
A TECHNO-ANTHROPOLOGICAL STUDY OF COVID-19'S INFLUENCE ON PHYSICIANS AND NURSES' HAND HYGIENE PRACTICE

- And technologies used to prevent transmission of COVID-19



School of Architecture, Design and Planning MSc
Master of Science in Techno-Anthropology



Title: *A TECHNO-ANTHROPOLOGICAL STUDY OF COVID-19'S INFLUENCE ON PHYSICIANS' AND NURSES' HAND HYGIENE PRACTICE*

Semester: 10. Semester
Semester theme: Master's Thesis
Project period: 01/02 2020 – 04/06 2020
ECTS: 30
Supervisor: Pernille Bertelsen
Project group: 6

Line Thane Andersen (20155852)

This Master Thesis, study how hospital physicians and nurses hand hygiene practice at Aalborg University Hospital South has been affected by the COVID-19 pandemic. Additionally, the study focuses on technology mediated actions that can prevent transmission of the virus among staff and hospitalized patients. The methods applied in the study are: Fieldwork, participatory observation, unstructured- and semi-structured interview.

Etienne Wenger's Communities of Practice is the theoretical framework. The theory supports the physicians' and nurses' experiences of changing communities and practices and how the situation has entailed learning. Postphenomenology is used as a complementary theory to analyze the technologies the physicians and nurses use to prevent transmission of the virus and to maintain their work.

Pages: 89

Appendix: 6

The report is not confidential - I am responsible for the all contents in the project.

Abstract

Hospitalsinfektioner har i en årrække været et globalt problem. Der er flere årsager til, at patienter kan erhverve sig en hospitalsinfektion, heraf personalet, besøgende og omgivelserne. Flere initiativer bruges til at bekæmpe og forebygge hospitalsinfektioner, herunder antibiotika og korrekt håndhygiejne. I dette speciale har det været hensigten at undersøge læger og sygeplejerskers håndhygiejne praksis og dennes indflydelse på hospitalsinfektioner. Derudover har der været fokus på de teknologiske løsninger, som personalet har anvendt under COVID-19 pandemien til at begrænse smitten blandt personale og patienter, men også for at opretholde udførelsen af deres arbejdsopgaver.

Undersøgelsen i dette speciale er udført på Aalborg Universitetshospital Syd. De udvalgte metoder til at undersøge ovenstående er feltarbejde, deltagerobservation, ustrukturerede- og semistrukturerede interviews. Communities of Practice danner det teoretiske grundlag og er anvendt til at analysere, hvorvidt der er sket en ændring i læger og sygeplejerskers håndhygiejne praksis. Postfænomenologi er anvendt som supplerende teori og fokuserer på de teknologi-medierede handlinger der har til formål at forebygge smitte såvel som at give personalet mulighed for at opretholde deres arbejdspraksis.

Hvorvidt det øget fokus der er både på håndhygiejne og anvendelsen af teknologi, til at begrænse smitte, vil blive anvendt fremadrettet efter pandemien er vanskeligt at konkludere indenfor specialets tidsramme.

Preface

This Master Thesis came to be in the spring of 2020 by a 10th Semester Techno-Anthropology student at Aalborg University. The focus of the Master Thesis is how COVID-19 has affected physicians' and nurses' work tasks and practices and whether it has influenced them to become more aware of their hand hygiene practice. The study in the thesis has also focused on the technologies used to prevent transmission of the virus and how these technologies can mediate communication and help prevent hospital acquired infections in the future. In this study, the first part of collecting empirical data was through fieldwork, participatory observations, and unstructured interviews conducted at Aalborg University Hospital South. The second part was semi-structured interviews with 11 physicians and nurses.

In preparation for this study, I would like to thank the people who have contributed. First and foremost, I would like to thank the Work Environment Coordinator Ove Willadsen for his engagement, availability, help, and mediating contact throughout this project. Also, I would like to thank the Hygiene Unit for their collaboration, engagement, and granting access to Aalborg University Hospital South.

Additionally, I would like to thank everyone who has helped me throughout the data collection. A special thanks to the 11 informants who were willing to spare time and participate in interviews and share their experiences. Your contribution is of great significance for this study.

Lastly, I would like to grant a huge thank you to my supervisor Pernille Bertelsen for her availability, engagement, and good and constructive feedback. Your sparring has had a positive influence during the process of this Master Thesis.

Disclaimer from Head of Studies and Head of Study Boards

COVID19 and the consequences of the lock-down of society and the university since March 13, 2020 have had influence on which activities that have been possible to stage and carry out as part of the project work. More specifically, this means that activities have been limited to online activities, and that activities such as Lab activities; surveying activities; on-site ethnographic studies and on-site involvement activities have not been possible.

When assessing this project, please bear this in mind.

The consequences of the lock down affected my plans for doing fieldwork at Aalborg University Hospital. As the COVID-19 situation is relevant for the focus of this study: Hand hygiene and Hospital infections, it was decided to include the pandemic into the study. Other ways to collect empirical data was found and the study ended up focusing on how the pandemic have affected physicians' and nurses' hand hygiene. Throughout the Master Thesis, it will be evident that the pandemic has been included as a part of the focus. The process of how the situation affected the study have been written into the thesis.

Reading guide

The following will give an overview of the structure of this Master Thesis. Please note that medical terms may not be correctly translated to English throughout the thesis. The interviews were conducted in Danish, and the citations from the transcribed interviews have been translated to be readable in English. Therefore, they are not a complete representation of the informants' statements. However, the meaning has been preserved. The original statements can be found in the extracts from the transcribed interviews in Appendix E.

The thesis is divided into 10 chapters. Below is a short presentation of each chapter.

1. Introduction

The thesis is presented with its overall purpose, challenges, and the location of the empirical data gathering. Furthermore, the interdisciplinary collaboration with the Work Environment Coordinator and the Hygiene Unit will be explained. The chapter ends with an initiating wonder.

2. Problem analysis

This chapter addresses the initiating wonder. It defines hospital acquired infections, how patients acquire an infection, the scope of the problem, how the infections are treated and prevented, and lastly, the health care professionals' role in relation to preventing infections.

3. The effects of a pandemic outbreak

It is addressed how the pandemic had affected and caused changes to the study. It starts with an overview of the COVID-19 development in Denmark and how its influence on the study progressed. Followed by reflections on the focus of the study and the changes that have been made moving forward.

4. Problem statement

Within this chapter, a delimitation of the focus of the study is presented followed by the problem statement which has been divided into two questions.

5. Methods

Clarifies the methods used in the study. Fieldwork has been used as the overall methodological framework. 1) The first part of the study was participatory observations and unstructured interviews. 2) The second part was semi-structured interviews.

After the presentation of the methods, the application is discussed as well as how the methods have helped collect empirical data to answer the problem statement.

6. Presentation of empirical findings

The empirical findings from the two parts of the study are presented in this chapter. The physicians' and nurses' experiences and opinions are elucidated and will be further analyzed in the analysis.

7. Analysis

This chapter presents the analysis. It is split into two parts. The theories are shortly presented and further elaborated in the analysis. The overall theoretical framework is Communities of Practice which will be used to analyze the way the pandemic has affected the communities and their practices. 1) is an analysis of the physicians and nurses who maintained their work at their department of employment. 2) analyzes the physicians and nurses who were working at the Pandemic Department. Communities of Practice will continue to be used to analyze the establishment of a new community of practice. Additionally, postphenomenology is used to analyze the socio-technical perspectives of the technologies used at the Pandemic Department to prevent transmission of COVID-19.

8. Discussion

The physicians' and nurses' experiences with how the pandemic has affected their hand hygiene practice is discussed. The technologies that have mediated action as for preventing transmission and maintaining work tasks are also discussed. The discussion about hand

hygiene and technology mediated communication is compared with how they can help prevent hospital acquired infections after the pandemic.

9. Conclusion

This chapter will conclude on how the pandemic has affected physicians' and nurses' hand hygiene practices. Furthermore, it reflects on what the informants have learned from the pandemic and if they will integrate some of these learning experiences in their work practice after the pandemic.

10. Bibliography

This chapter holds references for the literature used in this Master Thesis.

