is important to note that our presentation of contextual factors in Paper I is not thorough. There were other components that also had an impact on the NGDs' experiences and their first months of practice. See Figure 4.

Table 3. Struggles experiences by the NGDs and contextual factors [103]

Struggles	**Newly Graduated Doctors' experiences (Observed and expressed)**	**Contextual factors (Conceptualised by components of CHAT)**
Responsibility	Overwhelmed by the sudden feeling of responsibility Fearful of (potential) consequences Difficulties and uncertainty in decision-making	Worsened when the NGDs worked physically remote from other doctors (division of labour) The NGDs are by law not the ones responsible for the final decisions (rules)
Local knowhow	Local knowhow as a prerequisite for the NGDs' work Insufficient local knowhow affected the NGDs' pace of work	The introduction period was time limited (rules), but with information overload (tools) Often there was no overlap between newcomers and more experienced NGDs (rules)
Time management	Lacking a sense of time made prioritising tasks difficult A heavy workload generated stressful situations and missed learning opportunities (reflections) Many interruptions	The NGDs often covered several departments at the same time (division of labour) Guidelines caused numerous interruptions (rules)
Collaborators	Collaborators were crucial during the first months and were addressed differently Collaborators could be challenging	The NGDs had many different departments and collaborators with various perspectives to relate to (division of labour) The NGDs worked in the frontline, physically remote from their departments (division of labour)

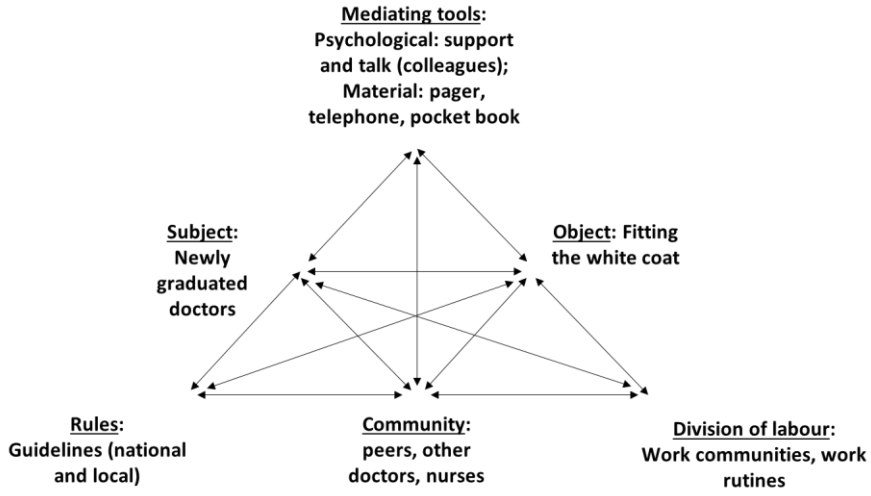

Figure 4. A model of an activity system, adapted from Engeström [61]

4.2.3. COLLABORATORS

In our analysis, we found collaborators were essential when the NGDs were struggling to fit their white coats [103]. Thus, we decided to consider them in more depth by exploring what characterised the NGDs' collaborations, and which strategies the NGDs used when they were striving to establish and maintain those collaborators. The details are presented in Paper II, and I will only outline them briefly here. It is important to note that this analysis is a sequel to Paper I, in which I re-analysed the data with a specific focus on the NGDs' collaborations.

During the fieldwork, it became evident how the NGDs consulted their collaborators depending on the challenges they were facing. They used their peer NGDs as a 'safe haven' where uncertainty and 'stupid questions' were shared and accepted. The registered nurses (RN) were primarily consulted about local know-how, and a common phrase addressed by the NGDs was *how do you usually do this?*. Senior doctors were addressed in decision-making for example concerning diagnostics, further treatments, admission or discharging. Finally, junior doctors were addressed concerning decision-making and local know-how (see Figure 5). The different collaborators fulfil different needs of the NGDs, thus the NGDs' access to these collaborators was very important.

Figure 5. The newly graduated doctors' collaborators. From Paper II.

Furthermore, we found the NGDs actively committed themselves to establishing and maintaining good relationships with their collaborators. They used different strategies in this endeavour: 1) displaying competence; 2) appearing humble; and 3) 'playing the game'. These three strategies all show how the NGDs inferred the behaviour that they expected would be most efficient when they needed help from their collaborators. In some situations, the NGDs were absorbed with displaying competence and not being a burden to their colleagues. In other situations, they used the opposite strategy by appearing humble in order to reduce the risk of conflicts and legitimise their need for help. This need for alternating strategies and performances was an additional stressor for the NGDs on top of the already known challenges of being an NGD (e.g. attending to acutely ill patients, the feeling of sudden responsibility, decision making, and lack of local know-how). In Paper III, we highlight how it is necessary to rethink the way the NGDs are introduced to their work and learning as new doctors. Including an emphasis on the importance of different collaborators, the opportunity to meet

future collaborators and discuss different work agendas and mutual expectations. This could be one way to ensuring a respectful interprofessional culture and a better learning environment.

5. FROM STUDY 1 TO STUDY 2

Study 1 gave me thorough knowledge of how the NGDs experienced their first months of practice and how those were organised. This knowledge was important for several reasons. First, the knowledge ensured that the upcoming Change Laboratory (CL) intervention process (Study 2) focused on current essential problems [5], as throughout the fieldwork, we were able to point to several factors that caused challenges to the NGDs. Secondly, the data and results from Study 1 served as a collective background intended to orient the participants toward central challenges of the doctors' current work activity. Finally, Study 1 also meant that I got to know the field – and the field got to know me. The fieldwork gave me as a researcher an important insight into the NGDs' work and learning environment and the hospital organisation. This both enabled me to refine and challenge perspectives and enter into discussions with the doctors during the CL process. At the same time, my engagement in the field during the fieldwork established trust and goodwill, which was important to make the doctors engage in the project as co-researchers.

5.1. INTERVIEWING THE COLLABORATORS

Before initiating Study 2, we needed more knowledge about the NGDs' work and education environment, including the planning of PGME and historical, cultural, and developmental aspects of the organisation. Therefore, I conducted two group interviews: one with registered nurses (RN) from the A&E (n=4) and one with CREs from the medical departments and the A&E (n=5). Besides giving me concrete knowledge, the interviews also informed me as a researcher about potential conflicts within the organisation. This choice to generate more data based on an actual need lay well within my pragmatist position.

The CREs were included as they are the ones responsible for the NGDs' learning environment, and as the management's support is crucial when conducting a CL process [5], I invited CREs to a group interview to get knowledge of their perspectives on the NGDs' first months of practice. The RNs were included as we knew from Study 1 that they were often the NGDs' closest collaborators, but also how it was not an easy constellation, as opposing agendas and different priorities existed [103]. Therefore, we were curious about the organisation of their work and their perspectives on the NGDs' first months of practice.

In both interviews, I asked about their experiences with collaborating with the NGDs, their organisation of work (in relation to their work with the NGDS), and if there had been developments/changes which had, in their view, led to the current situation. I included questions about things from the fieldwork I was wondering about such as the

many phone calls from the RNs to the NGDs and the establishment of the formal work-community spanning the A&E and medical departments.

The transcripts of the interviews were read and systematically searched for themes. Across the two interviews, there was an agreement that the collaborations across professions, departments and seniority levels were based on all professionals' ability to work as a team – it was described as a community based on interdependence. Both RNs and CREs could see how the NGDs were struggling during the first months of practice, both in managing the many new work procedures when many factors were unknown and in making decisions on an incomplete foundation. Both RNs and CREs expressed that they felt sorry for the NGDs.

During the interviews, the RNs recognised and confessed that the many patients waiting and heavy workload would sometimes generate a tense atmosphere in the A&E, leading to extra pressure on the NGDs – a pressure which some of the NGDs were unable to cope with. However, even though the RNs expressed that they felt sorry for the NGDs and their situation, the RNs did not see it as their responsibility:

> I've said this EVERY TIME […]: 'You must go back in your own ranks because… we have our own leader whom we consult with our own problems… we cannot do it for you' (Kate, RN).

Kate explained how the RNs were busy taking care of 'their own' (new nurses), and they saw it as a challenge which should be handled within the doctors' profession. In the interview with the RNs, I also gained knowledge about their work procedures, and how this affected their collaboration with the NGDs. For example, they were told about guidelines stating that they must always call a doctor when patients arrive (and that the NGDs experience this as stressful), and that the RNs had a 'green notice' with questions, to be filled out when they were admitting patients (and the doctors experienced this as an interrogation).

The CREs described how they initiated different initiatives to meet the NGDs when challenged, e.g. debriefing after night shift. One department introduced an extra day dedicated to training in cardiac arrest management after one NGD had a 'bad experience'. This highlighted how the learning environment was organised differently across departments, and during the interviews, the CREs discussed their way of doing it and why. In the interview with the CREs, it appeared that an organisational change had had a crucial impact on the NGDs' work and learning environment. With the implementation of the A&E as a separate department (FAM) in Aalborg, in 2013, the allocation of NGDs were changed. A number of NGDs were relocated, leaving fewer doctors in the medical departments. As a compensation, the extent of the tasks required from the medical departments was reduced, but they are still required to attend to some of the patients in the A&E. The medical CREs explicitly expressed frustration that their NGDs find it very difficult to navigate a system where they are

unfamiliar with the A&E and the doctors working there. This discussion triggered a tension between the CREs as they did not agree on if the allocation of tasks were distributed in a fair way.

The knowledge from these two group interviews informed our planning and conducting of the CL process. For example, the discussions among the CREs made me aware that the division of groups in the sessions should be planned carefully such that representatives from the individual departments were in different groups. This would enable more perspectives to be nuanced during the group discussions.

6. STUDY 2 – INTERVENTION

This chapter reflects on Study 2, which is described in Paper III. The aim of this study was to explore how a Change Laboratory intervention process can be used to develop concrete initiatives to support the NGDs during their first months of practice. This presentation supplements the paper by elaborating on the method and describing the sessions in more detail.

6.1. THE CHANGE LABORATORY

Change laboratory (CL) is an intervention method introduced by Engeström and colleagues in the 1990s [69]. CL aims to support *expansive learning* in which the research team works together with practitioners in order to analyse existing practices in depth and create new ways of working within their organisation [5,69].

CL builds on the theoretical framework of CHAT (described in Study 1), which makes it possible to 'grasp the systemic hole' in the analysis [70]. CHAT and its key concepts (including activity, activity system, contradiction, and expansive learning) are described in Study 1 (see section 4.1.4).

Furthermore, CL builds on Vygotsky's method of *double stimulation*, in which two stimuli are presented to the subject or participants [69]. *The first stimulus* is presented by the researcher to the practitioners as a *mirror* of the current activity, and particularly of problematic situations in their current work activities. The first stimulus is crucial, as it aims to construct a shared point of departure and a consciousness of problems that need to be solved. At the outset of the intervention, the participants might already have their own motives for developing the activity, but these are typically defined from the individual perspective, and the participants might have different ideas of what the problems are and how to solve them [110]. Therefore, one of the first steps is to create a common understanding and an agreement of the current problem of the activity which is done through the mirror. The mirror can include documents, observations, transcripts of interviews, etc. [5,70]. According to Vygotsky, the task facing – the problem with the current activity – cannot be solved with existing skills. Therefore, a second stimulus is presented [99]. *The second stimulus* is a tool or artefact introduced by the researcher, e.g. a model of the activity system [69]. The practitioners can use this tool as an instrument for analysing the mirror data and for finding contradictions that produce the problems the practitioners encounter in their daily work [5]. The principle of double stimulation is to orient practitioners towards central challenges and enable them to work with an apparently solution-less situations to create solutions through the use of tools [111].

The CL process is often depicted in a cycle and includes several sessions. An expansive learning process proceeds from questioning and charting the existing practice to analysing it, then to modelling, concretising, and implementing a new solution. The cycle ends with reflecting on the process and generalising the new practice [5,69]. Even though the method is relatively prescriptive, offering concrete tools and steps to follow, it requires taking local circumstances into account. Figure 6 shows our CL process.

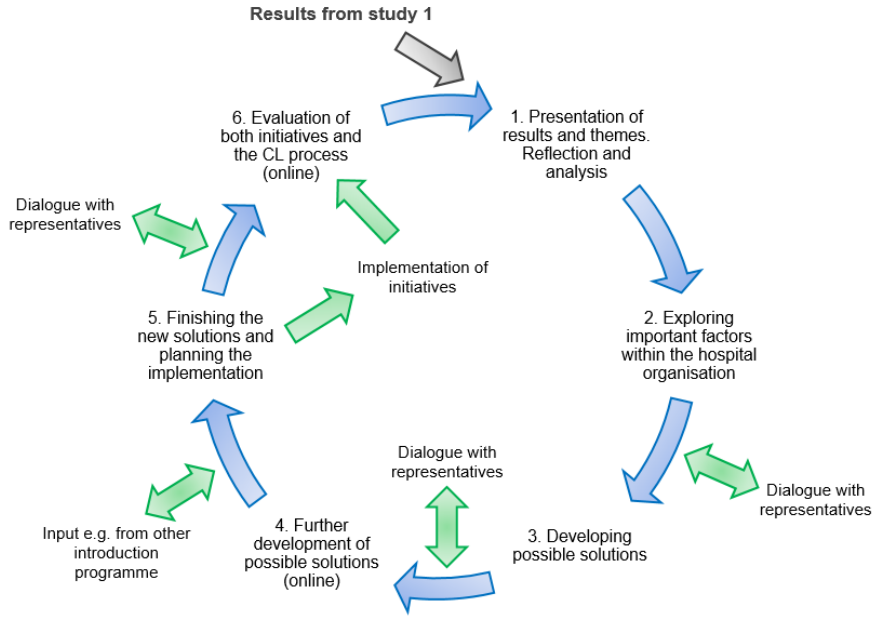

Figure 6. Our Change Laboratory sessions as a process of expansive learning, adapted from Engeström [61]

6.2. SETTING

6.2.1. PLANNING AND CONDUCTING THE SESSIONS

Our study was conducted across 8 medical departments, including the A&E, at Aalborg University Hospital. We chose these departments as there was a formal work community across these departments, which we found to be important for the NGDs' challenges. They were also representative of the setting of Study 1 [103]. The participants were NGDs, junior doctors coordinating postgraduate education (JDEs) and consultants responsible for postgraduate medical education (CRE). Initially, we sent information about the project and the upcoming process to the departments' CREs, who forwarded the information to the relevant doctors.

We conducted 6 CL sessions from January 2020 to April 2021. The number of participants at the sessions oscillated between 14 and 22 doctors. On average, 18 doctors participated in each session. Although we asked the doctors to participate in all sessions, this was not always possible due to shifts, conferences, seminars, holidays, etc. Furthermore, the process spanned the NGDs' assignments, which meant new participants were introduced. To keep consistency and to introduce new participants to the process, written material and summaries from each session were always sent to the participants. From Study 1, we knew it would be hard gathering doctors across departments and seniority levels, as each department had its own schedules, peaks of patient flow, meeting etc. Therefore, we chose to use an already established assembly point to ensure that the session did not coincide with their daily programmes: Every Tuesday morning was allocated to medical education across departments. As these Tuesday meetings lasted 45 minutes, this became the frame for our sessions. The sessions were conducted in a bigger meeting room not assigned to any of the involved departments. We arranged the first five meetings at intervals of three to four weeks. Due to the COVID-19 pandemic, we were forced to postpone three sessions, two of which were held online instead of the physical setting.