11. Appendix

The appendixes are attached in a separate document and are divided into six chapters.

The full transcribed semi-structured interviews will be available during the exam. In the appendix are extracts used in the analysis. This way of handling the semi-structured interviews is to preserve the informants' anonymity as their statements about their work are intertwined with the department they work at.

- Appendix A: Interview guide
- Appendix B: Follow up interview guide
- Appendix C: Poster
- Appendix D: Informed consent document
- Appendix E: Extracts from the transcribed interviews
Interview 1 – 11
- Appendix F: Fieldnotes
Fieldnotes 1 - 4

Table of contents

1. Introduction	12
2. Problem analysis.....	14
2.1. Defining hospital acquired infections	14
2.1.1 How do patients acquire a hospital acquired infection	16
2.2 Are hospital acquired infections a problem	18
2.2.1 Treatments and ways to prevent hospital acquired infections	20
2.3 Health care staff's influence on hospital acquired infections	21
3. The effects of a pandemic outbreak.....	24
3.1 The progression of COVID-19 in a Danish context.....	24
3.2 The original plan for the study	26
3.2.1 Planning the study.....	27
3.2.2 Getting started on fieldwork.....	28
3.3 A time of uncertainty	29
3.3.1 From fieldwork negotiations to lock down	30
3.4 A new focus for the study.....	33
4. Problem statement.....	35
5. Methods	36
5.1 Fieldwork.....	36
5.1.1 Participatory observation	37
5.1.2 Interview.....	40
6. Presentation of empirical findings	45
6.1 Baseline data	45
6.2 How COVID-19 have affected physicians' and nurses' communities of practice	46
6.3 Working at the Pandemic Department	47
6.4 The field visit to the Pandemic Department	48

7. Analysis.....	51
7.1 How COVID-19 have affected physicians and nurses working at their department of employment.....	51
7.1.1 Having to reorganize to phone consultations	54
7.1.2 How the Pandemic Department have affected the informants' communities	56
7.1.3 Physicians and nurses being aware of microorganisms on work related technologies.....	59
7.1.4 The physicians' and nurses' hand hygiene practice	61
7.2 Technology used to prevent transmission of COVID-19	66
7.2.1 The use of personal protective equipment.....	70
7.2.2 Using technology to be in contact with relatives	73
7.2.3 The ventilation system as preventing transmission	75
7.2.4 Summary of technology relations.....	77
8 Discussion	78
8.1 The Pandemics influence on physicians' and nurses' hand hygiene practice.....	78
8.2 Breaking the habit of introducing oneself with handshakes	80
8.3 Video- and phone consultations as a future solution	80
8.4 Technology mediated "visiting hours" as a replacement for personal attendance.....	81
9. Conclusion.....	83
10. Bibliography.....	86

Figure list

Figure 1: The process of the study from starting point to end point.	13
Figure 2: The difference between a hospital acquired infection and a community acquired infection.	15
Figure 3: The different ways a patient can acquire an infection at the hospital. The figure has been translated into English	16
Figure 4: An example of a process for how a patient can acquire an infection	17
Figure 5: Numbers from the Danish surveillance system HAIBA. Showing the number of infections from the six monitored infections from year 2014-2018 divided into months.	19
Figure 6: Showing the daily number of infections in EU	20
Figure 7: Events from the fast growing development of COVID-19 in Denmark.....	25
Figure 8: Example of how predefined cases could be visualized during the interviews.....	28
Figure 9: The five recommendations from the Danish Health Authority.....	29
Figure 10: The development in the number of people testing positive with COVID-19 in Denmark between February 27 to March 10.....	30
Figure 11: The magnifying glass visualize the Pandemic Department	33
Figure 12: Showing fieldwork as the overall framework and the first part of the study with participatory observations and unstructured interviews to the left and the second part with semi-structured interviews to the right.....	36
Figure 13: Cato Wadel's categories for participatory observations	38
Figure 14: The four situations with participatory observations. The first meeting was in December and the last meeting in March due to COVID-19	39
Figure 15: The snowball sampling process and the people and informants involved in the process. The green colour is the informants.....	42
Figure 16: The different departments that are the 11 informants department of employment.	45
Figure 17: Distribution of informants respectively working at the department of employment and the Pandemic Department.....	46
Figure 18: Map showing the area of Aalborg University Hospital South. The magnifying glass is the Pandemic Departments and the arrows indicate the departments of employment the informants normally work at	50
Figure 19: Visualization of the four components of learning in Communities of Practice	53
Figure 20: The poster with the five guidelines from the Danish Health Authority the informants were shown during the interview in an English version	64

1 | Introduction

This Master Thesis deals with hospital acquired infections and hospital physicians' and nurses' hand hygiene practice. For over a century, hand hygiene has received increased attention and has been linked with preventing infections occurring in hospitalized patients (Kadar, Romero, and Papp 2018) (Gesser-Edelsburg et al. 2020). This thesis departure from a Danish perspective, with an estimated 60.000 hospital acquired infections a year (Statsrevisorerne Rigsrevisionen 2017). Hospital acquired infections are a societal problem whose economic consequences are unknown. They are a societal problem that causes prolonged hospital stays, reduced quality of life, and long-term disability among the infected (World Health Organization 2009) (Cassini et al. 2019). Hand hygiene has proven to be one of the most effective ways to prevent the transmission of microorganisms that can cause an infection (Statens Serum Institut 2018c).

This study departure from a curiosity about the complexity of hospital acquired infections. It both involves looking into human behavior and technological solutions when trying to solve the problem. It is a problem that has not been solved yet and therefore, this thesis study ways to prevent transmission. At Aalborg University Hospital, a Hygiene unit work on how to improve the hand hygiene among the staff and reduce the number of hospital acquired infections. An interdisciplinary collaboration was established with a Work Environment Coordinator, three employees from the Hygiene Unit, and two chief physicians. In collaboration, the focus of the study was brainstormed and designed.

The focus has been on physicians' hand hygiene practice relating to hospital acquired infections as the collaborators have been anxious to gain more insights into this area. The study started at the beginning of February and within the first one and a half months, the Corona situation turned into a pandemic that ended up having consequences for the study. Although the design of the study changed, the focus remained with some small changes. Figure 1 broadly outlines the changes which will be further elaborated in Chapter 3.

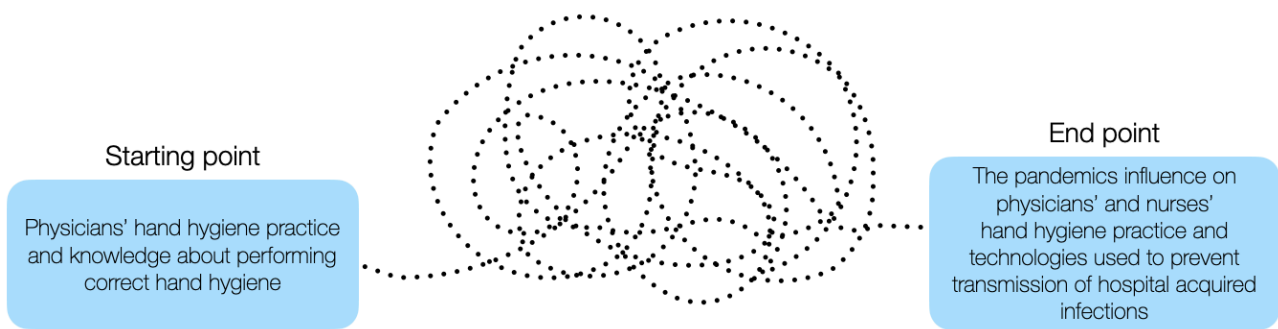


Figure 1: The process of the study from starting point to end point.

The original plan for the project was to study physicians' hand hygiene practices and knowledge about hand hygiene by shadowing them and observe their behavior. Furthermore, the physicians were going to be interviewed about their knowledge. The changes that were made was to broaden the focus to physicians and nurses. Furthermore, the focus had been changed to study how the pandemic has affected physicians' and nurses' hand hygiene practices. The study has also focused on technologies used to prevent transmission of COVID-19 among patients and staff.