Before the first session, we invited all doctors from the involved departments to a "start-up meeting" to inform them about the project and the upcoming process. Eighty to 100 doctors participated in the meeting. In this manner, we reached as many doctors as possible directly, in addition to notifying them through written material.

Three researchers were present at each session: one presenting and facilitating the session, one taking notes on the board and one observing/taking notes. The structure of all the sessions was as follows: 1) I held a brief presentation (10-15 minutes), during which the participants were introduced to both formalities (recordings, confidentiality etc.), the process and the session's theme. 2) Group work (15-20 minutes), during which the participants discussed the themes presented (each group had its own theme). Before the sessions, we discussed the opportunity to split the groups depending on seniority, to create a safe space where the participants could speak freely, not worrying

about who was listening. However, a crucial element of CL is the opportunity for different perspectives to meet and contradictions to emerge. On this basis, we mixed the groups beforehand taking seniority, departments, and previous participation in the process into account. Each of us joined separate groups, where we primarily observed and took notes, but also helped to clarify questions. 3) The sessions ended with a general discussion (15 minutes) where we summed up the group discussions.

Between the sessions, all recordings were transcribed and analysed. The research group formulated a resume for the participants and prepared the following session. Between some of the sessions (see Figure 6), I met or corresponded with representatives of the participants to discuss the process. In these conversations, some ideas and themes were further pursued, and others were dismissed. In this way, the representatives both gave me valuable feedback on the analysis and the work sheets for the upcoming session and help ensure the validity of our data. For example, after session 2, the research team categorised three themes, and formulated different contradictions under each theme. I asked the representatives if they could recognise the outcomes and listed contradictions.

6.2.2. ETHICS

No formal ethics approval was required for this study as ruled by the Regional Ethics Committee of The North Denmark Region (2016–000615). When new doctors participated the process, they received written information about the project and a consent form to sign. They were informed about their right to withdraw from further research at any time. All quotes, written materials and personal identifiable information were anonymised. In the following sections, I use pseudonyms. However, as this study consists of sessions with many participants, it was not enough that we (the research team) could vouch for their anonymity – they had promise anonymity to each other as well. Therefore, both in the written information and in the oral presentation of the project, the participants were informed that they were subject to confidentiality.

6.3. FINDINGS

The findings included detailed descriptions of the content of the sessions and of the implemented initiatives. The sixth and last session was an evaluation of both the initiatives and participation in the process. I chose to present the initiatives between session 5 and session 6 in order to do so before the evaluation of the initiatives. In the description of the content of the sessions, I included some analytical reflections

intended to link concrete conclusions with my analytical process. I hope that this will allow the reader to assess the 'quality of craftmanship' [87].

6.3.1. CONTENT OF THE SESSIONS AND INITIATIVES

An overview of the findings is provided in Table 4. The sessions are further elaborated on below.

Table 4. Overview of the Change Laboratory sessions (Paper III)

Session	Purpose of the session/first stimuli	Second stimuli	Mirror data	Topics/Tensions
1	To present data from field study as a mirror of their current activity	Model of expansive learning	Quotes from field study (field notes, interviews with NGDs, CREs and nurses)	The data was recognised and acknowledged overall Excessive formal information was provided during the first weeks of work - an insufficient utilisation of the introduction period? Peer NGDs are crucial, and it is an advantage if it is a known peer Sometimes a challenging collaboration with nurses
2	To explore important factors within the hospital organisation	Model of expansive learning The CHAT model was introduced to sharpen the attention paid to the many different components within the organisation	Quotes from field study and session 1	The *division of labour*, in which NGDs work across different departments and meet different expectations The community with colleagues is sometimes impeded because of opposing agendas and priorities NGDs often work at a physical distance from other doctors

The first two sessions were explorative and aimed at questioning and analysing NGDs' existing work practices and learning environment. Much of the discussion revolved around the organisational model that requires the NGDs cover several departments, which led one of the participants to describe the NGDs as *lone wolves*.				
3	To develop possible solutions	Model of expansive learning The concept of contradictions	Quotes from earlier sessions presented as contradictions	A mandatory day of introduction, including an introduction to the work in admitting in the A&E and to interprofessional collaboration A follow-up introduction after a month An opportunity to match expectation across professions, departments, and seniority
4	To develop the solutions further		Summary from earlier sessions presented as solutions targeting specific challenges	A NGD introduction day • Focus on need to know and logistics • Secure a common point of departure • Meeting future collaborators (both peers, other doctors, and other professions) Followed up by a monthly NGD forum Collaboration with other professions, including mutual knowledge about work activities and prioritisations Working as a team is important to the patients, workflow and the staff

Session 3 and 4 were aimed at developing possible solutions to some of the challenges faced by the NGDs. Based on sessions 1 and 2, we identified contradictions (session 3) and possible solutions (session 4), which were presented to the participants. In session 4, the possible solutions were addressed through three themes: 1) introduction period; 2) collaboration across professions, and 3) prioritising between tasks. Within each theme, we presented key points and asked follow-up questions, such as "what is need-to-know during the first weeks of practice?", "who should facilitate such initiative(s)?" and "how should they be rooted in the organisation?".				
5	To qualify and finish the new solutions and to plan the implementation	Model of expansive learning	Models developed by participants Concrete solutions	NGD introduction day Monthly NGD forum Mandatory training of senior residents on call in the A&E including enforcement of time-outs.
In session 5, we presented concrete suggestions for what the possible solutions could look like (based on the previous sessions), and the solutions were discussed in detail. Generally, there was a great support and acceptance from the participants, and the initiatives were fine-tuned.				
6	To evaluate both initiatives and the CL process	Model of expansive learning	The implemented initiatives	Evaluation of the implemented initiatives • Great support to and acceptance of initiatives among participants Evaluation of participating in the CL process • Overall, the feedback was very positive • The concepts of CL were experienced as a bit confusing • COVID-19 was mentioned as a challenge to operate/run the initiatives

Sessions 1 and 2

The first two sessions were explorative and aimed at questioning and analysing the existing practices. In session 1, we presented the results from the ethnographic fieldwork (Study 1, Paper I) as a mirror of current status. These quotes both created recognisability, and legitimised the discussion, as 'someone else said it first'. As researchers, we quickly saw how the session functioned as a 'safe space' in which the participants could speak freely, and how the CREs contributed to a trustful atmosphere by sharing their own experiences, such as that they can still (as consultants) find the

shifts in the A&E challenging. When discussing the NGDs' experiences and their challenges in covering different departments in one shift, one CRE supported them:

> That's true […] because it's like being caught between a rock and a hard place because you cannot fulfil any of their demands and this is off cause very frustrating (Angela, CRE, session 1)

Statements like these and support for the NGDs gave rise to a constructive debate and I experienced how this made the NGDs feel safe to express their own experiences Some of the tensions raised were an insufficient utilisation of the introduction period (too much formal information, too little concrete introduction to their work) and how the NGDs need peers:

> […] you can always call someone when you get home from work and tell if you have had a shit day, then that someone can say "I understand, I had such a day the other day too". And if you don't have one with the same challenges, then it's obvious you don't have anyone to spar with in the same manner (Ann, NGD, session 1)

The NGDs explained that it is an advantage if they know each other beforehand e.g., through courses. The participants agreed that it takes experience to manage oneself – both to prioritise between patients/tasks and to navigate the collaboration with colleagues:

> As a junior doctor, you are extremely dependent on peers, nurses, secretaries. This sometimes makes it tough to get to the point with medical specialist stuff, as you are dependent on being in "good standing" to secure your work life (Stephen, JDE, session 1)

The quote illustrates how the doctors need to navigate between 'standing by' their medical knowledge while simultaneously being dependent on 'being in good standing'.

In session 2, the focus was on exploring factors within the hospital organisation that might influence the NGDs' education and work environment. We thus aimed to enhance the participants' understanding of where and why challenges arose – and where there was a need for additional attention. For example, when peers were crucial in the first months as an NGD – which factors within the hospital organisation influenced this?

> Something which makes it especially tough is that you have such a huge interface with that many departments. The A&E does not run it in the same way as one of the departments, which does not run in the same way as another department. Those four departments which you need to collaborate with during

> nights as an NGD where nobody does it in the same way. I think *that* is really hard to handle when being a completely new NGD (Nicole, JDE, session 2)

As the quote illustrates, much of the discussion revolved around the organisational structure, in which the NGDs covered several departments. Another theme was how the NGDs work was organised where they often worked isolated. This made one of the participants describe the NGDs as *lone wolves*:

> It is crucial that they [NGDs] have someone to lean on; otherwise, they will be lost. Not only during shift but also being in a department… If you are the only NGD, I think it's a little tough because you might think you are the only one [who is] this stupid, not knowing anything (Angela, CRE, session 2)

The discussions in session 1 and 2 centred on *community* (dependence and access to collaborators) and *division of labour* (challenges with the organisation, in which the NGDs cover several departments) conceptualised via components of CHAT. The discussions of the mirror data ensured that the upcoming sessions focused on current essential problems, and that the participants could jointly develop solutions based on a common background.

Sessions 3 and 4

Sessions 3 and 4 aimed to develop possible solutions to some of the challenges faced by the NGDs, as revealed in the initial sessions and Study 1. As described in section 4.1.46.1, the term *contradiction* identifies tensions between different components of the activity system, which are often manifested as problems or conflicts in the activity system, but should rather be seen as opportunities for development [61]. We identified several contradictions based on the data from session 1 and 2 (see Figure 7 for an example).

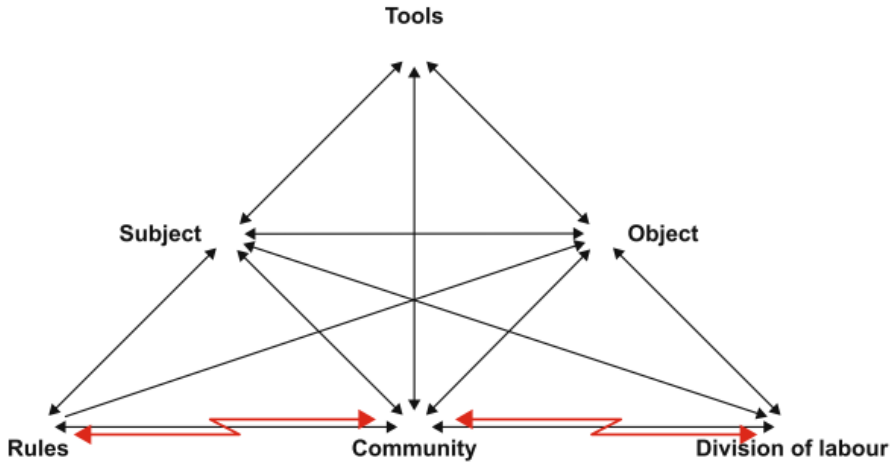

Figure 7.Example of contradictions, adapted from Paper I [103]. *NGD emphasised the importance of support and professional back-and-forth with peers (community), but peers were not always present (rules, division of labour)*

When discussing the contradictions, the participants started proposing possible solutions. Some participants suggested a meeting to match expectations across professions and seniority levels. Some participants suggested an early introduction to collaborators to address different work-agendas, mutual expectations, and interdependence. The participants also suggested securing 'time-outs' during shifts. A suggestion of an optimisation of the introduction period which should include some of the listed themes and a follow-up-introduction became the focus of the subsequent discussion:

> I think a joint introduction will be a really great place to start […] Because I actually think it often is about 'Oh my God, I'm not the only one thinking this is tough'. Because they have the exact same problems, but they rarely talk about it because they are never together (Scott, JDE, session 3)

The discussions about this led the participants (JDEs) to discuss the balance between the departments' and the NGDs' own responsibility:

> Scott: *In reality, it's just about facilitating some situations where they can be together*
> *Janet: I think we should be careful with… It's one's own responsibility if you don't feel well. Then you have to find some of your colleagues or friends and talk to them. We should not take all the responsibility from them […] The NGD*

> *needs to learn how it is to be a doctor. It must off cause be in order, and we must take care of them. But we should not care too much.*
> *Scott: I don't talk about taking care of them. I talk about facilitating a setting which gives the opportunity for back-up and feedback. That's not the same as giving them everything… and I actually think it's wrong to say that the individual is responsible for one's own well-being. I'm not dissident with what you are saying because you cannot come from being overprotected to manage everything on your own. But this is also far from saying that it is the individuals own responsibility if you aren't doing fine.*

The emphasis on the NGDs' own responsibility triggered a discussion about what the aims of the initiatives should be and how there was a joint commitment: the hospital organisation is responsible for securing optimal conditions, but at the same time the NGDs have a responsibility themselves.

Due to the COVID-19 pandemic, session 4 was held online. In this session, the doctors were requested to meet within their own departments and jointly fill out a work sheet where they were asked to reflect on the suggested solutions and refine those. The possible solutions were addressed through three themes: 1) introduction programme; 2) collaboration across professions; and 3) prioritising between tasks. Within each theme we presented key-points and asked follow-up questions, such as "what is *need-to-know* during the first weeks of practice?", "who should facilitate such initiative(s)?" and "how should it be embedded in the organisation?" Six out of 8 departments answered, and one NGD (because of maternity leave) sent her response separately. The responses from the departments were concrete and inspiring, and the alternative plan proved to be successful despite the altered circumstances.

Session 5

Based on the former sessions, we presented concrete suggestions for possible initiatives, and the initiatives were discussed in detail. The suggested initiatives were: 1) a new day of introduction to the NGDs; 2) an NGD forum; and 3) mandatory training of senior residents from cooperating departments on call in the A&E, including enforcement of time-outs.

When it came to the 'new day of introduction' initiative, the participants highlighted how it was crucial that it was junior doctors who became responsible or presented on the day, as 'they can still remember it'. The participants furthermore emphasised that the existing formal introduction programme should be reduced, as it is too general and far from what the NGDs need to know. The suggestion for the content of the introduction day raised a discussion about how each speciality should hold a brief presentation on that day to introduce the NGDs to the most common diseases. Some

of the participants found this aspect important, as all the NGDs admitted patients in all departments. However, some of the participants raised concerns about this:

> Somehow that isn't consistent with this information-overload which we have discussed previously. They [NGD] don't feel they can handle it (Stephen, JDR, session 5)

This discussion was interesting, as it presented a recurrent contradiction in the work with the initiatives: the difference between what the NGDs needed during their first months of work, and what their collaborators needed that the NGDs could/knew. This illustrated (as mentioned in section 6.1) a challenge in the CL process: to transform the individual's motive and idea of what the problems are to a common understanding and an agreement of the current problem of the activity. However, the discussion also showed how as the work progressed, the participants took over the part of the chairing function, took agency and discussed contradictions.

Concerning the NGD forum, the doctors agreed that an NGD forum should be held monthly instead of six times a year, and they suggested using an already existing meeting forum (Tuesdays, 45 minutes) to ensure that the NGDs could participate. Furthermore, they commented that it was important for the forum to have a facilitator, and that it should include all NGDs from the hospital (not only the participating departments).

Finally, regarding the mandatory training of doctors on call and the enforcement of time-outs, the participants discussed how they experienced a high turnover among the senior resident from cooperating departments on call in the A&E. These individuals sometimes seemed inexperienced and came with no formal introduction. Thus, the participants agreed it was essential that the doctors on call be groomed for their duty – especially their role as flow managers.

The session ended with an agreement on the final solutions, and two doctors were chosen as representatives. Afterward, I met with the two representatives and scrutinised the initiatives. They suggested that some of the presentation should be interactive, e.g. it should involve presenting dilemmas to the NGDs which they would then discuss in small groups. The representatives also highlighted the importance of using many concrete examples to which the NGDs could relate. Furthermore, the research group meet with the management of the A&E to discuss and plan the implementation of the NGD introduction day. At this meeting, it was determined that the introduction day should be expanded to include all NGDs at the hospital (and not only the departments that participated in the CL process). The final initiatives were sent to all the participating doctors and all departments with NGDs.

Implemented initiatives

The CL process resulted in two concrete initiatives to reduce some of the challenges faced by the NGDs: 1) an NGD introduction day; and 2) a monthly NGD forum. The third initiative, which was the mandatory training of senior residents from cooperating departments on call in the A&E, including the enforcement of time-outs, came into focus in the A&E as part of the CL process: The medical departments' senior residents were formally invited to an introduction to the work of a flow master in the A&E. Thus, this initiative became imbedded in the A&E.

The first initiative is a mandatory day of introduction for all NGDs at the hospital, which is held on day two of their employment. Overall, the focus is on 'need-to-know' to fulfil their new duties as both doctors and learners, meet future collaborators and establish community with peers. The programme consists of (see Appendix F for more detail):

- An introduction by one of the medical coordinators of postgraduate medical education at the hospital, who emphasises the importance of their job and the NGDs' own responsibility. The balance of being both a part of the workforce and a trainee is also addressed
- Concrete knowledge about local procedures, the work community around the patients and the NGDs' tasks in this, as well as a tour of the A&E
- An introduction to some of the NGDs' closest collaborators, including registered nurses and secretaries. This included descriptions of work procedures and guidelines that other professionals must follow and thus indirectly affected the NGDs' work, discussions about good communication across professions (both oral and written) as well as about matching of expectations
- Information about some of the most common procedures e.g., dictating and referrals to x-rays
- JDEs from each of the participating NGDs' departments participated at the end of the program where NGDs had the opportunity to address questions specific related to their departments
- Through the day, time is allocated to frame the possibility of establishing relationships with peers, including group discussions about common dilemmas trainees face when working as NGDs, as well as about their expectations/what they are fearful of in their new jobs

This introduction day is followed up by the second initiative: A monthly NGD forum that focusses on 'nice-to-know', reflections and community with peers. During the first part of the forum, an invited junior doctor presents a theme, which is followed up by group discussions both on the topic and on NGDs' new roles as doctors and the challenges involved. For example, when the theme was 'We all make mistakes', one junior doctor introduced the hospital's procedure for reporting adverse events and the importance of doing so. They were followed by another junior doctor who presented examples from her own work of cases in which she had made mistakes. These

examples opened a rich discussion and functioned as an invitation to the participating doctors to share their stories and personal experiences of making mistakes. Other themes have addressed supervision in clinical practice, scheduling and work-life-balance, conflicts with collaborators, limitations of care, etc. To ensure that the NGDs could participate, we chose to use an already established assembly point to ensure that the session did not coincide with their daily programmes. The number of participating NGDs at the forum oscillated typically between 12 and 20 doctors. Because of logistics, we once held it at a different time of the week, which resulted in only 3 participating doctors. This emphasises the importance of carefully consider the framework for new initiatives.

Both the NGD introduction day and the monthly NGD forum were implemented in Fall 2020, and during the first year, the NGDs were asked to evaluate the initiatives in detail in order to give us information needed to adjust the programmes. This was especially the case with the introduction day.

Session 6

Originally, we had scheduled the sixth and final follow-up CL session to commence after 5 months. We aimed to use it to evaluate both the implemented initiatives and the general experience of participation in the CL process. Due to gathering restrictions during the COVID-19 pandemic, we ended up holding the session online after 10 months. Yet, this postponing had the advantage that we were able to host 3 introduction days (1 online) and 3 NGD forums (3 were cancelled) before the evaluation and the participating doctors thus had opportunities to gain more experience of the initiatives before discussing them.

Evaluation of the initiatives

When asked about their experience of the initiatives, the participants were generally positive. They found it much more relevant than the former introduction program, and they still supported the initiative. In the evaluation of the new introduction day, the participating doctors said:

> I think it is a fantastic initiative and I got a lot out of participating […] I wish that ALL NGDs could have it [the NGD introduction day] from the beginning because we are told a lot about all the practical stuff, the procedures, the tour in the A&E. I think it was very valuable (Adam, NGD, session 6)

> I've been talking to some of our NGDs […] and they were very positive about it. They highlighted how the learned about the collaboration with the nurses

> […] how to get a good start on one's working life between professions, which is new to many of them (Scott, JDE, session 6)

> In total, I think […] it has been some positive change […] something about collaboration and local knowhow, that is positive, I think (Angela, CRE, session 6)

The participants praised the introduction day for including both a concrete orientation to the NGDs' work (local and common procedures, tour, how to dictate/make a referral) and the more tacit aspects of that work, such as communication with collaborators and sharing expectations with peers through group work. Some of the participants commented that it had not been optimal when one of the introduction day had been held online (due to COVID-19), as this had especially affected the community-creating part. Furthermore, the CREs in particular had experienced some difficulties in navigating the formal introduction programme, as they had other mandatory programmes to attend, e.g. about IT.

The evaluation of the monthly NGD forum was also positive:

> You get such a good experience […] also to hear about how your colleagues are doing and how they somehow are in the same boat (laughing). You have the same job, but you don't have an insight into how they are doing […] it gives you a push in the same direction, it offers a feeling of safety and collegiate spirit. In that way it is very nice (Lauren, NGD, session 6)

The CREs and the JDEs supported the importance of the forum, but also admitted that it was hard to prioritise and remember in their busy work lives. They suggested that dates be announced early to the NGDs, JDEs, CREs and the planner of the schedules. These comments illustrate how it can be difficult to implement new initiatives even though participants have been involved in developing them.

During the evaluation session, the participants also discussed how it is important to realise that it is not possible to completely remove the shock faced by the NGDs during their first months of practice:

> Tine: The point of departure was the NGDs' experiences. They felt alone during shifts, and there was a lack of community and an information overload during the first few weeks. Do you think that some of the results, which were developed through the process… do you think they have solved some of the problems or challenges that the NGDs are facing?
> Carl (CRE): I definitely think that the NGD introduction has helped a lot. But I think we need to be aware that the NGDs' challenges are not solved yet. The shifts are VERY busy. Even the experienced NGDs or other junior doctors are stressed by the workload. It is better, yes, but we should not lean back and think everything is solved.

> We will never be able to remove the NGDs' insecurity, which is caused by the fact that they have never been working in the clinical practice before, being the one responsible. You could never solve that completely. It's a hurdle you have to overcome. But we can do something to make them ready for it (Nicole, JDE, session 6)

The participant supported continuously the initiatives, and they found how they have improved and helped the NGDs with some aspects of their new work. However, there was still an agreement that the transition period is tough.

Evaluation of participating in the CL process

Overall, feedback on the CL process and on participating in it was very positive. The participants found it rewarding and interesting to participate, and a participant highlighted how it had been motivating to experience how the process had ended in concrete initiatives. The possibility to meet across seniority levels and departments was highlighted as a very positive aspect of participating in the CL process. The JDEs and CREs expressed how the process gave them a thorough insight into what it is like to be an NGD:

> It is always nice to hear from the young themselves how they experience it. It's not something we have used before except talking to our own NGDs from our own departments. But it has been really interesting to get an insight into how we experience it across the different departments. (Karen, JDE, session 6)

> As a soon-to-be retired consultant, I would like to say that it has been great to be a part of this process. In my everyday work, I'm not the one who is close to the NGDs' work and learning environment […] I think it has been great and rewarding to hear about how the life of an NGD unfolds. (Paul, CRE, session 6)

Even though the doctors were colleagues and worked at the same departments, they seldom had opportunities in their daily work lives to discuss the NGDs' well-being in detail and across seniority levels. The CL process gave them an opportunity, and the importance of this was highlighted by the participating doctors' wish for the process to continue (but maybe not as frequently) as it created the opportunity to regularly discuss issues which extend across and between these departments. Concerning alterations, one participant commented on how they had been a bit confused by the concepts of 'sessions' and a 'change laboratory', as they had never heard about these before. In the research group, we had continuous discussions about the presentation of theoretical concepts during the process. Since we only had 45 minutes available and there were many new participants in each session, we prioritised and decided which theoretical concepts and considerations were nice-to-know and which were

need-to-know for the CL participants. Consequently, concepts such as ‘expansive learning’, ‘contradictions’, and ‘CHAT’ were briefly introduced, whereas concepts such as ‘double stimulation’ and ‘mirror’ were only applied at an analytical level. However, the evaluation showed that the participants had difficulties with the theoretical framework despite this. Furthermore, the participants called for a more evident prioritisation of the process from the management. The lack of continuity among participants was also mentioned, as it had been a challenge to continue the fruitful discussions across sessions. Finally, COVID-19 was identified as a challenge to running the initiatives.

7. DISCUSSION

In this chapter, I first discuss the findings across the two studies, including their implications. Next, I discuss the strengths and limitations of the designs chosen for the project, the ethnographic fieldwork and the Change Laboratory intervention model. The individual studies are discussed in the papers.

7.1. DISCUSSION OF FINDINGS

The overall aim of this project was to explore the NGDs' work and learning environment and the use of a participatory research design to develop and implement initiatives to support the NGDs during their first months of practice. Together, the two studies contribute to the medical education literature by offering a comprehensive perspective on the NGDs' first months of work. They also provide an example of how to work participatorily with clinicians, focusing on the hospital organisation to optimise the NGDs' first months of practice. The struggle between learning and service is a basic problem in the field of workplace learning [45,46], and this study showed how several components within the hospital organisation tilt the balance towards service. NGDs experience their first months of work as an intense learning period in which they struggle in their new role due to a lack of local knowhow, problems with time management, a feeling of sudden responsibility and complex collaborations with their colleagues. When NGDs begin their FY, they need a community supporting them and concrete knowledge of how to fulfil this new role, which includes both procedures in their own and collaborating departments. Study 2 illustrates one way to address these challenges with a participatory design, and together with the participants, develop implementable initiatives supporting the NGDs' first months of work.

This project did not solve the challenges faced by the NGDs during their first months of practice, or remove the 'shock' completely, as one of the CREs participating in the CL put it. Other studies argue that the goal should not be a seamless transition, and note that with the right support, challenges can be viewed as necessary elements of the transition [29,112]. The evaluation in session 6 showed how the implemented initiatives did help reduce some of that shock by supporting them in the transition, and the project's results highlighted themes that should be taken into account when developing postgraduate medical education. Some of the themes, 'context matters', 'working participatorily' and 'creating a community', will be addressed in the following sections.

7.1.1. CONTEXT MATTERS

The findings of the project demonstrate that it is important to take contextual factors in the hospital organisation into account when aiming to develop and implement initiatives in postgraduate medical education. Similarly, others have shown how the context is important to pay attention to when working in both under and postgraduate medical education. For example, in a recent published review about work readiness, Padley et al. [112] show that contextual factors (referring to the learning environment) have an impact on the individual preparedness, including team hierarchy and enablement of support and back-up. They suggest that these should be addressed in a workplace aiming to create optimal learning opportunities for students. Teunissen et al. [113] highlight that it is important to pay attention to the local context, since the settings for medical education have never been more diverse. Further, since competent performance is embedded in local contexts, it is crucial to help newcomers entering new settings by proactively addressing an awareness of specific contextual changes that they need to navigate and learn from. My project likewise showed how factors within the hospital organisation prevented the NGDs from putting their medical competencies to work. For example, the NGDs often covered several departments, which made it hard for them to figure out the local knowhow and procedures. Other studies have also found factors at a local level, e.g. how increased workload and lack of downtime contribute to variation in the acquisition of competencies among residents [56], and how the composition of the team and shifts influences the NGDs' degree of responsibility [114].

However, even though studies refer to 'context', the factors included vary. Some studies focus on context at a local level [9,56,114], while others uses a more general definition of context [115] when describing how the structural and political context limit teaching and learning opportunities for junior doctors [58]. Dilley [116] problematises the (unreflective) use of 'context' as an analytical concept, as it involves making connections and, by implication, disconnections. Which features are excluded and deemed irrelevant? This is a point to pay attention to when exploring a complex setting like a hospital, in which many healthcare professionals work together across departments, professions, procedures, seniority levels, etc. Through my ethnographic fieldwork and *thick descriptions* [7], many details about the NGDs' work and learning environment were included, and thus a long list of potential important contextual factors were produced. Other studies that have used CHAT to identify factors in medical education and workplace learning highlight how the theory helps to identify contradictions, and thus point to possible areas for improvement [41,55,72]. By employing CHAT as an analytical frame, it was possible to systematically analyse the data, concretise and formulate the involved factors explicitly, and identify connections and contradictions between them. For example, NGDs' feeling of being overwhelmed by sudden responsibility was worsened when the NGDs worked apart from other doctors. By identifying such contradictions, CHAT facilitated a deeper systemic understanding of the challenges and need for

development in the process of becoming a doctor in a complex system of workplace learning.