The thesis is structured in that way, that Chapter 2: Problem analysis is based on the original plan for the project based on the initiating wonder below. Chapter 3: The effects of a pandemic outbreak addresses the way the pandemic affected the study and the process of changing the focus. Chapter 4: Problem statement and the remainder is based on the new focus of the study.

The initiating wonder was based on a curiosity about hospital acquired infections, the influence of hand hygiene, and the role of the health care staff in relation to the infections:

How do health care professionals affect hospital acquired infections in hospitalized patients?

In the following, a problem analysis will address hospital acquired infections, how they are defined, how patients acquire an infection, how they are a problem, and how they are treated and prevented.

2 | Problem analysis

This chapter is exploring the initiating wonder. It starts out with how hospital acquired infections are defined, how they are acquired, and if they are a problem. Lastly, the chapter is clarifying the health care professionals influence on patients acquiring an infection.

2.1. Defining hospital acquired infections

Through a search for a definition of hospital acquired infections (HAI), various terms appeared. The prevalent terms in the literature search was health care-associated infections (World Health Organization 2009), hospital acquired infections (Sagar et al. 2019) and nosocomial infections (Girard et al. 2002).

Health-care associated infections is an amplification of the term hospital acquired infections. The term hospital acquired infections has traditionally been grasped as a patient acquiring an infection while being hospitalized which was not appearing during admission or was in incubation during the admission. Health care-associated infection which is the amplification has a broader meaning as it includes not only infections acquired at a hospital but also infections that are acquired in other health care facilities (Padoveze et al. 2019).

The World Health Organization (WHO), a world alliance, who is working towards a safer Health Care, has also described what defines HAI and notes that not only patients but staff as well can acquire HAI (Girard et al. 2002):

“An infection occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility (2).” (Girard et al. 2002, 1).

Some of the terms include different contexts, like health care facilities, the term used throughout this thesis is *hospital acquired infections*. This is due to the term indicating the context as being at a hospital. The further focus in this thesis is infections acquired by *hospitalized patients in hospitals*.

Looking further into what classify HAI, an infection can be assessed as a community acquired infection or a hospital acquired infection depending on the incubation time (Padoveze et al. 2019). Symptoms and incubation time are determining factors related to classifying HAI:

“The date of symptom onset is often used to distinguish health-care-associated from community-acquired infections. Those patients developing symptoms early in an inpatient stay are considered to have community-acquired infection, while those developing symptoms later are considered nosocomially infected.” (Lessler, Brookmeyer, and Perl 2007, 1220)

In order to assess whether an infection is community acquired or HAI among patients, time is used to define the situation that caused the infection. Figure 2 show, that if a patient has been admitted for more than 48 hours and infections are occurring, then it is usually considered as HAI (Statsrevisorerne Rigsrevisionen 2017) (Girard et al. 2002). This means that an infection occurring before 48 hours of admission, then, the infection is most likely community acquired if the patient has not had any previous encounter with other health care facilities which could have caused the infection (Girard et al. 2002). In the following, it will be further explored how patients acquire HAI.

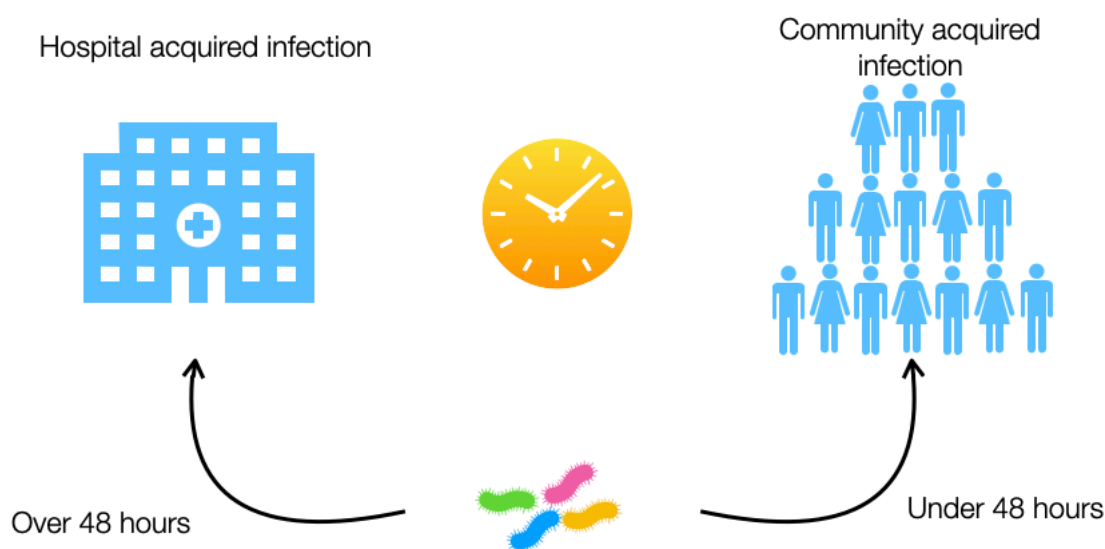


Figure 2: The difference between a hospital acquired infection and a community acquired infection.

2.1.1 How do patients acquire a hospital acquired infection

Hospitalized patients are surrounded by and being exposed to different microorganisms. Being surrounded and exposed to these different microorganisms does not necessarily result in acquiring an HAI, but some factors like patients having decreased immunity response when being at the hospital and invasive procedures and techniques are increasing are all contributing to the risk of acquiring an infection (Padoveze et al. 2019) (Girard et al. 2002). Several types of microorganisms can cause infections: bacteria, fungi, parasites, and viruses. Patients can acquire an infection in any region of their bodies and the infection can either be caused by the environment an individual is or has been in. Substances or objects patients has been in contact with and therefore can risk acquiring an infection from can be caused by other individuals who have been in contact with and have contaminated the object or substances (Girard et al. 2002). Figure 3 shows examples of the different ways a patient can acquire an infection. An infected patient can have been in contact with, for example, employees, visitors, and inventory which another patient afterward has been in contact with.

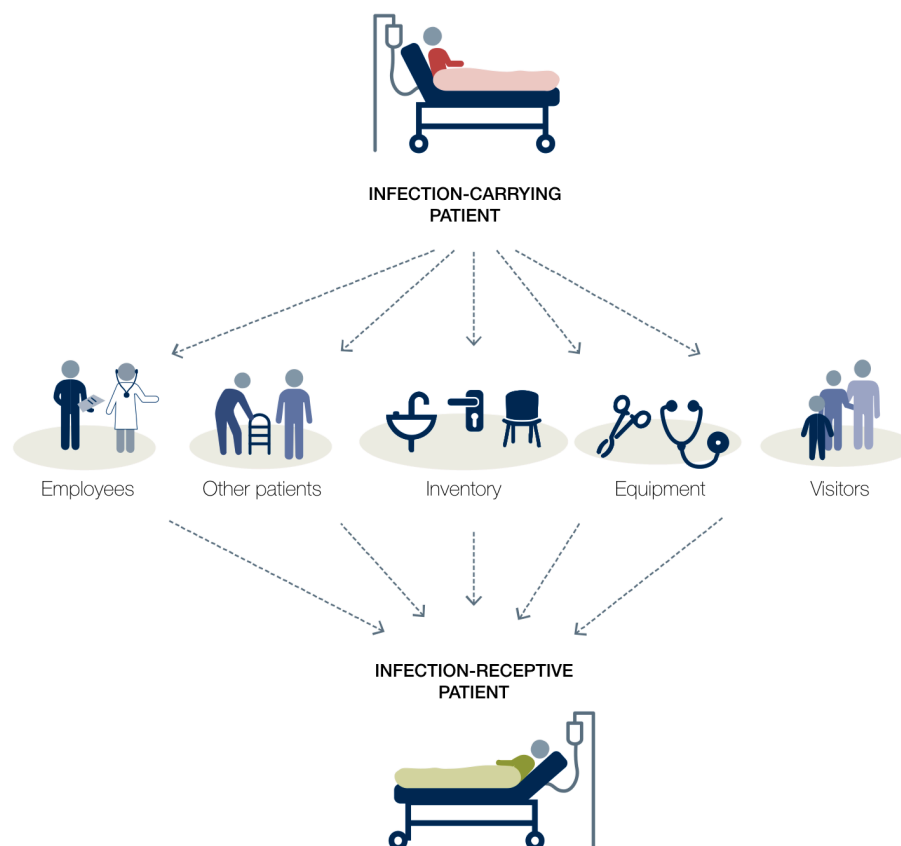


Figure 3: The different ways a patient can acquire an infection at the hospital. The figure has been translated into English (Statsrevisorene Rigsrevisionen 2017)

When acquiring an infection, the infection source can either be endogenous or exogenous. The patient's own microorganisms can cause an infection, endogenous, which could be during surgery or via some sort of catheter (Statsrevisorerne Rigsrevisionen 2017). In some cases, a patient is carrying multi resistant bacteria which does not necessarily cause any symptoms in the patient but can cause an infection if the natural barrier, like the skin, is fractured during surgery or other treatments. The patient can transmit these bacteria to objects and surfaces other patients touch and thereby infect others even though the patient has not acquired an infection itself.