7.1.2. WORKING PARTICIPATORILY

The fact that factors within the hospital organisation have such a crucial impact puts pressure on the management of both the PGME and the hospital, as it becomes more accountable for providing the necessary framework for supporting the NGDs during their first months of practice. This was also a theme in our CL process (session 3), during which some of the participants discussed how the hospital organisation is responsible for ensuring the most optimal conditions. This responsibility is also addressed in other studies. Ott and Pack [117] describe it as a 'collective responsibility', noting that educators must take an active part in onboarding new doctors into new contexts. A way of doing this is through a participatorily research design [3,5,6], in which the researcher aims to give voice to the participants in order to provide insight into the local context, challenges and beliefs [3,110]. Within the field of development and implementation, the involvement of the practitioners is often seen as a prerequisite for success. Scott [118] emphasises the importance of involving local practitioners when facilitating changes, as they hold the key to local knowhow. In a similar vein, Lipsky [119] notes there is a risk of 'a distinct degree of noncompliance if lower-level workers' interests differ from the interests of those at higher levels', which is why he advocates for practitioners to be included in the process. With these aspects in mind, we (the research group) decided to actively involve the relevant doctors in a process of developing the NGDs' work and learning environment, and we designed a Change Laboratory intervention process. The sessions offered a unique opportunity for the doctors to meet across departments and seniority levels, which is often not possible in busy daily clinical practice. Through the process, existing practices were questioned, and new work activities within the organisation were envisaged. During the sessions, there was a rewarding discussion characterised by eagerness to contribute. The participating doctors emphasised that it had been rewarding to meet the NGDs and have a thorough insight into their work and learning environment. They also found it positive that the process actually ended in implemented initiatives. The CL approach has previously proven useful in changing practice in complex hospital settings, including preparing clinical workplaces to implement an assistantship model for medical students [63], reorganising the educational setting in the outpatient clinic in a paediatric department [72] and enabling nurses to develop transitional care between primary and hospital care [120]. However, the success in deepening the understanding of the causes of the problems and developing solutions was not the only advantage of the participatory approach in this case. The CL process induced a sense of ownership among the participants, which turned out to be crucial when implementing the initiatives, as the participants functioned as 'ambassadors' for the new initiatives, and we experienced their full

support and acceptance. This should not be overlooked when implementing new initiatives within organisations.

7.1.3. COMMUNITY IN FOCUS

The project showed how community with collaborators is crucial during the NGDs' first months of practice. Other studies touch upon the importance of collaborators during the NGDs' first months of practice [30,121–123]. However, we found this was not unequivocally an easy constellation to navigate, as different agendas and priorities appeared. In interviews, both the registered nurses (RNs) and CREs recognised that the many patients waiting and the heavy workload would sometimes generate a tense atmosphere, leading to extra pressure on the NGDs. Through the analysis, we found that this tension was aggravated by several components within 'division of labour', including the fact the NGDs had many different departments and collaborators with various perspectives to relate to and the fact they often worked on the frontline, physically remote from their departments. This structure put the NGDs in an exposed position: Different departments demanded their presence, and the high workflows clashed with their pace of work as newcomers. This raised the question of how to make the situations less conflictual? Engeström states [61] that when components within the activity contradicts, there is potential for change. During the CL sessions, the NGDs articulated a contradiction between how the RNs were their closest collaborators (community) and they actually only knew very little about the RNs' work (rules, division of labour), and vice versa. One suggestion was to focus on the way NGDs are introduced to their collaborators and the functions each of them fulfils while also discussing different work agendas and mutual expectations. These themes are addressed in the NGD introduction day where RNs join a session about interprofessional collaboration.

In Study 1, we found that the NGDs described the peer relationship as a safe haven which is in line with other studies [25,121,124,125]. When we used these results as mirror to the participants in the sessions in Study 2, NGDs, JDEs and CREs recognised and articulated the importance of a community among NGDs, as they support each other. During the CL process, the participants addressed this need continuously, e.g. through identifying contradictions. The NGDs emphasised that it was an advantage if they knew each other before working independently in the departments (community), but there were often only a few NGDs in the same department, and introductions were conducted by section (rules, division of labour). Thus, ensuring these moments of sharing across departments in a busy work life became an important theme. The participants in the CL process developed two initiatives that address this need for a community with peers. The NGD introduction day features elements of facilitating community across departments throughout the day, e.g. through group discussions of cases/dilemmas and group work on posters concerning NGDs' expectations about

their work, what they are fearful of and what they will do if they fail to thrive. This emphasis on establishing community is passed on in the second initiative, the monthly NGD forum. The forum has some similarities with the concepts of peer coaching [32,125] or peer-to-peer support programmes [126] in which junior doctors meet to discuss different topics. However, in these cases the junior doctors often meet in small, fixed groups that are facilitated by either professionals [32] or senior residents who have received an education in peer facilitation [125]. Our monthly NGD forum is also facilitated by senior residents, who might not be educated as facilitators, but who are indeed committed to and engaged in the work. Furthermore, the forum aims to *frame* and *encourage* to community among peers. With only 45 minutes available and with up to 20 participants, it is unrealistic for the forum to try to achieve the same depth as coaching. However, where some other researchers have had difficulties in recruiting participants to their coaching programmes [126,127], we have not experienced the same challenge with attendance. This might be caused by different factors. The combination of presenting a (relevant) theme and the opportunity for casual discussions with peers might have an impact on the NGDs' willingness to participate, as the invitation is open and non-binding. Furthermore, the initiative has been developed by the NGDs' colleagues and their predecessors. Thus, it is not faculty-led or imposed top-down, but instead developed cooperatively based on experienced contradictions.

The CL process showed how community is important not only to the NGDs, but also across departments and seniority levels. One of the key elements of CL intervention is the involvement of practitioners, including the encouragement of their agency [110,128]. Before entering the CL process, the participating departments had no formal setting where they could jointly discuss and collaboratively develop the postgraduate medical education environment. With aid of the CL process, we were successful in creating a setting where the involved clinicians could discuss cross-departmental challenges openly. As researchers, we experienced great energy and commitment among the participants, and during the sessions, there were always rich discussions characterised by eagerness to contribute. They were curious about each other's work procedures, and they shared stories of both positive and negative experiences. This is in line with previous CL research [6,72,129], and Morris et al. conclude 'Change Laboratory has the potential to open silos and foster respectful, creative working relationships' [129]. In the final CL session, the participants expressed that it had been fruitful to have the opportunity to meet in a process, and they requested that the process continue. Ott and Pack [117] describe it as a 'collective responsibility': educators must take an active part in onboarding new doctors into new contexts. However, the results from this project show that it is necessary to create a space for them to do so – the CREs (and JDEs) need an opportunity to share reflections and experiences. As CREs, they have broad responsibilities, but work in isolation, with limited time allocated. This challenge is addressed in another study, where CREs emphasise that working with education should be prioritised in their departments, in line with medical practices such as research, and that time should be allocated to do

the job [18]. Our results support this prioritisation and indicate that it should include an opportunity to exchange experiences across departments.

7.2. DISCUSSION OF METHODS

Doing qualitative research has both strengths and limitations. Through the fieldwork in Study 1, I gained insight into the NGDs' work and learning environment, and their experiences of it. Participant observation is an embodied activity [81], which is why reflexivity about my position as researcher and how this could have affected the research is important to be aware of [8,80]. It is possible that the methodological choice to follow the NGDs has made me more sympathetic to their experiences than I would be if I had used another methodological framework. I followed them in a challenging and vulnerable time in their working lives: I experienced how they struggled with finding their way to a cardiac arrest, how patients commended their efforts, and how they shared their doubts with me in the middle of the night when they were uncertain about calling the attending doctor about 'banalities'. Within the first few weeks of the fieldwork, I was invited to join a weekly meeting in one of the departments, at which senior doctors discussed the junior doctors' learning development, among other things. The NGDs had already told me about the meeting; they found it covert and secret, as they were seldom told about the content of the evaluations. On one hand, the meeting was an opportunity for me as a researcher to explore the senior doctors' experiences of the NGDs' work and education environment, and thus add nuances to my research. On the other hand, I feared that if I attended such a meeting, it could have consequences for my fieldwork among the NGDs. Fieldwork is largely about trust and building a confidential relationship with the participants over time [81]. What position would I put myself in if I went to a meeting where my informants were being evaluated? I chose to decline the invitation based on these reflections. In these situations, the close collaborations with my supervisors were important, as they challenged me and continually drew my attention to this balance. Furthermore, we included the RNs and CREs' perspectives in the interviews between Study 1 and 2, and those of the CREs and JDEs in Study 2, which contributed to more nuanced results.

The primary strength of ethnographic fieldwork is its systematic investigation of what people *do*, as well as what they *say*, which provides the ethnographer with thorough knowledge of the people studied [80]. In Study 1, these methods gave me the opportunity to explore not only how the doctors themselves experienced their work retrospectively (interviews), but also their practices and the surroundings in the situation (observations). This knowledge was crucial when exploring the NGDs work and learning environment, and provided a thorough data set I used to analyse the organisation through the lens of CHAT (Study 1, Paper I). However, other studies using CHAT are not necessarily based on ethnographic fieldwork or observations.

Feijter et al. [55] use CHAT to explore medical students' balance between learning to be doctors and delivering safe patient care. This study is based on focus group interviews with medical students. Bull et al. [41] combine one hour of observation with a subsequent recall interview (typically the same day) to explore decision-making among doctors and the contextual factors that influence the ways these decisions are made and justified. Thus, ethnography is not necessarily the only option. However, in this study, ethnographic fieldwork was not only performed in Study 1, but also formed the basis for Study 2. It ensured the CL process was focussed on essential problems and the data served as a mirror to the participants of their current work practices. Furthermore, it allowed me as a researcher to take part in discussions during the sessions. The thorough knowledge of NGDs' experiences, their practices and the organisation enabled me to ask additional questions and challenge their perceptions or statements. Thus, future researchers should pay attention to which setting they are exploring and which kind of knowledge they need when deciding which methods, they should use.

The way CHAT systematically visualises and highlights elements within an organisation that interact and thus produce tensions was one of the reasons we chose CHAT and CL as the analytical and methodological framework for the project. CHAT makes room for artefacts, rules, collaborators, etc. and demands analytical attention to how these components interact and influence one another. This visualisation and discussion of how the elements interact concretise and clarify the potential for change. At the same time, they ensure that the solutions developed are focused on current essential problems and that the participants can jointly develop these based on a common background. As presented in section 2.2, another theory emphasising socio-cultural perspectives is *situated learning* [48]. This theory would have contributed to other interesting analyses, such as one concerning the NGDs' access to the community, and how this influenced the development of their professional identities.

On the one hand, the Change Laboratory intervention model is relatively prescriptive, offering concrete tools and steps to follow. On the other hand, it requires researchers to take local circumstances into account. Other studies reported that it is difficult to get large groups of practitioners to engage in developmental processes in time-poor workplaces together [71,72,129,130], and I had the same experience when planning interviews in Study 1, as each department had its own schedules, peaks of patient flow, meeting etc. To overcome this challenge, we (the research team) chose to use an already established assembly point: every other Tuesday morning, the junior doctors in all medical departments and the A&E participate in a joint educational meeting. Skipper et al. [72] use the same strategy in their CL process. The strength of this strategy was that the time was already allocated to education, and thus the sessions did not take time away from clinical programmes, which resulted in high attendance. The limitation was that the frame for these Tuesday meetings became the frame of our sessions, allowing only 45 minutes for each. However, with a strict time control, we managed to succeed despite having less time available than the method prescribes [5].

Future studies should pay attention to this weighting between the ideal timeframe for the process and the possibilities presented by actual work practices.

CL is thoroughly anchored in its theoretical foundation, and this use of complicated concepts might cause challenges and confusion when participants are unfamiliar with the theoretical framework [111,131]. In our process, because of the limited time available, we determined which theoretical concepts were 'nice-to-know' (double stimulation and mirror) and which were 'need-to-know' (expansive learning, contradiction and CHAT). However, in the final CL session, when the participants were asked to evaluate the process, some of them commented on how it had been 'confusing' to deal with many new concepts. Therefore, we would recommend that future researchers consider the use of concepts introduced to the participants carefully and keep this necessary 'translation' of theoretical concepts in mind when planning a CL process.

CL allows different relevant stakeholders to engage in the process [5], and we continuously discussed the possibility of including other clinicians than the NGDs, JDEs and CREs in our sessions. During the process, several themes, contradictions and possible solutions were discussed. Some of these discussions could have been interesting with additional perspectives, e.g. the registered nurses' (RNs'). However, for several reasons, we ended up with only including medical doctors. In each session, we prioritised representatives from all departments and across seniority levels, because we found that mutual understanding across these divisions were of great importance for the process of developing and implementing initiatives, and thus invited 30+ doctors. With the recommended participation number of 15-20 [5], it would potentially have been chaotic with RNs from each department – or would have been at the expense of NGDs, JDEs or CREs. We could have done as Morris et al. [129] did, and started running profession-specific sessions as a way of making points of connectedness visible. However, there was a risk this could have created an 'us against them' attitude and thus reinforced silos instead of opening them. Furthermore, RNs were more peripheral to the formal aspects of the NGDs' work and education environment, as they were neither responsible for nor committed to making changes like the CREs and JDEs were. In the interview with RNs, they told how they were busy taking care of 'their own' (new nurses), and they saw the provision of that care as a challenge that should be handled within the profession. Although we only included doctors in our sessions, the process addressed interprofessional collaborations and resulted in continuing initiatives that focus on promoting these through such things as an introduction to other professions' tasks, a discussion of different agendas and a possible matching of expectations. The process of 'onboarding' NGDs is an ongoing one, and future CL sessions could be expanded to invite RNs, patients, and other stakeholders in.

7.2.1. THE QUALITY OF QUALITATIVE RESEARCH

Doing qualitative research is always in a process of decision-making in which some ideas and themes are further pursued, and others are dismissed. The question for the researcher(s) is how to ensure they do justice to the complexity of everyday life [80].

Credibility or validity is about the connection between the field under study and the researcher's descriptions, interpretations and conclusions. As described in section 4.1.4, the fieldwork and analysis are a 'circular dance' [93]. This meant that during my long-term fieldwork, I had the opportunity to share and 'check' my reflections, doubts, curiosities, and interpretations with the NGDs. Furthermore, I presented our results at conferences and meetings where our findings were recognised. For example, at a meeting about a new organisation of the NGDs' shifts, a senior resident burst out: 'You just summed up my foundation year!' Lastly, the results from Study 1 formed the basis for Study 2, and in sessions 1 and 2, they were presented as mirrors to the participating doctors. In these sessions, we experienced a high degree of recognition, and the results were further refined through the discussions.

Another way of securing credibility is through triangulation of the methods used. The combination of participant observation and interviews is common within ethnography, and with good reason. I planned and conducted the days of observation and the interviews simultaneously. It was therefore possible to address questions in the interviews based on my observations, and vice versa. I could focus my attention in the observation on topics raised in the interviews. I also triangulated by including different departments in the study. As the departments organise PGME differently (especially between the A&E and the medical departments, as described in section 4.1.2), it was important to explore the different aspects across them.

In Study 2, credibility was also essential to have in mind. During the process, we paid attention to the possible bias in doing participatory research: that the researchers might affect the decisions made during the process [5], such as those concerning which themes or proposed solutions to follow. As we, the researchers, analysed the sessions and formulated the material for the coming sessions, we had an impact on the data. Many solutions were discussed, some of which were further pursued, and others of which were dismissed. Throughout the process, we had a dialogue with representatives in which we presented our analysis and our preliminary results from each session. They gave credibility to the process. Furthermore, besides the participants' priorities and solutions, which covered several challenges, we had to balance the estimated degree of implementability, and how well it could solve some of the challenges. In this process, we had to be realistic about what was possible and what was within the scope of the project. For example, solutions such as developing an app to find the way, postponing the NGDs' start on their FY, and 14 days of mandatory shadowing were dismissed, but recorded.

Even though transferability is not the primary aim of qualitative research, it is nevertheless important to address the criterion of it: Can the findings of this study be useful in other contexts? [132]. In this, the concept of transparency is essential. Only by allowing readers to get a thorough insight into the setting and the research will it be possible to evaluate the relevance of that research [133]. Even though the setting of Aalborg University Hospital might be unique, I hope that this thesis, together with the 3 papers, has allowed readers to assess the extent to which elements from the study can be transferred to other settings.

8. CONCLUSION AND FUTURE PERSPECTIVES

This PhD thesis aimed to explore how an ethnographic and participatory research design could be used to generate new knowledge of NGDs' work, and to develop and implement initiatives to support the NGDs in their first months of practice. The two studies performed in this project relate to the opening quote in Chapter 1, which illustrates the point of departure; NGD Maria shared her experiences of her first shift in a group interview. She described being challenged and stressed, and not feeling competent to deal with the tasks she was expected to perform. The quote also illustrates how the organisation of her work and learning environment was crucial in the given situation: she did not know how to find her way to the acutely ill patient, she was alone (had to call), and even though patients were already assigned to her, more were coming in.

Through the ethnographic fieldwork, we gained a thorough knowledge about the NGDs' work and learning environment. By including the theoretical framework of CHAT in the analysis it was possible to identify relevant factors and explore their interrelatedness. This generated a deeper understanding of the systemic challenges and need for development to support the process of becoming a doctor in the complex system of workplace learning. The results emphasised that the collaborations with colleagues should be devoted more attention and that factors within the hospital organisation may negatively affect the NGDs' experiences in their first months of practice. The results from Study 1 were used to inform the participatory CL process in Study 2, which allowed for a mutual understanding of the challenges across and between the involved departments and levels of seniority. The process resulted in the development of two concrete initiatives that were also implemented into practice: *a NGD introduction day* and a *monthly NGD forum.* Besides these two initiatives, a list of future points to address was also formulated based on the CL sessions. The evaluation of the initiatives showed how the implemented initiatives helped reduce some of the 'transition- shock' by supporting the NGDs in their first month of work. This included a thorough introduction to local knowhow across settings, an introduction to the interprofessional collaboration and facilitating the opportunity to create a community with peers. Attention to these themes is crucial within PGME when working with and developing the NGDs' work and learning environment. Future research could address these themes when working with medical students or doctors further in their education programme in order to support findings.

The participatory CL process offered a unique opportunity for the participating doctors to meet across departments and seniority levels, which is often not possible in the busy daily clinical practice. Through the process, the participants questioned the existing practices and envisaged new work activities within the hospital organisation.

This process can in future studies be extrapolated to other similar settings pertaining to doctors further in their post-graduate educational programmes, as their learning takes place in an increasing number of sites with different factors involved. Such studies could benefit from inviting RNs, patients, and other stakeholders in as suggested in Paper III. However, conducting participatory research in complex organisations takes time and requires commitment from the involved stakeholders which future research should consider when planning such studies.

The CL process highlighted the need to pay attention to establishing a community within the organisation of PGME. It is essential that the planners of PGME (the CREs and JDEs) can meet in order to plan and continuously develop the work and learning environment. CL is recommendable for this as it provides insight, induces strong commitment and a sense of ownership, which should not be overlooked when developing and implementing new initiatives within organisations.

The results of this project represent a powerful demonstration of how to use qualitative research to change practice. The combination of ethnographic fieldwork and a CL intervention process can be a method for working with challenges across departments and seniority levels in future studies spanning several healthcare disciplines within the field of workplace learning.

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APPENDICES

Appendix A. Paper I

Klitgaard, T.L., Stentoft, D., Skipper, M., Grønkjær, M., and Nøhr, S.. (2021) 'Struggling to fit the white coat and the role of contextual factors within a hospital organisation - an ethnographic study on the first months as newly graduated doctors', *BMC Medical Education*, 21(1), p. 74.

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RESEARCH ARTICLE Open Access

Struggling to fit the white coat and the role of contextual factors within a hospital organisation - an ethnographic study on the first months as newly graduated doctors

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Abstract

Background: Despite increased focus on improving the transition from being a medical student to working as a junior doctor, many newly graduated doctors (NGD) report the process of fitting the white coat as stressful, and burnout levels indicate that they might face bigger challenges than they can handle. During this period, the NGDs are in a process of learning how to be doctors, and this takes place in an organisation where the workflow and different priorities set the scene. However, little is known about how the hospital organisation influences this process. Thus, we aimed to explore how the NGDs experience their first months of work in order to understand 1) which struggles they are facing, and 2) which contextual factors within the hospital organisation that might be essential in this transition.

Methods: An ethnographic study was conducted at a university hospital in Denmark including 135 h of participant observations of the NGDs ($n = 11$). Six semi-structured interviews (four group interviews and two individual interviews) were conducted ($n = 21$). The analysis was divided into two steps: Firstly, we carried out a "close-to-data" analysis with focus on the struggles faced by the NGDs. Secondly, we reviewed the struggles by using the theoretical lens of Cultural Historical Activity Theory (CHAT) to help us explore, which contextual factors within the hospital organisation that seem to have an impact on the NGDs' experiences.

Results: The NGDs' struggles fall into four themes: *Responsibility, local knowhow, time management and collaborators*. By using the CHAT lens, we were able to identify significant contextual factors, including a physically remote placement, a missing overlap between new and experienced NGDs, a time limited introduction period, and the affiliation to several departments. These struggles and factors were highly intertwined and influenced by one another.

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Conclusion: Contextual factors within the hospital organisation may aggravate the struggles experienced by the NGDs, and this study points to possible elements that could be addressed to make the transition less challenging and overwhelming.

Keywords: Contextual factors, Cultural historical activity theory (CHAT), Ethnography, Newly graduated doctors, Medical education, Postgraduate, Qualitative research, Struggles, Transition, Workplace organisation

Background

The development of undergraduate and postgraduate medical education has been devoted much attention in an attempt to diminish the gap between medical school and the work as doctors. Newly graduated doctors (NGD) enter a complex and busy environment where they are expected to contribute to the workforce within the first few weeks [1, 2]. In this transition, they become acquainted with the challenges of workplace learning: Although, the learning process of fitting the white coat is recognised as a legitimate purpose, it is to take place in a context where the workflow and the priority of different collaborators set the scene. This means that there often is neither the time nor the priorities to support the NGDs in this process [3]. Several studies report that the transition period is associated with both positive and negative experiences. Although the transition can be seen as an important learning experience with increasing responsibilities and tasks [4–7], many NGDs find it stressful and challenging [5, 7–12]. Burnout levels indicate that they may be facing bigger challenges than they can handle [1, 13].

Various factors have been identified as contributing to the NGDs' feelings of stress and burnout. Several studies point to extensive working hours, sleep deprivation, challenges in clinical decision-making and high levels of responsibility as essential factors [7, 8, 14–17]. A Danish investigation among all residents in 2012 demonstrated that the doctors experienced a high level of time pressure and heavy workload during evening and night shifts. The perceived pressure was highest among recently graduated doctors as 69% of graduates stated that there was a "high" or "very high" level of time pressure during night shifts [18]. Lastly, international and national studies state that the gap should be elucidated as a clash between the ideals taught at medical school and the realities of clinical practice [1, 11, 19–22]. Thus, the transition from medical school to clinical practice represents a difficult and uncertain period to the NGDs.

Lefroy et al. [22] state that a lack of contextual knowledge, such as how to gain access to appropriate support, could affect the new doctors' experiences of failure and may result in inadequate solutions. Moreover, Kilminster et al. [23] advocate that the doctors' practice is mainly dependent on situational and contextual factors, rather than on formal frameworks. However, little is known about which contextual factors within the hospital organisation that might influence the doctors' experiences. Inspired by Coles et al. [24], context is not perceived as the backdrop to the NGDs' work. Rather, context can be widely perceived as elements that interact, influence, modify, facilitate or constrain the experiences of working as an NGD. Thus, there is a need to explore contextual factors in-depth in order to point at areas Within the organisation of medical education at hospitals, which could be optimised in order to make the transition less challenging.

The aim of this study is to explore how the NGDs experience their first months of work in a complex clinical setting in order to understand 1) which struggles they are facing, and 2) which contextual factors within the hospital organisation that might be essential in this transition. In this exploration, we include two different, yet interrelated, analytical strategies. In the first, we explore the struggles experienced by the NGDs. In the second, we add the hospital organisation as the unit of analysis and through the theoretical lens of Cultural Historical Activity Theory (CHAT), we explore which contextual factors within the hospital organisation that might have an impact on the NGDs' experience of struggles when fitting in the white coat. This combination provides significant insights into the lived world of the NGDs and how contextual factors of the surrounding hospital organisation influence these experiences.

Methods

Methodology

To explore the complexity of the NGDs' work and the struggles they are facing, an ethnographic study design was chosen employing the methods of participant observation and interviews. These methods gave us the opportunity to explore not only how the doctors themselves experience their work retrospectively (interviews), but also their practices and the surroundings *in* the situation (observations).

Setting and participants

The study took place at a university hospital in Denmark, where approximately 70 NGDs are employed yearly. The doctors included in this study were in the

first part of their internship/foundation year programme (see further information about medical education in Denmark in Fig. 1, [25, 26]). Although the first year is referred to as training and is part of an educational programme, it is also a fulltime job (37 h/week in average), where the NGDs are expected to contribute to the workforce already within the first few weeks.

The fieldwork was conducted in the Accident and Emergency Department (A&E) and the cooperating medical departments. The A&E serves as the entry point of (nearly) all acutely admitted patients. NGDs from the A&E and the medical departments share the task of attending to the (medical) patients and deciding who are discharged and who are admitted for further diagnosing and treatment. In this complex context, the NGDs have to acquire specific competencies simultaneously, and they are assessed as part of their training programme during their employment [27, 28].

All involved departments were informed about the study and accepted to participate. Still, access also had to be planned with the NGDs as their participation depended on their consent [29]. NGDs were asked to sign a consent form indicating their agreement to participate and for their data to be used. The participants were chosen on the basis of availability (residents on duty on observations days) and with a variety in gender, medical school, department of employment and prior clinical experience in mind [30].

Data generation – methods of the fieldwork

Participant observation and interviews

The first author is an anthropologist and conducted the fieldwork, where a total of 135 h of participant observation were carried out from June 2016 to March 2017. Even though the focus was on the NGDs, it quickly became clear that the NGDs constantly interacted with other staff (doctors and nurses) in their work, and thus these collaborators unavoidably became a part of the observations as well.

Participant observation involved participating in the doctors' work life over a period of time, asking questions, listening and taking notes [31]. The objective was to explore the experiences of working as a NGD and to gain a better understanding of the complexity and multitude of factors involved in their work [30]. A total of 11 NGDs were observed throughout their working hours at different shifts and at different times of the day and the week. The first author donned the white coat and followed the NGDs throughout their entire shift observing patient examinations, staff meetings, administrative work, phone calls, coffee breaks etc. During the fieldwork, extensive field notes were written, including both observational notes of activities and interactions and more reflective notes of analytical ideas and the researcher's position in the field. First as jotted notes and later into full, elaborated notes [30]. Whenever the NGDs interacted with patients or colleagues, the fieldworker remained in the background, but was occasionally asked to participate in the work, e.g. when assisting a patient while the NGD would auscultate the patient's lungs.

The participant observations were supplemented by semi-structured interviews to gain insight into the NGDs' subjective perception of their work and to be able to generate more specific interview questions [32]. The interviews took place at the hospital during the NGDs' working hours, lasted between 1 and 2 h, and were audio-recorded. We chose to include group interviews to allow the NGDs to discuss different themes in order to see various or even contrasting perspectives on their first months of practice. (N = 6, NGDs = 21). However,

In Denmark, NGDs are required to undergo a foundation year programme before they receive their authorisation to work independently as medical doctors. The purpose of this year is to ensure a safe and successful transition from being a medical student to working as a doctor in the clinical setting. The Danish Health Authority adequately puts it: One has to "learn to be a doctor by actually being one" (25). Until the doctors have received their authorisation to work independently they work under another doctor's responsibility (26).

Fig. 1 Medical Education in Denmark

due to practical reasons, individual interviews were conducted as well ($N = 2$) [30, 33, 34].

Data analysis

In order to examine both the struggles experienced by the NGDs as well as the contextual factors influencing these experiences, we designed a two-step analysis. Firstly, we carried out a "close-to-data" analysis with focus on the NGDs' experiences and the struggles they were facing. Secondly, we reviewed the findings with the theoretical lens of Cultural Historical Activity Theory (CHAT) to explore which contextual factors within the hospital organisation that might have an impact on the NGDs' experience of struggles when the object of the activity is to fit the white coat.

First round of analysis – close-to-data

All interview recordings were transcribed verbatim. All field notes and interview transcriptions were analysed using NVivo (qualitative data analysis software). The first part of the analysis was inspired by Clarke and Braun's thematic analysis [35]. The ethnographic research is an iterative-inductive process, and it can be difficult to separate the different phases, including the analytical one. According to this, the analysis already began during the fieldwork where the first author read and reread the field notes and transcripts to familiarise herself with the data. This included coding and searching for themes. The first and the last author performed the preliminary coding of data. All authors discussed the findings during the process of analysis. The codes were then clustered into themes by identifying patterns and similarities.

Second round of analysis – theory-guided

To explore the complexity and to point at contextual factors within the hospital organisation that might have an impact on the NGDs' experience of struggles, we reviewed the themes again, this time using Cultural Historical Activity Theory (CHAT) as an analytical lens. CHAT derives from Soviet cultural psychology (among others Vygotsky, Leont'ev and Luria) and has been further developed (in its second and third generation) by Western scholars, including Engeström [36]. The theory stipulates that learning is collective, social, and situated in participation in practice, and that the relationship between "subjects" and "objects" is mediated by "tools", e.g. language, physical objects and other people. Engeström expanded this unit of analysis to include three additional components, "Rules", "Community" and "Division of labour", and he depicted the model as an activity system - an entity of different interconnected elements which are described and illustrated in Fig. 2 [36–38]. CHAT can be used as a conceptual tool to render visible the complexity of organisations by identifying tensions and contradictions in the activities and between various factors and interacting activity systems within the organisation. The structure of the model with sub-triangles highlight the numerous relationships throughout the activity [39]. Any change in one of the components may cause changes in the others.

Through the lens of CHAT, we analysed the process of becoming a doctor, where the NGD was the "subject", and the NGD's aim of *fitting the white coat* was the "object". Analysis and conceptual modelling of the NGDs' transition into an activity system enabled us to focus on different, but interrelated aspects of the activity (system), which all had an impact on the NGDs' process of becoming doctors. E.g. the psychological and physical tools available to the NGDs, the communities in the system (group actions), the rules and ways in which the tasks were organised. The conceptual model helped demonstrating the tensions in the activity system where NGDs are striving to fit the white coat, and it thereby pointed at possible ways to construct (and change) postgraduate medical education in a complex hospital setting. CHAT has previously proved helpful in exploring postgraduate medical education in a complex hospital setting [16, 40].