Exogenous caused infections are microorganisms that do not come from the patient's own flora, like the health care staffs' hand or the environment. It is difficult and not always possible to determine whether the infection is caused by endogenous or exogenous infectious (Statsrevisorerne Rigsrevisionen 2017). An infection grows when the patient's own immune response system does not succeed in fighting the microorganisms which therefore gets the chance to develop (Statsrevisorerne Rigsrevisionen 2017). As immune-composed patients who are infection-receptive as well as infection-carrying patients both are located at the hospital, it provides bacteria good growing conditions. The way the infection can be disrupted is through good hygiene and is considered as one of the best preventive methods to HAI (Statsrevisorerne Rigsrevisionen 2017). The way a patient can be infected is through multifarious routes of infection: through direct or indirect contact, air, droplets, dust, and vehicle born. Direct contact is for example skin contact and indirect could be through surroundings or medical equipment that has not been adequately cleaned. Examples of air born infection are tiny little drops in the air, whereas infection through drops can be sneezes, speech, and coughing. The microorganisms are able to stay where they were left until they die or otherwise are removed. The amount of time a microorganism is capable of surviving is determined by its character and the environment the microorganism was let in. Factors that can be determined of its capability of survival are temperature conditions, whether the environment is moisture or dry, and the type of surface (Statens Serum Institut 2019b). Figure 4 show a possible way of infection:

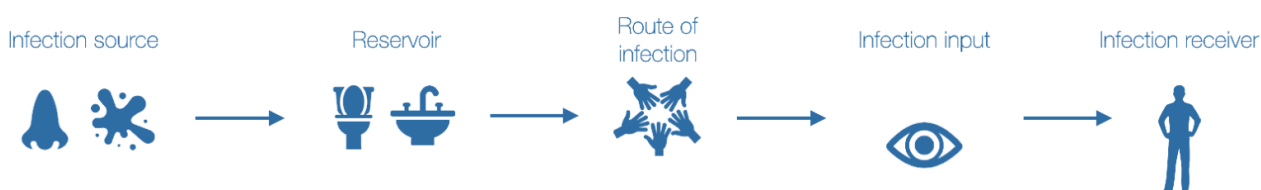


Figure 4: An example of a process for how a patient can acquire an infection (Statens Serum Institut 2019b)

2.2 Are hospital acquired infections a problem

HAI have been a problem for many years (Gesser-Edelsburg et al. 2020) and are considered as one of the most frequent adverse a patient can acquire during care delivery. It is a global problem that has not yet been solved, although, some discoveries have been made regarding what can help prevent as well as kill the infections (World Health Organization 2016)(World Health Organization 2009).

HAI are causing death among the affected and other consequences might be longer hospitalization, an increased resistance in regard to microorganisms, due to antibiotics, and long-term disability (World Health Organization 2009) (Cassini et al. 2019) that can result in the patient's quality of life being reduced (Girard et al. 2002) (Storr et al. 2017).

Patients affected by HAI can have economic consequences in that a prolonged hospital stay can increase the patient's cost, for example lost work. The payers as well will have increased costs, and prolonged stays are considered as one of the greatest costs due to the possibility of isolation and the increase in drug use (Girard et al. 2002) (Statsrevisorerne Rigsrevisionen 2017). According to a Danish report about the prevention of HAI, it is stated that the infections have economic consequences in Denmark. The economic consequences are unknown but solutions like surveillance of HAI, a focus on prevention, and more rational use of antibiotics are in focus (Statsrevisorerne Rigsrevisionen 2017).

Guidelines, as well as surveillance systems, are being implemented in more and more countries and due to problems such as lack of resources in low- and middle-income countries, there is no reliable data about estimating the global burden (Allegranzi et al. 2011) (Storr et al. 2017). Estimations are being made about the size of the problem and it is anticipated that many people, which are around hundreds of millions, are being affected. In the European Union, around 4,500,000 people are affected yearly and the annual death rate is around 37,000 people (Gesser-Edelsburg et al. 2020). Additionally, it depends on the different hospitals which departments are included in their specific surveillance system. That makes it difficult to obtain an overview of the exact number of infections that are a part of the different HAI surveillance systems (Fieldnotes 1).

This thesis departure from a Danish perspective. The yearly number of HAI in Denmark are estimated to be around 60,000 (Statsrevisorerne Rigsrevisionen 2017). A national surveillance system, Hospital Acquired Infections Database (HAIBA), is used to monitor HAI (Statsrevisorerne Rigsrevisionen 2017) (Statens Serum Institut 2018a). Due to revisions, the

database does not contain data for 2019, but from the period between 2014-2018. The surveillance system monitors six different HAI: Bloodstream infection, urinary tract infections, intestinal infections with clostridium difficile, hip replacement infections, and knee replacement infections (Statens Serum Institut 2019a). The monitored infections are selected, but there is no statement explaining why these have been selected for the surveillance system. 2014 was the year with most infections with a total number of 26,407 and the year with the lowest number was 2016 with 25,201. The numbers are based on the above-mentioned infection types. In 2018 the monitored number of infections was 25,728 which is the latest number available in the system and an increase since 2016 (Statens Serum Institut 2019a). This indicate that there is a natural variation in the number of HAI and the problem is rather consistent. Figure 5 is based on data from HAIBA (Statens Serum Institut 2019a), show year 2014-2018 and the total number of infections each month.

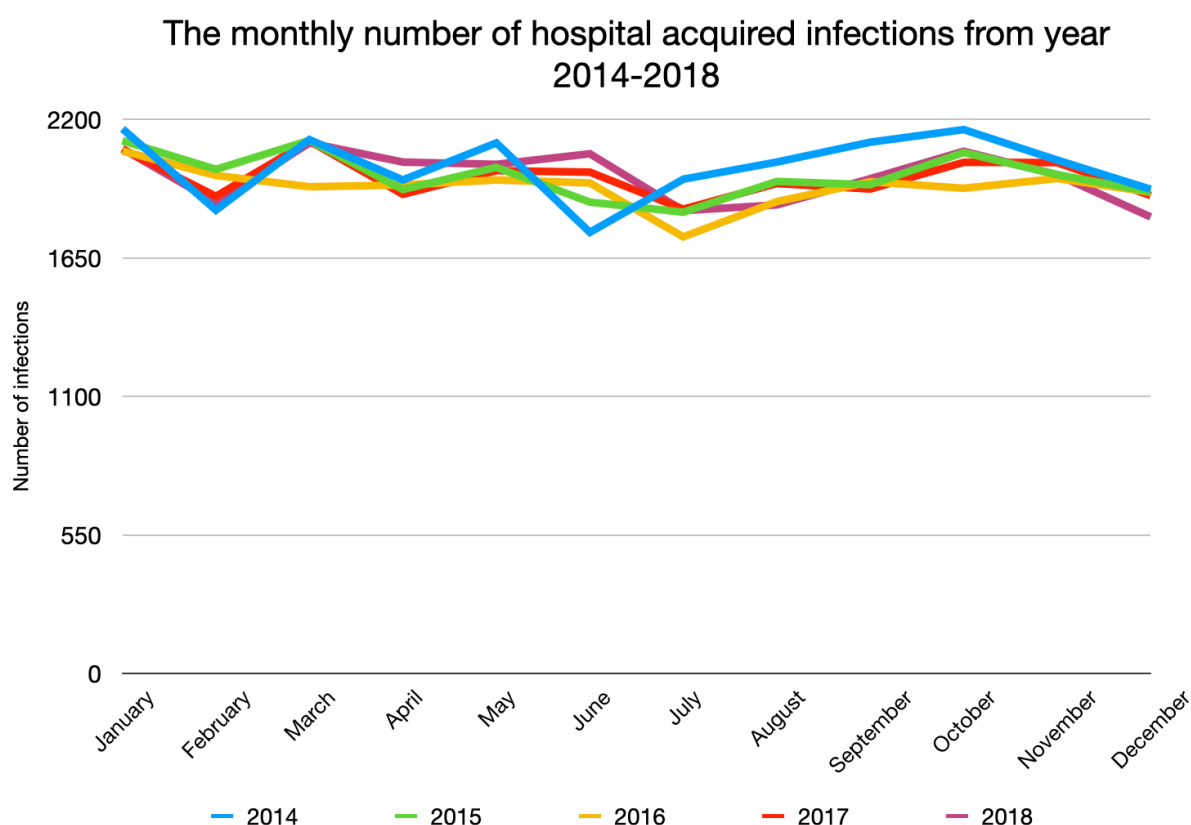


Figure 5: Numbers from the Danish surveillance system HAIBA. Showing the number of infections from the six monitored infections from year 2014-2018 divided into months (Statens Serum Institut 2019a).

One of the reasons why the surveillance system does not contain data for 2019 is due to adjustments to the system that, for example, should take into account that the societal

development is moving towards more treatments at home and shorter inpatient stays. This requires an adjustment to the system. Instead of monitoring hospital acquired infections, the system should monitor health care-associated infections (Statens Serum Institut 2018b). In the following, different ways for how HAI can be treated and prevented will be elaborated.

2.2.1 Treatments and ways to prevent hospital acquired infections

In many years, antibiotics have been used as treatment for infections. The use of antibiotics to treat bacterial infections have had a significant effect in regard to reducing the mortality caused by various of different infectious diseases (Sagar et al. 2019). As many patients are being treated and given antibiotics, the use of it has had some negative side effects. The use of antibiotics has succeeded in killing infections. However, it has resulted in an overuse of antibiotics that are causing bacterial resistance (Gould and van der Meer 2011) (Sagar et al. 2019). The overuse has resulted in antibiotics becoming less effective (Sagar et al. 2019). Therefore, the challenge of resistant bacteria has caused an increased awareness of the use of antibiotics to prevent the increasing resistance (Sagar et al. 2019). Furthermore, the use of antibiotics to treat infections have shown that the use actually is causing the number of infections to increase (Figure 6). The overuse of antibiotics and resistance are linked together with the number of HAI and are considered as being the main reason for developing HAI (Gould and van der Meer 2011) in that the use develop as well as keep resistant bacteria alive (Statsrevisorerne Rigsrevisionen 2017). The different types of infections can be resistant towards one or several types of antibiotics which results in the treatment being none effective. One of the problems with antibiotics has been the use of broad-spectrum antibiotics instead of using narrow-spectrum antibiotics that are more targeted.

The broad-spectrum antibiotics are the biggest contributors to developing resistance in that the target is wider. The most rational use of antibiotics is therefore to use narrow-spectrum antibiotics in that the broad-spectrum antibiotics contribute to the development of bacteria that are able to resist treatment which excludes specific types of antibiotics to be used when

On any given day:

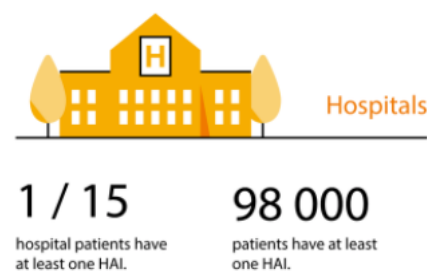


Figure 6: Showing the daily number of infections in EU (European Centre for Disease Prevention and Control 2018).

treating infections. Rational use will be able to slow down the developing resistance (Statsrevisorerne Rigsrevisionen 2017). Other ways are to prevent infections from manifesting. The design of the hospital environment can influence the transmission of infections and the ideal hospital would be designed with one room bed facilities and a personal bathroom (Gould and van der Meer 2011).

Good hygiene is considered as one of the best methods to prevent HAI and the use of antibiotics would decrease. Good hygiene among patients, visitors, and employees are important in order to prevent infections (Statens Serum Institut 2019b). Cleaning of the hospital environment and equipment is equally important, but, as well as hand hygiene, reliable on human behavior (Gould and van der Meer 2011).

The following section will focus on the health care staffs' influence on the emergence of HAI.

2.3 Health care staff's influence on hospital acquired infections

In the 1840s, Ignaz Semmelweis, a Hungarian obstetrician, noticed a coherence between childbed fever and hand hygiene (Jacobsen and Larse 2017) (Kadar, Romero, and Papp 2018). In many cases, women in labour acquired an infection that could have been prevented with the use of chlorinous hand disinfection before examining the women. Semmelweis discovered how "cadaveric particles" from the staff's hands, which they had gotten during autopsies, were transferred to women in labour as they had only washed their hands with water and soap prior to the examination. His discoveries resulted in a decrease in the mortality number of women with childbed fever as chlorinous hand wash was imposed on the staff before an examination of women in labour (Kadar, Romero, and Papp 2018).

The importance of hand hygiene has been known for many years. In the hospital environment, microorganisms are present where patients, employees, and visitors are or have been present. Microorganisms that are not treatable with antibiotics tend to stay wherever they were "left" until they die or are removed (Statens Serum Institut 2019b). Whether or not the microorganisms survive, if they are not removed, is determined by the surface, whether the environment is wet or dry, and temperature conditions. Also, some organisms are harder to remove than others. The likelihood of patients, visitors, and employees being in contact with these microorganisms increases the longer the organisms get to stay in the hospital environment. Microorganisms can stay in the hospital environment from a few days to several

months and that is why adequate cleaning is important (Statens Serum Institut 2019b). Furthermore, preventing HAI cannot be placed on a single group of employees in that it has to be a joint responsibility whether it is the management, the cleaning staff, or the health care staff, who provide patient care, to name a few. It is important they work corporately to prevent infections (Girard et al. 2002). Involving the patients' and visitors' too is important in order to prevent HAI in that they touch objects within the hospital environment, each other, and the health care staff (Gesser-Edelsburg et al. 2020). According to a report by WHO, endogenous sources of infection most often happens due to transmission from health care providers' hands. There is a link between health care providers hand hygiene and the prevalence of HAI:

“Given that HCAI is inherently linked to health-care workers’ behaviour (e.g. sub-optimal hand hygiene practices) and, in some cases, to health-care system gaps (e.g. lack of adequate equipment), this burden translates into a profound frustration and loss of trust in the system and health-care professionals” (World Health Organization 2009).

Having strategies for good hand hygiene has proved to be a successful way to reduce the number of HAI. WHO has made guidelines for hand hygiene in health care (World Health Organization 2009). Within a Danish context, Statens Serum Institut has provided the Danish health care with national guidelines about how to prevent as well as limit the transmission of infections. A paradigm shift has happened in the area of hand hygiene and the traditional way of getting clean hands with water and soap has changed to involve the use of alcohol-based products to perform hand rubs (Vermeil et al. 2019). This is based on evidence proving that hand hygiene involving alcohol is killing microorganisms more effectively than using water and soap (Statens Serum Institut 2018c). According to the Danish national guidelines, hand hygiene should be performed when the health care staff find themselves in one of the following cases: before performing clean procedures, after using gloves, and after unclean procedures (Statens Serum Institut 2019b). Fungi, virus, and bacteria can survive on the hands and it is the microorganisms that are able to be transferred, and are able to survive in the environment, that can cause HAI. Several factors are crucial for the number of microorganisms on the staff's hands. What the individual person is working with, how the work is carried out, and how long the person is working with something are some of the factors. Additionally, the contamination of microorganisms relating to performing tasks has a linear growth in cases where there is not

performed hand hygiene and both virus and bacteria are able to survive on the skin of our hands from minutes to hours. There are several ways for the microorganisms to transmit: contact with patients', surroundings, equipment used for the patient, direct patient contact, and wet material such as respiratory secretions, blood, and saliva. These are some of the ways that constitute a risk for contamination of the staff's hands. The guidelines also clarify that the staff's hands can be contaminated with microorganisms by short-term contact like measuring the patient's blood pressure or performing a transfer. Hand hygiene is documented to be the best method to prevent infection in that it prevents transmission (Statens Serum Institut 2018c).