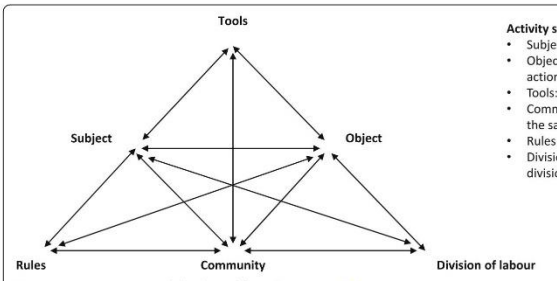

Fig. 2 Activity system model, adapted from Engeström [37]

Results and analysis

Struggles experienced by the NGDs

The first round of analysis showed that the NGDs experienced their first months as an important learning experience, yet also stressful and challenging. As one of the participants expressed "it's pure survival". We were able to point out four struggles: 1) *Responsibility*; 2) *Local knowhow*; 3) *Time management* and 4) *Collaborators*. These results are shown in Table 1 and are unfolded in the following sections. The components of each of the four struggles are explored in detail (first round of analysis) and for each struggle, the related contextual factors are described (second round of analysis). Thus, we both present results from the first and second part of the analysis in the same section in order to link the contextual factors directly to the struggles and thereby showing the connection between them.

Struggle 1 - responsibility

The first struggle describes how the sudden feeling of responsibility *overwhelmed* the NGDs. The feeling of being the ones responsible made them *fearful of (potential) consequences* and they experienced *difficulties and uncertainty in decision-making*.

Overwhelmed by the sudden feeling of responsibility In general, the NGDs reported that the most evident difference between being a medical student and working as a doctor was that they were now the ones making clinical decisions and therefore feeling responsible for the patients. This was described as an overwhelming and challenging experience:

> NGD10: Well, THE RESPONSIBILITY, that's it! When you're observing someone doing it, then you don't learn how to do it or figure it out. It's not something you learn by simply observing (Group interview).

> NGD8: However, I do believe the first shock came on my first day. I completely shut down. I couldn't grasp the concept of having the responsibility. […] For me it was truly brutal coming from studying and then to real life. And the first shift I had … just to carry the phone (stretches out her shaking hands), I was just like that (NGD10 giggles), I was really shaking and nervous and then it goes off, and it's a potential meningitis, and I need to head to the A&E, I don't even know how to find it! … and then I call my attending and say: "it's a potential meningitis". "Well then you need to do a lumbar puncture". And I had seen it once before, it didn't go well, and then I had to be there by myself (NGD9 growls: hmmm) Well I was so nervous, and then the world collapsed, because the patients just kept piling in and that … I ended with completely breaking down and crying in the A&E (Group interview).

In the quote, it is clear that on her first shift on call NGD8 is assigned a patient she does not feel capable of handling, and the sudden responsibility made her very uncomfortable. Here, her breakdown was caused by the fact that she had to both attend to a potentially critically ill patient and was simultaneously required to respond to other patients.

Fearful of (potential) consequences The feeling of being responsible for patients' lives made mistakes tangible, and the awareness of matters of life and death affected the NGDs. One of the NGDs expressed how this feeling was further enhanced as medical school had

Table 1 Struggles experienced by the NGDs and contextual factors

Struggles	Newly Graduated Doctors' experiences (Observed and expressed)	Contextual factors (Conceptualised by components of CHAT)
1. Responsibility	Overwhelmed by the sudden feeling of responsibility Fearful of (potential) consequences Difficulties and uncertainty in decision-making	Worsened when the NGDs worked physically remote from other doctors (division of labour) The NGDs are by law not the ones responsible for the final decisions (rules)
2. Local knowhow	Local knowhow as a prerequisite for the NGDs' work Insufficient local knowhow affected the NGDs' pace of work	The introduction period was time limited (rules), but with information overload (tools) Often there was no overlap between new and more experienced NGDs (rules)
3. Time management	Lacking a sense of time made prioritising tasks difficult Heavy workload generated stressful situations and missed learning opportunities (reflections) Many interruptions	The NGDs often covered several departments at the same time (division of labour) Guidelines caused numerous interruptions (rules)
4. Collaborators	Collaborators were crucial during the first months and were addressed differently Collaborators could be challenging	The NGDs had many different departments and collaborators with various perspectives to relate to (division of labour) The NGDs worked in the frontline, physically remote from their departments (division of labour)

taught them what the consequences of making mistakes could be. This had made him "extra alert" and wanting "everything to be done correctly". This was also evident among other NGDs:

> 13.40. Finally, lunch! When seated, NGD12 is staring straight ahead. I ask her: "What's up?", and she tells me that she wants to confer the patient one last time with the senior doctor before she discharges him. We leave our untouched lunch in the break room and find the senior doctor in the corridor (Field note).

In this example, NGD12 had actually discharged the patient already – and conferred him with the senior doctor. Still, she felt uncomfortable with the decision and therefore turned to the senior doctor again, just to be "absolutely sure".

Difficulties and uncertainty in clinical decision-making When the participants were asked to elaborate on the differences between being a student and a junior doctor, most often the answers were that their awareness of their responsibilities made clinical decision-making difficult. Even though the NGDs all have had clerkships as students, it was still a completely different situation to be working as doctors, since as students they often just followed the doctors around and did not have the responsibility and independent interaction with patients themselves. In supplement, the NGDs discussed "having the courage [to do something]" which indicates that the fear of responsibility in decision-making is something to be overcome.

> NGD14: You can easily make one … write an admission record, but you can bloody well not make a plan. I mean make decisions, you cannot figure out how to make a treatment plan when you are newly graduated as a doctor, well […] I think the most difficult is to make the decisions. Well, I can see okay "I have a patient with low potassium" for example, then I must decide if the patient should get potassium. I can very well figure out that the patient needs it, but I simply cannot […] anyway, I personally have difficulties making the decision if the patient should get it (Group interview).

The NGDs have read about the cases in textbooks during their studies, and they know (in theory) what to do. However, they found a barrier in making and executing the decisions themselves. This was also conspicuous in the fieldwork where the nurses would comment on all the extra scans or blood tests ordered by the NGDs, or the crowds of NGDs surrounding the senior doctor in order to ask clarifying questions.

Contextual factors in relation to struggle 1 - responsibility (THEORY- GUIDED) Using the theory of CHAT, we found that the "divisions of labour" (Table 1 and Fig. 2) in the activity system influenced the NGDs' feeling of responsibility. This was especially evident for the NGDs working across departments as *they were often physically remote from other doctors in their primary medical department.* An important part of the NGDs' job in the A&E was to function as gatekeepers to the rest of the hospital, and the A&E is physically separated from the medical departments. The more or less permanent placement in the A&E made an NGD describe her affiliation to her own department as being "guest of the week". This feeling was further aggravated at night, as the on call work was organised in a way where medical NGDs were the only doctors at work in the department, after just few days of training. Even though more experienced doctors were on call from home throughout the night, the NGDs still felt overwhelmed and uncomfortable by being the only doctor in the ward.

The concept of "Rules" (Table 1 and Fig. 2) was essential to bring into play when we explored the NGDs' fear of potential consequences. By law, *the NGDs are not the ones responsible for the final decisions (regarding patients' treatment plans).* As long as the doctors have not yet received their authorisation to work independently as medical doctors, they work under another doctor's responsibility [26]. This subject became evident during the observations where an NGD was requested to dictate the name of the senior doctor who she conferred the patient with, "just in case something happens". However, this explicit guideline does not mitigate the NGDs' overwhelming feelings:

> NGD8: I'm the one who must live with it. They [senior doctors] might say, that it's their responsibility, but I'm still the one dealing with a human life (NGD10: mmm). And that's the thing, which to me is extremely anxiety-provoking. I don't give a damn if the senior doctor says it's okay or not … (Group interview).

Even though the NGDs know that they are not the ones ultimately responsible, it offers little comfort, for example when being alone and terrified at night with only a few weeks of experience, expected to prioritise between patients. In a legal sense, the NGDs might not hold the responsibility in these situations, but they still must live with the potential mistakes.

Struggle 2 - local knowhow

The second theme describes how the NGDs were *struggling with local knowhow as a prerequisite for their work.* At the same time, this *insufficient local knowhow affected the NGDs' pace of work* as everything takes extra time.

Local knowhow as a prerequisite for the NGDs' work In the fieldwork, it became clear that local knowhow was essential in the transition from medical school to clinical practice as it was a prerequisite for working as medical doctors. For example, the NGDs had a hard time figuring out the computer system, the pager, ordering blood tests, even navigating at the hospital was a challenge:

> While running [to a cardiac arrest], NGD11 says, she has no idea where the department is (Field note).

The field note was from NGD11's first shift, and illustrates how the NGDs perform tasks they do not feel ready for and/or properly introduced to; such as holding one of the pagers for cardiac arrest when they have still not gotten to know "the house". The NGDs often expressed frustrations about the lack of knowledge and how this insufficiency affected their work:

> NGD10: I don't think the medical skills have much to say. I think it's ALL ABOUT local procedures, well … It's really not much … you can almost do without knowing medical stuff, because that part you can always just call someone and ask for (NGD8: yes). You can't call anyone and ask how to do the x-ray referral (Group interview).

> NGD21: The logistics of working in a new house, that … that I think, takes up much more energy than being professional and seeing an ill patient (Group interview).

The participants experienced the local knowhow as the foundation for fitting the white coat. Only after acquiring sufficient expertise in local procedures, did they feel that their medical competencies could be put to work.

Insufficient knowhow affects the NGDs' pace of work The lack of local knowhow not only challenged the NGDs in relation to their medical expertise, it also affected the doctors' pace of work. During the fieldwork, we observed how the more experienced NGDs worked significantly faster that the newly graduated ones. They examined the patients faster (i.e. asked quickly, precisely and without hesitation, and only examined what seemed relevant to the problem at hand), knew how to order medicine and scans, and mastered to a greater extent something as common as dictating. Both the physical surroundings and the work procedures were all unknown to the NGDs. This obviously made them work more slowly – they needed either to ask for extra help or to take the time to investigate it themselves. This caught the NGDs in a vicious circle: Everything took additional time, and this meant more waiting time, (extra) long lines of patients waiting and impatient collaborators, which all together stressed the NGDs.

Contextual factors in relation to struggle 2 - local knowhow (THEORY-GUIDED) Various elements within both "rules" and "tools" (Table 1 and Fig. 2) were evident as important contextual factors. Firstly, *the introduction period of the NGDs was limited* to one or 2 weeks ("rules"), and in this limited period of time much information ("tools") was given:

> NGD11: […] because it's especially within the first week, you have to learn ALL these things, and you get SO many impressions that even though you do your best, you cannot remember anything at all (Group interview).

As the quote illustrates, the introduction period creates a paradox: On the one hand, the period is limited and fleeting; on the other hand, many of the NGDs suffer "information overload" and are unable to retain important information concerning local procedures (Table 1 and Fig. 2). This illustrates a division between being told how to do it and actually knowing how to do it; e.g. ordering a CT scan. Previously, we described how NGD8 had a breakdown in the A&E on her first shift. In the interview, the NGDs discussed how NGD8's situation probably was accentuated by the lack of local knowhow (i.e. whom to call and when). During her first shift, she does not know (or remember) the guidelines concerning senior doctors present in the A&E. It takes time to learn to conduct oneself, and it appears difficult or downright impossible to take in the enormous amount of new information and local knowhow within the limited time of the introduction week.

Secondly, there was often *no overlap between new and more experienced NGDs* at some of the departments ("rules", Fig. 2). When only few NGDs were employed simultaneously in the same department, and these began at the same time, it had a crucial twofold negative impact on the NGDs concerning local knowhow; both on their capabilities to acquire it and their frustrations of lacking it. The absence of overlap meant that the NGDs had no department specific experienced peer(s), and

thereby there were often no or limited formal exchanges of experiences between new and more experienced NGDs. This also had the consequence that the NGDs only had a few days of formal introduction to their work before taking over the tasks themselves. The NGDs made inquiries about the opportunity for shadowing another NGD before taking over the tasks themselves, but as they were needed in the shift among colleagues, the opportunities for this were limited. Moreover, it was apparent that the new NGDs missed having a "near" peer during their first months. The informants described the peer relationship as a safe haven, which allowed asking "stupid" questions and getting mental support. NGDs employed at departments with numerous NGDs emphasised the opportunity for sparring with peers as essential in learning how to conduct oneself as doctor.

Struggle 3 - time management

The third theme describes how the feeling of shortage of time was yet another crucial factor for the NGDs. During their first months, they reported having an insufficient sense of time, which made *prioritising between tasks difficult*. Their work was characterised by a *heavy workload, which generated stressful situations and missed learning opportunities*, and this was furthermore exacerbated by *many interruptions*.

Lacking a sense of time made prioritising between tasks difficult During the first months, the NGDs struggled with time management, e.g. about how long they spent on a task and what was a reasonable amount of time with respect to patients and collaborators:

> NGD10: I just think that the sense of time is really bad in the beginning. You have no idea, how long a certain kind of patient can wait, and how much time has passed, while I've been standing here sweating. Well, those two things you don't have any clue about [...] You don't know either, well, how long can you let the pager beep, because it goes off constantly, while I look after whoever is critically ill right now. When you don't know what's realistic to do, and what the time frame is. If you don't know that you cannot prioritise (Group interview).

In NGD10's statement, there are two elements relating to time management. Firstly, he stated how he experienced a lack of sense of time; everything is new and "time flies". Secondly, he had not yet learned how long the various tasks are supposed to take, and how long it is safe for the patients to wait. This makes it hard for NGDs to prioritise; e.g. between tasks and patients. At medical school, the students were taught about diseases and treatments, but the NGDs expressed how the teaching seldom included any aspects of time. This makes it hard to estimate the waiting time when colleagues from different departments call and ask them to see a patient, and this led to confrontations.

Heavy workload generated stressful situations and missed learning opportunities When we asked our participants about their experiences of their first months, they stated that the heavy workload caused many stressful situations. As in most healthcare systems, the NGDs' were often busy:

> NGD6: [...] I don't think I often had time to think about; what can this be, I need to look it up, how is it with this thing, what are you supposed to do? It just became; I went out and presented the patient I had, and then I needed an answer. Because I needed to move the patient to the ward ... You did learn something, but probably not as much as I had thought (Group interview).

The NGDs emphasised that the lack of time had an impact on how they worked and especially when they asked for help. This was particularly apparent when there was a seemingly endless line of patients waiting, and telephones that would never stop ringing. This made the NGDs call for help more quickly and thereby choose the "easier" solution. They did not feel they had enough time to investigate symptoms, diseases etc. themselves before asking for help. One problem with this strategy was that they felt they bypassed any intermediate thought processes and thereby potentially lost time to reflect and learn from the situation. Instead of doing all the reflections and investigations themselves, they sought concrete answers from more experienced doctors and nurses to get the patients through faster.