The next chapter will clarify the way the COVID-19 pandemic has influenced the project and caused changes to the original plan. The latter part of the chapter addresses the new plan moving forward and is followed by a problem statement in Chapter 4.

3 | The effects of a pandemic outbreak

In this chapter, the progression of the pandemic within a Danish context is presented and the way it affected the plan for the study and collaboration with the Work Environment Coordinator and Hygiene Unit. The process of planning the study is elaborated and lastly, the decision of changing the focus to include the pandemic into the study is presented.

3.1 The progression of COVID-19 in a Danish context

In December 2019 a virus outbreak was discovered in the Chinese city Wuhan. China experienced cases where people got severe pneumonia which in some cases resulted in deaths. People in other Asian countries started to show the same symptoms and among these were people who had stayed in Wuhan (Sundhedsstyrelsen 2020e). It started to become a huge problem and within long it had spread quickly to neighboring countries (Sundhedsstyrelsen 2020h). The 22nd of January, the Danish Health Authority had reported that the situation was monitored closely:

“The Danish Health Authority estimates that the risk of the disease coming to Denmark is very low. [...] The Danish Health Authority does not recommend entry screening measures in e.g. airports in Denmark. However, if a person in Denmark show signs of the disease, then the Danish health authorities and the Danish health service are ready to deal with this.”

(Sundhedsstyrelsen 2020f).

On the 15th of January, the health care professionals were issued with information about the virus and received guidelines for how to handle situations of COVID-19. The guidelines contained information about symptoms, when patients should be tested and how and when to take action if employees are showing symptoms (Sundhedsstyrelsen 2020i). On the 28th of January, it was estimated that the likelihood of a person entering Denmark with the disease was low. Also, no travel restrictions were imposed for travelling to countries where cases of coronavirus had been registered. The Danish Health Authority had ensured that the Danish

health care system was informed about the disease. They had been prepared for how to handle cases of travelers coming to Denmark with symptoms of COVID-19 (Sundhedsstyrelsen 2020e).

The same day a person was admitted to a hospital in Denmark, who had symptoms of Coronavirus, but tested negative (Sundhedsstyrelsen 2020m). On January 30th, the Danish Health Authority informed that WHO had now declared the Coronavirus situation for a '*global emergency*' (Sundhedsstyrelsen 2020o). Throughout the next one and a half month the situation emerged rapidly. The guidelines for the health care professionals kept getting updated (Sundhedsstyrelsen 2020b) (Sundhedsstyrelsen 2020n) as well as recommendations for the Danish citizens were issued (Sundhedsstyrelsen 2020a). The situation around the world and within Europe evolved quickly and the Danish Health Authority reported that the likelihood for the virus to enter Denmark had increased (Sundhedsstyrelsen 2020l). In late February, the first two cases of Coronavirus were confirmed in Denmark (Sundhedsstyrelsen 2020k) (Sundhedsstyrelsen 2020g). The situation within Denmark escalated quickly and ended up affecting this project more than first anticipated. Figure 7 show the development in broad outline.

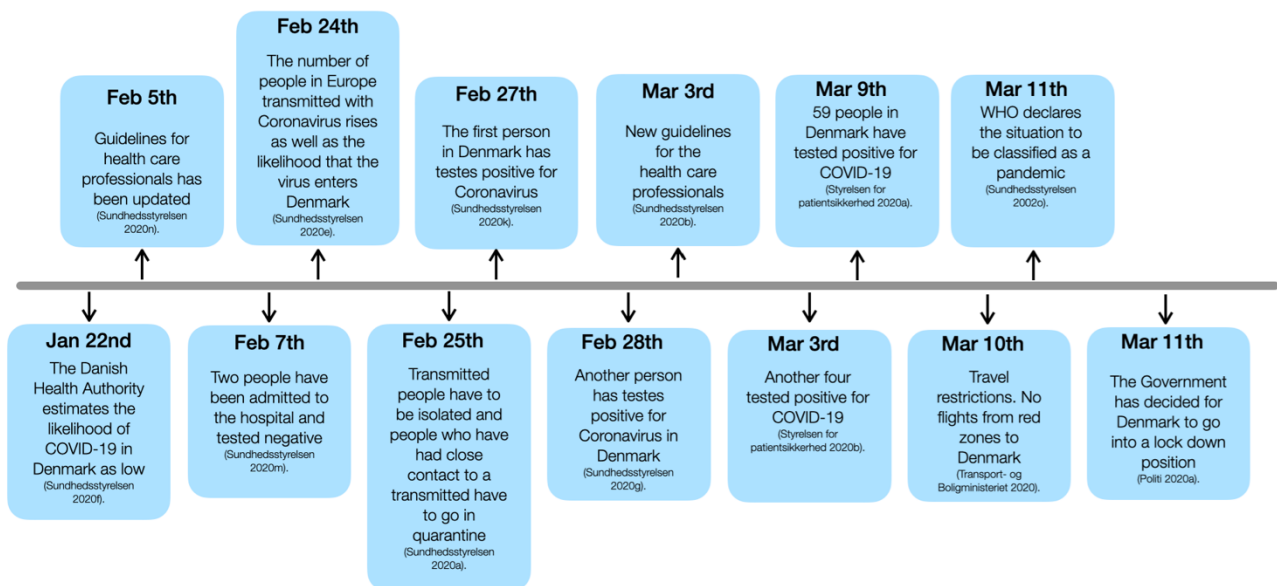


Figure 7: Events from the fast growing development of COVID-19 in Denmark.

In the following, the original plan for the project will be outlined and the way the Corona virus ended up affecting the project will be elaborated.

3.2 The original plan for the study

On January 28, the first meeting about the course of the project was held. The participants at the meeting had different backgrounds and experiences concerning HAI and hand hygiene. Participating in this meeting was a Work Environment Coordinator and two from the Hygiene Unit. They stated that physicians at Aalborg UH's performance in regard to hand hygiene is insufficient. The statements were based on personal experience as well as the six-monthly hygiene inspections. The thesis was supposed to study whether insufficient hand hygiene was caused by bad habits, ignorance, or something else (Fieldnotes 1). During our conversation, two different dilemmas appeared about hand hygiene: the training of newly educated physicians and a loyalty towards the profession of medicine.

The first dilemma concerned the training of the newly educated physicians and the habits and knowledge of the experienced physicians. If the experienced physicians perform incorrect hand hygiene, due to bad habits or insufficient knowledge, then, this could affect the way the newly educated physicians perform hand hygiene. They are being trained by experienced physicians. The second dilemma was about a loyalty towards the profession of medicine and the physicians' ability to nudge each other. According to the participants, the physicians are poor at verbalizing if they notice someone perform hand hygiene, for example, in an insufficient way. This could mean that they are bad at nudging each other to be better at performing hand hygiene. The participants further explained that according to them, it should be noted that none of them were physicians, the physicians do not question or comment on each other's habits or knowledge in that they mind their own business (Fieldnotes 1).

During the meeting, the participants also discussed which departments do a better job than others and which especially have challenges. This information was based on the six-monthly hygiene inspections. An example could be a department which has a big patient flow and the physicians are struggling to keep up with the hand hygiene in between patients (Fieldnotes 1). Based on our discussion during this meeting, the direction of the project was clear; I was going to study the physicians' practice and knowledge about hand hygiene. At this point, COVID-19 was not an issue and the study still followed the original plan for studying physicians' hand hygiene practices. The following section presents the process of brainstorming methods for the study.

3.2.1 Planning the study

After the meeting, possible methods and ways to carry out the study was evaluated. Should one part of the study be shadowing the physicians or observe at a fixed location? Either way to observe would have pros and cons regarding the outcome.

Shadowing one or several physicians throughout a workday would give insight into what a workday looks like for them. It would be possible to observe their practice, what they do, and which choices they make. Are they skipping hand hygiene because they are busy, forgetting, or something else? This would probably not be possible to observe in a fixed location in that information about where they came from or where they were going would be missing in relation to observe the reason for their actions.

The pros of observing in a fixed location would be to observe multiple physicians rather than a few by shadowing them. Then, there is the aspect of influencing their behavior. Observing in a fixed location would be less obvious than shadowing physicians by following them. This could give a more truthful and realistic insight into their hand hygiene performance but would lack a more profound insight into why they act the way they did.

Shadowing one or several physicians would most likely influence them to be more aware of their hand hygiene practice and the observed would not be a truthful representation of their everyday practices. It takes time to develop a relationship, which means the same physicians should be followed through a period of time in order for them to get used to my presence and thereby observe the possible changes in the physicians' hand hygiene practices. As anthropology is about people as a part of a social community rather than focusing on people themselves (Hastrup 2010), then, following the physicians, their interactions and choices in the communities would give an insight into the situations they are facing during a workday that could affect their hand hygiene practices.

Instead of just observing it would be possible to do participant observations and take on a role as an apprentice (Wadel 1991), ask them to teach me to perform correct hand hygiene. In the presence of a passive observer, the physicians' will not act naturally and spontaneously in the way they would in the presence of a fellow employee (Bundgaard 2010). As Described by Helle Bundgaard (2010) I would be given a role as an apprentice in that I am not already a part of their community and have knowledge about their practices. Taking on a role as an apprentice could be to gain insight into their hand hygiene knowledge and how they would perform hand hygiene in different situations.

Another method to gain insight about their knowledge on how and when to perform hand hygiene would be through a semi-structured interview. The physicians could participate in an interview based on the problems stated by the collaborators. If they think, the physicians do not know when to perform hand hygiene, then, they could be presented with different cases and ask them to explain the hand hygiene process. Planning an interview with a set of predefined cases could create a foundation to understand how and why the physicians would act differently or in the exact same way. The collaborators could help find physicians that could develop a set of cases in which the interviewed physicians should explain the hand hygiene process. Figure 8 illustrates how an example of a case and how it could be presented to the physicians visually.

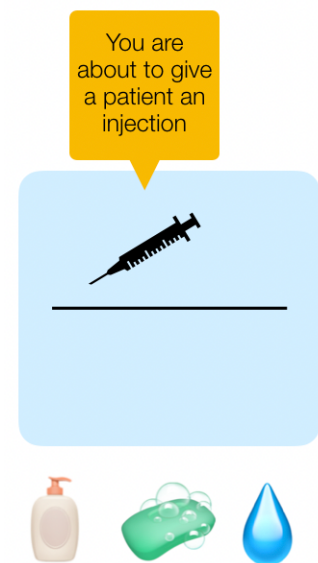


Figure 8: Example of how predefined cases could be visualized during the interviews.

Planning the study was an ongoing process between the first start-up meeting and the second start-up meeting with the collaborators. This second start-up meeting was for the rest of the collaborators, the two chief physicians and one from the Hygiene Unit, to discuss their inputs for the study. They were not able to attend the first meeting and therefore, another start-up meeting was arranged.

3.2.2 Getting started on fieldwork

Many thoughts were put into preparing fieldwork, and the second start-up meeting was the steppingstone for getting started. On the 2nd of March, I arrived at the meeting at the Work Environment Coordinators office and he asked me if I knew anyone with Corona? I declined the question and expressed my curiosity for the development and that I keep a close eye on how the situation is progressing. At this point, the first four people in Denmark were confirmed positive with COVID-19. Since the first case of Coronavirus was confirmed in Denmark, the public recommendations as well as the guidelines for the health care staff had been updated and the situation was all over the news (Fieldnotes 2). The Work Environment Coordinator informed that one of the chief physicians had canceled last minute. Shortly after, the two participants from the Hygiene Unit arrived. They informed the Work Environment Coordinator that the other chief physician also had canceled as well had the third participant from the Hygiene Unit. They started talking about how busy they had become since people had started

testing positive in Denmark. The meeting proceeded without the missing collaborators' inputs, and we started discussing the plan for fieldwork.

We reached a mutual understanding of shadowing six different physicians from two different departments. The departments included in the study would be chosen based on the six-monthly hygiene inspections. Departments that had respectively a high score and a low score in the hygiene inspections would be chosen for the study (Fieldnote 2). The purpose was to get insight into how their hand hygiene practices differ from each other. Additionally, the collaborators were enthusiastic about the idea with semi-structured interviews and presenting the physicians with cases where they explain the hand hygiene process to gain insight into their hand hygiene practice. They brought up COVID-19 again and explained that the virus outbreak most likely would affect the result of the project. For the past week or so, the Danish Health Authority had intensified the recommendations, figure 9, about how we should be taking care of ourselves and others (Sundhedsstyrelsen 2020j).



Figure 9: The five recommendations from the Danish Health Authority (Sundhedsstyrelsen 2020j).

3.3 A time of uncertainty

From the 2nd of March to the 4th of March, the number of people testing positive for COVID-19 had almost doubled in a few days. I reached out to the Work Environment Coordinator about a new meeting to gain more information about when the shadowing of the physicians could begin. On the 6th of March, I contacted him again since he had not replied yet. He usually replies within a day and it crossed my mind that he could be occupied with something related to

COVID-19, considering the development in Denmark. Between the 4th of March and the 6th of March, the number of people tested positive for Corona had more than doubled again. I tried reaching out again to the Work Environment Coordinator on the 10th of March. Still, I was not able to reach him. In the last few days, the number of people testing positive for the virus in Denmark had rapidly increased as shown in figure 10.

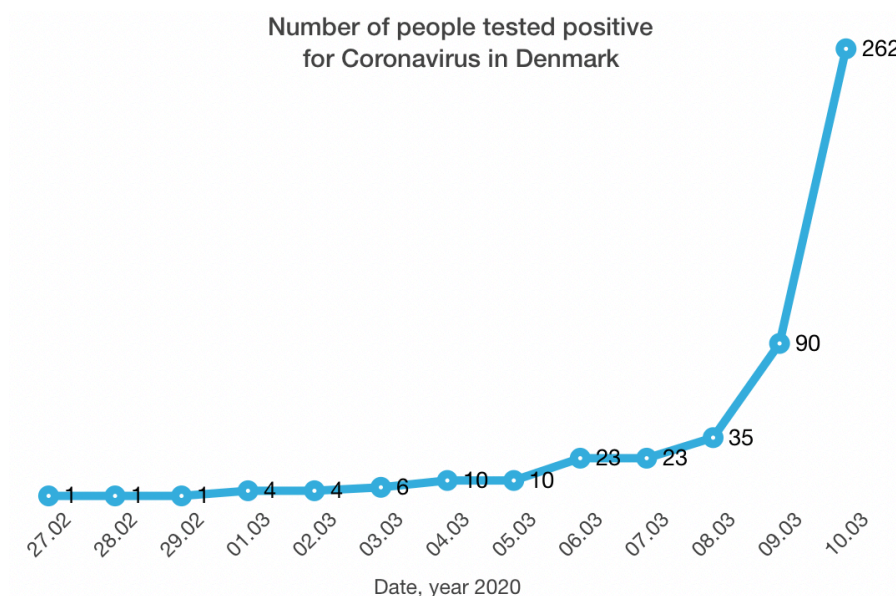


Figure 10: The development in the number of people testing positive with COVID-19 in Denmark between February 27 to March 10 (Sundhedsstyrelsen 2020m).

The Government had in a press conference on March 11 recommended that employees who can work at home to do so. Meetings should be limited and restrictions for gathering more than 100 people were coming (Politi 2020a). Also, international travel restrictions had been updated and divided into zones colored either green, yellow, orange, or red. Yellow indicates that you as a traveler should be extra careful whereas traveling to a country colored orange or red you are recommended to stay at home for 14 days when returning to Denmark (Udenrigsministeriet 2020). The fast development started to cause more and more concern.