Many interruptions The heavy workload was further aggravated by the many interruptions. This is exemplified by these field notes:

> 10 pm: NGD17 approaches the patient, who is on the bed in a dark room because of a headache. 10.05 pm: NGD17 is paged, she walks outside, calls [...] 10.12 pm: Paged again. 10.16 pm: Paged again. 10.25 pm: The examination is completed (Field notes)

In this case, NGD17 was interrupted in her interaction with the patient every time the phone rang. The first two times, NGD17 left the room. Once returned, it took considerable time to resume the examination, and thus the interruptions influenced her productivity. To add injury to insult every disturbing phone call was regarding

other patients – either new ones or patients waiting. NGD17 wrote all the new information (from each call) on a pad of paper in her white coat, adding new tasks to the ever-expanding to-do-list.

Contextual factors in relation to struggle 3 - time management (THEORY-GUIDED) Elements within the "division of labour" and "rules" (Table 1 and Fig. 2) reinforced the difficulty with "time management". Round the clock, the NGDs from different departments took turn in attending to all acutely ill medical patients admitted to the hospital. Some of the NGDs also had to take care of their respective departments by looking after the patients already admitted. On top of this, these NGDs were part of a working collaboration across several departments that extended through evenings, nights and weekends. Thus, they *covered several departments at the same time* ("division of labour", Fig. 2), which entailed that during nightly hours, there was not always a doctor present in each department; the doctor might be in the A&E or another department. Thus, there were often several patients waiting in different departments, and this required the NGDs to decide which patients were most critical. This "division of labour" generated repeated calls from impatiently waiting nurses with little knowledge of when the doctor may return. These frequent disturbances cause both stress and interruption of their work as they have to respond to a multitude of issues simultaneously. To complicate this further, the medical departments and the A&E were located at opposite ends of the hospital, and consequently the NGDs must walk across the hospital premises multiple times each shift and work in various sections of the hospital. This recurrent travelling takes time – time that is not spent bedside or doing patient related work. Furthermore, the NGDs' affiliation to different departments had an influence on their "tools". Each department had its own pager and telephone, and thus the white coats where often filled with multiple phones/pagers.

In the exploration of the many disturbances of the NGDs, the concept of "rules" (Fig. 2) was relevant. As the hospital employs a guideline or an *early warning system* to prevent deterioration of patients' conditions, the nurses are required (if triggered by the algorithm) to inform the doctors about various physiological parameters (e.g. temperature, oxygen saturation, blood pressure, pulse):

> NGD9: Sometimes, I'm called only to be informed "the patient's temperature is 38,6", "okay, what was it before?", "38,3", "okay, anything else?", "no, the patient is completely unaffected" […]. Try to imagine a shift where you are contacted because of such minor details throughout the night (Group interview).

In these situations, the NGDs experienced being called (i.e. disturbed) with trivialities which they were required to respond to. They described how they, as newly graduated, found it difficult to act over the phone and needed to see the patient first-hand. This called for additional mileage.

Struggle 4 - the collaborators

The fourth and final theme describes the collaboration between the NGDs and their colleagues (both doctors and nurses). On the one hand, *the collaborators were crucial* when the NGDs struggled during their first months. On the other hand, the same *collaborators could be challenging*, especially when conflicting agendas were present.

The collaborators were crucial and were addressed differently The NGDs were highly dependent on their collaborators in the process of fitting the white coat. As mentioned previously, local knowhow was an essential prerequisite for functioning in clinical practice, and since the collaborators hold this key, they become crucial in the transition.

> He wants to page him [the physician on call], but on the list with all the numbers, there are only three digits listed for each person, and he is quite certain one must press five digits. "Why doesn't it say here?". He finds the nurse from earlier and asks him "a stupid question" (Field note).

This example shows how the NGDs were struggling and how they overcame the challenges; by turning to their collaborators often with simple, yet necessary procedures. The collaborators were peer NGDs, senior doctors and nurses. However, they engaged in three very different types of collaborations. As mentioned previously the NGDs described the peer relationship as a safe haven, where the NGDs supported each other:

> NGD12: I think, it has made a difference that we are so many newly graduated doctors in the A&E (others: mmm [In acknowledgement]). You are a part of some sort of community, where there's always someone to ask (Group interview).

> NGD9: I honestly don't know what I would have done without you guys [nearest peers] (Group interview).

It is noteworthy that the participants felt that the community with other NGDs provided safety. Because of the sense of community, they did not feel alone with the

struggles they faced. For instance, it was safe to ask "stupid" questions, they would help each other with the patients, tend to each other's wellbeing and share their feelings of insufficiency. One of the NGDs even relieved a peer by taking over the person's pagers, even though he was not supposed or obliged to.

However, the peers were not the only ones consulted when there were struggles. The nurses were often the ones present, and since they had experience and local knowhow, the NGDs would ask the nurses about local procedures. They would consult the senior doctors when needing help in decision-making and concerning medical issues:

> The interviewer: [Who do] you primarily consult during the day […]?
>
> NGD14: It all depends on the situation … If you're having frustrations or have had an unusual experience with a patient, then it's one of the junior doctors. However, if it's concerning a medical issue, then it's one of the senior [doctors] (Group interview)

This strategic selection of colleagues illustrates that when the NGDs were struggling they did not just call a random colleague, but chose their collaborators depending on the struggle at hand.

The collaborators could be challenging The same collaborators that the NGDs asked for help could also be a challenge; for example, concerning patient flow and pace of work. This was especially evident with some of the nurses in the A&E:

NGD9: In addition, there is a general pressure from the A&E concerning the fact that their [the nurses] primary task is to ensure that the patients are quickly examined and shipped down the line, so the newly arrived can be seen. Additionally, there is also a time pressure from the staff; "why aren't you here [in the A&E] yet?", "why hasn't the patient been transferred [to the ward] yet?". Because in the moment the patients leave the A&E, their work [the nurses] with the patient is done, they can move on to the next. Thus, we always need to … I think, you are always made aware of "hurry up", "get this done" (Group interview).

> NGD17: I see it as two different agendas. They [the nurses] just want to empty the bed, the room and the A&E so it's ready for the next patient, and we would like to give the patient the best treatment, […] So I think, it is because they have to move on, and we would like to … we are most comfortable if we have the grand overview (Group interview).

In these examples, the NGDs experienced that the nurses in the A&E often had a different agenda from their own. The nurses wanted the patients to be, as fast as possible, ready for either discharge or admittance to another department. As described previously, the NGDs found these decisions hard to make as they felt they were the ones responsible at the end of the day. The many patients waiting and different agendas sometimes generated a tense atmosphere. Sneering was also seen at times during the observations:

> When we leave the patient, NGD1 wants to find the senior doctor again. When she asks for him, one of the nurses answers, "no, there is no "grown-up" doctors here". NGD1, slightly laughing "Grown-up doctor?", "Yes, grown-up doctors, you know … " the nurse answers and walks away (Field notes).

In these situations, the NGDs did not act on the harsh comment, but in the interviews, they expressed how these situations made them feel excluded or unwelcome.

Contextual factors in relation to struggle 4 - collaborators (THEORY-GUIDED) The organisation where the NGDs have *many different departments and collaborators with various perspectives to relate to* ("division of labour", Table 1 and Fig. 2) links closely to the NGDs' experience of their collaborators being crucial. When admitting patients for further diagnosing and treatment, the NGDs encountered most of the departments in the hospital. All of which had their own demands, expectations and agendas about how the NGDs should complete the task of being gatekeepers to the hospital. The various procedures and rules made the NGDs dependent on the help from others, and at the same time put the NGDs in conflict between different departments' guidelines:

> NGD18: […] And when it's your senior doctors [employed in the A&E], there's one rule, and when it's the other doctors there are other rules, I think. I don't know if you have experienced this as well, but it's EXTREMELY confusing (Group interview).

In this case, NGD18 perceived conflict between different departments "rules", and thus she had to navigate these depending on which department was represented. The NGDs' affiliation with many different departments generated many telephone calls from across the organisation, which were often about new or waiting patients. Therefore, various "Tools" (Fig. 2) become significant:

> NGD17: THAT pager … It almost wakes up the entire ward [other NGDs laughing] … It doesn't really

> have any inhibitions, right? It also goes off when you're with a crying relative or in the middle of a rectal examination, and then it goes off three times while doing it, right? I really don't like it [the pager] (Group interview).

> NGD18 is very chatty on the way to the x-ray conference, and she tells me, that she has been very nervous about today. She glares down at her pager and says: "I just fear that it suddenly goes off, but it will obviously" […] At the conference, NGD18 is sitting, tossing and turning her pager, and looks at it several times. Suddenly her phone rings, she is startled and goes outside to answer […] "Phew", she says, "it actually went alright" (Field note)

In the quotes, it is conspicuous that the phone and pager were not just neutral tools but were often associated with strong and sometimes negative emotions, and thus ascribed agency.

Another element within the "division of labour" (Fig. 2) was the organisation where the NGDs worked *in the frontline, physically remote from their departments* and thereby their colleagues. The NGDs described themselves as "guests" in the other departments and had the feeling of being in unknown territory. This organisation also limited the NGDs' opportunity to make use of the benefits of working together with peers (support and talk, psychological "tool").

Discussion

This study explored how NGDs experience their first months of work in a complex hospital setting. The aim was to understand 1) which struggles they were facing, and 2) which contextual factors within the hospital organisation might be essential in the process of fitting the white coat.

The overall picture was that the NGDs experienced their first months of practice as overwhelming and completely different from their experiences as students. We showed that four struggles were of paramount importance in this transition. In the discussion, we will focus on how these are highly intertwined, interacting and influenced by one another. CHAT offers a way to discuss our findings through the concept of "contradiction". The term "contradiction" describes tensions between different parts of the activity system or between different activity systems. Contradictions are often manifested as problems or conflicts in the activity system, but should rather be seen as opportunities for development [37]. We have chosen to discuss two topics within this concept: Responsibility and the complexity of the collaborations. In this part of the discussion, we will use the terms of CHAT (e.g. "rules" and "tools") to clarify the contradictions within the activity system, illustrated in Fig. 3. Finally, we discuss the overall consequences that the various struggles and contextual factors had on the NGDs' process of fitting the white coat – and possible ways to mitigate the challenges.

Responsibility

Our results show that one of the most vital differences between being a medical student and working in the clinic as a medical doctor is the sudden feeling of responsibility. This is in line with previous research describing how the realisation that the NGDs are now responsible for the patients' lives makes them feel burdened and fearful [8, 17, 20, 22]. As such, the theme in itself is not exceptional. The interesting thing is how this experience somehow contradicts the fact that the NGDs by law are not the ones responsible for the final decisions as they work under another doctor's responsibility (Fig. 3.A.1). This corresponds with Kilminster et al.'s [23] description of trainees in the UK who felt responsible when left alone in the ward, despite a formal framework stating that they are actually not. During our observations the matter of responsibility was also present, e.g. when they were requested to dictate the name of the senior doctor who they conferred the patient with "just in case if something happens". Both through the national legislation, the local guidelines and requests it is attempted to establish a framework which exonerate the NGDs from the final responsibility – but this has apparently failed. Thus, there seems to be a remaining contradiction where, regardless of the explicit legislation ("rules"), the NGDs ("subject") still feel burdened by the responsibility of patient care. Here it is not only a matter of keeping a line of retreat open; it is dealing with the anxiety-provoking decisions in the middle of the night knowing the potential consequences for the patients. We showed how the context and the way the NGDs' work is organised, where they are working physically remote from other doctors and being the only doctor in the ward ("division of labour"), have a crucial impact on the NGDs' feeling of being responsible (Fig. 3.A.2).

The overwhelming feeling of responsibility is an important part in the transition, and despite many regulations, it seems to be impossible to eliminate. However, it is important to address this and organise work and learning to facilitate a community, including the one with peers, where this challenge can be addressed.

Complexity in the collaborations

When struggling in the new role, the collaborators became the NGDs' salvation. This corresponds with previous studies, which also describe how the pressure of the

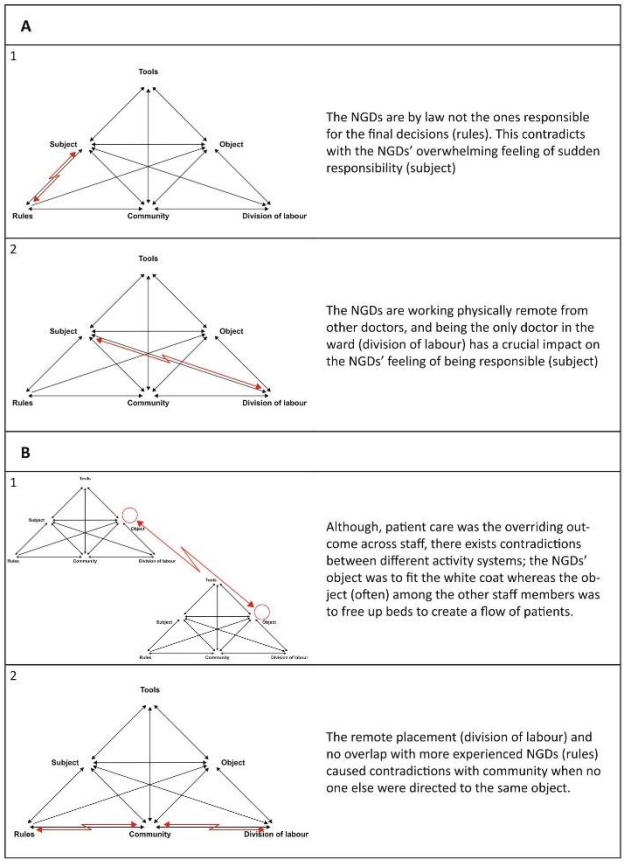

Fig. 3 Contradictions in the activity system

first months was eased when the junior doctors felt supported [8, 16, 22]. This includes both the peers as a safety net [5, 41], the senior doctors as the medical expertise [8, 20, 22] and the nurses as the ones with the local knowhow [8, 41].

In our study, we explored these collaborations in depth and found that it was not unequivocally an easy constellation, which has received only little attention in previous literature. Although patient care was the overriding outcome across staff, conflicting agendas and different priorities appeared when nurses wanted the patients to be ready for either discharge or admittance to another department as fast as possible, and the NGDs found these decisions hard to make. This clash created contradictions between different activity systems (Fig. 3.B.1); the NGDs' overall aim, their "object", was to fit the white coat whereas the "object" of the other staff members was predominately to free up beds to create a flow of patients. Since the NGDs were dependent on their collaborators, it became important for them to ensure a good relation – and this often entailed prioritising the flow of patients before their learning.

The challenges concerning the collaborators were further aggravated by the NGDs' remote placement and thus their limited access to the community. As newcomers, the NGDs depended on support from their collaborators, but they felt left alone with no safe haven in peers or trusted senior doctors. Engeström [36] describes the component "community" as a group of individuals who all act in relation to the same object. However, the remote placement ("division of labour") and no overlap with more experienced NGDs ("rule") caused contradictions when no one else were directed to the same object (Fig. 3.B.2). This again strengthened their feeling of being alone and overwhelmed by the various struggles - and corresponds with an NGD's statement of feeling as "the guest of the week".

Our results emphasise that the members of the "community" are a pivotal part in the process of fitting the white coat, and they show how elements within "rules" and "division of labour" may limit or hinder the access to the "community". Thus, it is important that the planning of the NGDs' postgraduate medical education programme addresses this essential need, for example by ensuring clinical encounters between NGDs and their closest collaborators.

The overall consequences for learning

When the *responsibility* is overwhelming, when the NGDs don't *know how* to do things, when they are short *of time* and their *collaborators* are not available, the NGDs often chose the quickest solution; consult their collaborators for answers. This "quick fix" has implications for their opportunities to learn, as they miss out on the intermediate results and thoughts behind the decisions and skip their own important learning.

The organisation where the NGDs work full-time and at the same time are engaged in an education programme (acquiring skills) often generates a conflict between" service" and "learning". This struggle seems to be unavoidable [1, 7, 28], however this study underlines the importance of working with various elements within the hospital organisation, which might mitigate some of the challenges.

The CHAT theory provided us with a model to identify relevant contextual factors and helped us clarifying how various elements of the activity system caused changes in the others and how the challenges this created could be addressed. This study contributes to the medical education literature by increasing our understanding of how the contextual factors influence the NGDs' work and education environment. This knowledge is crucial to incorporate into further work of optimising the postgraduate medical education, and it may have an important implication for the undergraduate curriculum as well.

Future perspectives

Our results suggest several contextual factors within the hospital organisation that could be addressed in order to mitigate the NGDs' struggles when fitting the white coat. Future work is needed to explore these factors further and ideally in collaboration with all the involved stakeholders in order to contribute to new learning in the organisation and better organisation of the NGDs' first months. By exploring the struggles and the contextual factors involved, our findings also evoked an interest in how the NGDs handled these struggles. In future studies, we aim to both explore how the NGDs "survive" and to develop appropriate initiatives to diminish some of the challenges which the NGDs are facing.

Limitations

Our study has some limitations. Firstly, as it focused on experienced struggles, it does not pay much attention to the more positive aspects of working as an NGD. Secondly, our study was conducted in a limited number of medical specialities at a single hospital. Nevertheless, we believe that the description of this case and the referral to the various contextual factors and elements described in CHAT could allow others to recognise and address similar problems in their own institutions.

Conclusion

In this study, we found that the NGDs experience several struggles when working as newly graduated in a complex clinical setting: *Responsibility*, *Local knowhow*, *Time management*, and *Collaborators*. We further explored various contextual factors, which might have an influence on these experiences. These findings represent a powerful demonstration of the need to take contextual factors into account when developing postgraduate medical education in order to mitigate some of the struggles that the NGDs are facing. In doing so, it is important to bear in mind that these are interrelated and when modifying one element, another may be affected.

Abbreviations

NGD: Newly Graduated Doctor; CHAT: Cultural Historical Activity Theory; A&E: The Accident and Emergency Department

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Authors' contributions

TLK and SBN planned and designed the study and had the contact with the clinical departments. TLK carried out the fieldwork (observations and interviews). TLK made the initial coding and SBN contributed to the validation of encodings. All authors participated in further discussion of the design, methods, analysis and drafting of the manuscript. TLK was responsible for drafting the manuscript. All authors have read and approved the final manuscript.

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Availability of data and materials
The data generated and analysed during the current study is available from the corresponding author on reasonable request.

Ethics approval and consent to participate
The Regional Ethics Committee of The North Denmark Region ruled that no formal ethics approval was required in this case (2016–000615). However, the study was still planned in accordance with the EU General Data Protection Regulation. When interacting with patients, the field worker remained in the background and either introduced herself or was introduced by the NGDs, typically very briefly as "one observing our work". The participants were informed about their right to withdraw from further research at any time. All quotes, written materials and personal identifiable information were fully anonymised, and in this article, we identified each participant with a unique identity code. The NGDs work in various settings, and it was thus necessary to inform many employees and departments about the project. This was done through written notices in the break rooms and email correspondence to heads of departments and principal nurses. However, we are aware that it is impossible to inform everyone who the NGDs interact with about the research since the NGDs work across several departments and therefore walk across the hospital premises multiple times and interact with many collaborators on every shift. This is why the consent, anonymisation of both participants and departments, and confidentiality of all data gathered are crucial [30].

Consent for publication
Not applicable.

Competing interests
The authors declare that no competing interests or conflict of interest had bias on the outcomes of our paper.

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Publisher's Note

Appendix B. Paper II

Klitgaard, T.L., Stentoft, D., Johansson, N., Grønkjær, M. and Nøhr, S. 'Collaborators as a key to survival: An ethnographic study on newly graduated doctors' collaboration with colleagues'. Manuscript in preparation for submission to *BMC Medical Education*, expected December 2021

Appendix C. Paper III

Klitgaard, T.L., Gjessing, S., Skipper, M. and Nøhr, S. 'Becoming a doctor – The potential of a Change Laboratory intervention'. Manuscript submitted for publication to Medical Education, November 2021

Appendix D. Interview guide

Interviewguide til gruppeinterview (KBU)

Temaer	Interviewspørgsmål
Velkomst, briefing	Introduktion: Interviewet omhandler jeres oplevelse af at være KBU-læge på AAUH. Det skal bruges som supplement til mine observationer på afdelingen i forbindelse med forskningsprojektet omkring uddannelses- og arbejdsmiljøet. Det er et område, som jeg som udefrakommende ikke ved særlig meget om, så jeg er rigtig glad for, at I er kommet her i dag, og gerne vil dele jeres oplevelser med mig. I er naturligvis anonyme i den skriftlige fremstilling, så I ikke kan genkendes i de endelige forskningsresultater. Men lige så vigtigt det er, at jeg garanterer jer anonymitet, lige så vigtigt er det, at det, der bliver sagt her også bliver her. Så I ikke snakker med andre om, hvad der er blevet sagt her. Interviewet vil blive optaget på bånd og transskriberet. Interviewet vil tage ca. halvanden time. Interviewet er anderledes end det, man normalt forbinder med at blive interviewet. Her er det mest jer, der skal snakke og diskutere med hinanden – lidt ligesom at sidde hjemme hos én af jer til daglig og snakke over kaffen. I kører selv diskussionen. Hvis den kører af sporet, hvis I løber tør for ting at sige, hvis ikke alle kommer på banen, så skal jeg nok supplere. Det er vigtigt, I husker på, at jeg ikke er interesseret i et "rigtigt" svar, men netop at få nuanceret tingene og få bragt flere synspunkter i spil. Det billede, I skal give, er det som er rigtigt for jer. I behøver ikke at være enige om svarene. Det er vigtigt, at I diskuterer spørgsmålene i gruppen – og ikke svarer til mig. For at jeg kan få det hele med, vil jeg bede jer om, ikke at tale i munden på hinanden. Undervejs vil jeg tage noter. Spørgsmål inden vi går i gang?
Introduktion af interviewpersoner	Jeg vil gerne, hvis I til at begynde med kort præsenterer jer ved navn og fortæller, hvilken afdeling I er tilknyttet, hvor lang tid I har arbejdet her, hvor I er uddannet, og om I har klinisk erfaring fra tidligere (vikariater under studiet?).
Hvad lægger de vægt på? (beskrivende startspørgsmål)	Jeg er her jo for at høre om jeres oplevelse med at arbejde som KBU-læger her på AAUH. Jeg vil spørge mere specifikt ind til forløbet i løbet af interviewet, men jeg kunne egentlig godt tænke mig at begynde med at spørge jer sådan helt bredt: Hvis I skulle fortælle nogle kommende læger om, hvordan det er at være KBU-læge her på AAUH, hvad ville I så sige til dem? KORT OPSAMLING PÅ TVÆRS
Forventninger til ansættelsen	Hvorfor valgte I netop forløbet her? (KBU-nummer, geografi, sammensætningen af forløb, ry, uddannelsen?) (Er der tale om et tilvalg eller et fravalg?) Kan I huske, hvilke forventninger, I havde til arbejdet inden I begyndte? Kendte I på forhånd noget til arbejdet her? Kendte nogen, der har arbejdet her? KORT OPSAMLING PÅ TVÆRS
Transitionen fra stud.med. til KBU	Hvordan husker I overgangen fra universitetet til ansættelsen?

Side **1** af **2**

	- Gerne konkret eksempler på gode/dårlige oplevelser - Var der nogen særlige udfordringer? - Hvor ligger ansvaret? Hos jer? Uni? Postgraduat? Kan I komme i tanke om noget, der kunne gøre overgangen bedre? KORT OPSAMLING PÅ TVÆRS
"Lære at være læge"	I KBU-målbeskrivelsen står der beskrevet, hvordan I skal "lære at være læger" - Hvad forbinder I med "at være læge"? - Hvordan synes I afdelingen løfter opgaven at "lære jer at være læger"?
Organisering af arbejde	Under feltarbejdet har jeg lagt mærke til, at jeres vagter er organiseret forskelligt. Kan I prøve at sætte ord på ligheder/forskelle på tværs? Hvad har det af fordele/ulemper? (Bliv ved med at diskutere det, indtil det står klart for jer selv, hvor I er enige, og hvor I er uenige) (OBS på eksempler) Hvad er jeres generelle oplevelse af arbejdets og uddannelsens organisering? Opmærksomhedspunkter: - Introduktion - Tilgængelighed af kollegaer - Mulighed for supervision/feedback/opbakning - Samarbejde med andre læger (herunder afgående KBU-læger) og sygeplejersker/faggrupper - Arbejdsbelastning Eksempler på uhensigtsmæssige oplevelser? Forslag til forbedringer? KORT OPSAMLING PÅ TVÆRS
Samarbejdspartnere	I løbet af en typisk arbejdsdag – hvem arbejder I sammen med? (Ældre lægekollegaer, andre KBU, YL og sygeplejersker) Er der udfordringer? Hvornår fungerer det? (OBS på, om de italesætter egen rolle i at få det til at fungere)
Mulige forbedringer	Er der noget, I tænker kunne gøres anderledes/bedre ift. generelt på afdelingerne ift. at gøre det til et bedre uddannelsessted? (Evt. Colucci, "tryllestav")
Afslutning	Noget, I vil spørge om eller tilføje? Er der noget, som I troede, vi skulle snakke om, som jeg ikke har fået spurgt ind til?
Debriefing	Opsamling på interview Hvordan har I oplevet det at deltage i interviewet?

Side **2** af **2**

Appendix E. Change lab planning sheet

This is an example of a work sheet that was used internally within the research group in planning the CL sessions, Study 2.

CHANGE LABORATORIUM SESSION	**NR.** 2 (04.02.20)

To-do liste til forberedelse

- Samtykkeerklæringer inkl. beskrivelse af proces sendes til nye deltagere
- Navneskilte, deltagerliste og bordinddeling
- Skilt til døren
- Kamera (inkl. Stativ og mikrofoner) + diktafoner (3 stk.) + pointer
- Resumé fra session 1
- Citater/statements fra observations og interviews + session1 – "historie" til fælles refleksion

Hovedformål for sessionen i den ekspansive lærings cyklus

- At diskutere hvordan faktorer inden for hospitalets organisation kan påvirke KBU-lægens oplevelser

Tid	**Min**	**Tema**	**Værktøjer, spejl, 2. stimuli**
08:00	3	Velkomst v/mødeleder, herunder praktiske informationer, præsentation af projektet (overordnet formål) og CL metoden	Powerpoint præsentation Moderator, via pps.
	3	Opsamling på session 1 - De fire temaer (session 1) + deltagernes refleksioner	Mirror: Oversigt over pointer, resume skriftligt
	5	Introduktion til dagens fokus, herunder præsentation af CHAT	2. stimuli: Ekspansiv læring – cirkel + CHAT-modellen
08:12	20	Gruppearbejde, 3 grupper	Forskerteam understøtter gruppearbejdet ved at gå rundt/sidde med. LHC tager tid
08:30	15	Opsamling og refleksioner i plenum Afrunding	På white-boards noteres pointer
8:45		Tak for i dag	

Til moderator's opmærksomhed

Udvælgelse af repræsentanter?

Fra Virkkunen, J. & Newnham, D. S. *The Change Laboratory - A Tool for Collaborative Development of Work and Education*. 1–269 (Sense Publishers, 2013).

Appendix F. NGD introduction day

I gode hænder hos
AALBORG UNIVERSITETSHOSPITAL

KBU-Introduktionsdag - velkommen som forvagt på Aalborg UH
2. november 2021 i Auditorium Syd

"KBU-Introduktionsdag - velkommen som forvagt på Aalborg UH" er primært målrettet alle nyansatte KBU-læger, men er også relevant for præ-KBU og introlæger, der ikke tidligere har været tilknyttet Aalborg Universitetshospital, og som skal fungere som forvagter.

Formålet med dagen er at give de nyansatte læger et fælles fagligt udgangspunkt, og samtidig skabe et fællesskab på tværs af afdelingerne.

"KBU-Introduktionsdag - velkommen som forvagt på Aalborg UH" er et supplement til den lokale afdelings introduktion – og fokuserer på arbejdsfællesskabet omkring akutte patienter og lokalt "know how". Dagen følges op af månedlige "Forvagtsforum", hvor forskellige tematikker tages op (fx "Klinisk vejledning", "Skemalægning" og "Fra hospitals-KBU til praksis-KBU), og hvor der samtidig lægges vægt på fællesskabet på tværs af afdelingerne.

Hvornår	Hvad
8.10-8.30	**Velkomst**, baggrund og formål med dagen **Uddannelse på arbejdspladsen**, kompetencevurdering og ansvar for egen læring
8.30-9.30	**At arbejde som forvagt på Aalborg UH – En vigtig opgave** **Patientens vej gennem Aalborg UH – lægens arbejdsopgaver** Præhospitalet, akutmodtagelsen og videre på afdeling/hjem
9.30-9.45	**PAUSE,** kaffe + rundstykker
9.45-10.45	**Rundvisning + gruppediskussioner om dilemmaer og "ring rigtigt"**
10.45-11.45	**Flow og samarbejde på tværs af afdelinger og faggrupper - forventninger og prioriteringer** Hvordan sikres et godt flow, hvor alle hjælper hinanden? Indblik i koordinatorernes rolle (sygeplejerske, akutlæge), når mange patienter skal igennem modtagelsen fordelt på få timer og få stuer **God mundtlig kommunikation**. Sygeplejerskens og akutlægens oplevelse af den gode kommunikation – hvad har de brug for fra forvagten, og omvendt hvad kan forvagten bruge dem til? **God skriftlig kommunikation og overlevering**. Journaldiktat og epikrise
11.45-12.15	**FROKOST**, sandwich og kildevand
12.15-12.40	**Den gode røntgenhenvisning**
12.40-13.25	**Fællesskab og forventninger til arbejdet** Gruppearbejde omkring forventninger til det kommende arbejde som KBU-læge på Aalborg UH på tværs af afdelingerne
13.25-14.00	**Ligsyn, dødsattest og obduktion**
14.00-14.45	**Rundbordssnak med afdelingernes UKYL'er** (med kaffe) Forventningsafstemning og spørgerunde
14.45-15.15	**Vigtige informationer, evaluering og afslutning** Fremtidigt netværk for KBU – "Forvagtsforum"

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