The following section presents the events that caused the study to hit a turning point and a change of focus was considered.

3.3.1 From fieldwork negotiations to lock down

This time of uncertainty and lack of communication with the collaborators started to get frustrating. The increasing number of people testing positive for COVID-19 was becoming a

great societal challenge. The concerns about how the situation would affect the study kept rising. Finally, on the 11th of March, the Work Environment Coordinator replied. We arranged a meeting at his office and the conversation started out discussing Corona. We discussed how fast the virus was spreading in Denmark and what would happen in the next few days. He told, that within the North Denmark Region, they had been busy preparing for COVID-19 patients. They had collected 80 respiratory apparatus and some of them were bought just for this crazy uncertain situation that rapidly was changing the society. He told about the 7000 m² wing they had renovated within seven days. All functions within this wing, as well as the staff's fitness room in the basement, had been moved to prepare for patients who would need hospitalization due to the virus (Fieldnotes 3).

Before moving on to talk about the plan for the study, a female employee came by to talk with the Work Environment Coordinator. He returned and said they just discussed the study. Due to the latest progression in the number of infected people in Denmark, the circumstances for continuing the study would be affected as nothing was "normal" at the hospital during this time. Everywhere, they were preparing for COVID-19 patients. They had discussed if the study should include COVID-19 as the situation was inevitable. A field visit to the Pandemic department was arranged within minutes and an employee from the Technical Department showed us around. The employee from the Technical Department explained the underlying principles about the renovation of the building. Working none stop for seven days, three floors had been established: one for testing, one for non-critically ill COVID-19 patients, and one for COVID-19 patients in need of intensive care. I was shown the three floors and the different bed facilities and explained the ventilation system. It had an important function as it keeps certain areas clean which will be elaborated further in the analysis (Fieldnotes 3-4).



Photo 1: The photo to the left: an examination room and the setup of a wash bowl, gloves, soap and hand sanitizer from the ground floor. The in the middle: one of the intensive care bed facilities on the first floor and the. The photo to the right: a respiratory machine for intensive care patients.

After the visit, the focus of the study was evaluated. Should the study continue to focus on physicians, their knowledge, and practice concerning hand hygiene? Or should I change the focus to include COVID-19 and study if it affects physicians' hand hygiene practice? Before I came to a decision, a historic event took place that same evening on March 11. On the TV, the prime minister held a press conference saying, that the government had decided to lock down the Danish society due to the seriousness of this situation with an aggressively transmitting virus. The number of people infected with COVID-19 had reached 514 and the last few days the number had doubled each day. The virus was rapidly spreading, and the World Health Organization had now characterized it as a pandemic outbreak (World Health Organization 2020). Drastic steps had been taken, among these were public employees, who did not imply a critical work function, was send home and students were not allowed to go to school (Politi 2020a). Restrictions concerning visits to nursing homes and hospitals had also been imposed (Politi 2020b) which definitely affected the plans for the study.

The following section is reflecting on whether it would be possible to continue the study as planned or if a change of focus will be necessary.

3.4 A new focus for the study

Taking into consideration that the number of people testing positive for COVID-19 kept rising and that Aalborg UH has dedicated an entire wing to isolate the infected patients in need of care, indicate the seriousness of the societal problem. This means that COVID-19 patients are not located among other patients at the hospital. Although, the only thing that separates the Pandemic Department from the rest of the hospital is a couple of doors as the building is connected to the main building as well as other buildings See figure 11.

It would still be possible to study physicians who are not going to work at the Pandemic Department as they could be continuing a rather normal workday. But the fact that the guidelines have been intensified for all of the health

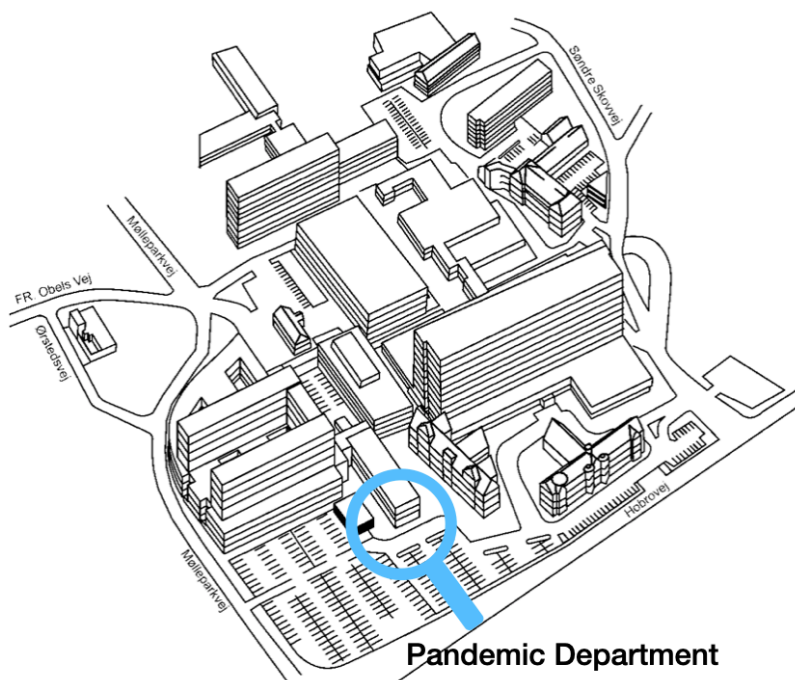


Figure 11: The magnifying glass visualize the Pandemic Department ("Aalborg Universitetshospital," n.d.)

care professionals, then, the result of continuing the original plan would still be biased. The collaborators questioned the usefulness of the results as the situation at the hospital had completely changed as many of the daily work tasks and routines were affected. To prevent COVID-19 from spreading and infecting the hospitalized patient, non-critical examinations, treatments, and operations had been postponed (Sundhedsstyrelsen 2020d). This indicates the probability of the physicians carrying out a normal workday is low. Furthermore, restrictions have been imposed on visitors at the hospital which complicated continuing fieldwork at the hospital even more (Politi 2020b). Doing fieldwork that could endanger lives is a serious matter and important to consider. The societal challenges had resulted in too much change at the hospital for it to make sense to continue the planned study. Furthermore, the University had sent out an e-mail, informing all students about prohibiting activities including fieldwork. Which left no choice but to change focus. Therefore, it was decided to change the focus to

include a current societal challenge, the COVID-19 pandemic, and focus on how it has affected physicians' and nurses' hand hygiene practices. The focus of the study has been broadened to include physicians and nurses to study if both groups have experienced changes in their practices. Furthermore, the study will focus on a socio-technical perspective studying technology mediated solutions used to prevent transmission of the virus and to maintain the physicians' and nurses' work tasks.

In the following, is a delimitation of the forward focus and the problem statement of the thesis which the study will seek to answer.

4 | Problem statement

Delimitation

Through the previous chapters, the focus of the study has been set. The study in this Master Thesis is conducted at Aalborg University Hospital. The overall focus is on hospital acquired infections and how hand hygiene can help prevent them. In this study, the focus is on physicians' and nurses' hand hygiene practices. Their hand hygiene practice will be studied in relation to the pandemic and whether their experiences from this situation will influence their hand hygiene practices. Additionally, a socio-technical perspective will be on the different technologies that mediate the physicians' and nurses' actions that help prevent transmission of the virus and for them to maintain their work.

Problem statement

The problem statement has been divided into two questions. The first question seeks to study the Pandemics influence on the physicians' and nurses' hand hygiene practices:

- *How has the pandemic affected physicians' and nurses' practice in relation to hand hygiene?*

The Second question study the socio-technical perspective focusing on the technological solutions the physicians' and nurses' have used to maintain work and prevent transmission of the virus:

- *In which way have technological solutions prevented the COVID-19 virus from transmitting at Aalborg University Hospital?*

5 | Methods

This chapter presents the empirical methods selected for the study. They have been chosen as they can provide answers to the problem statement. Fieldwork is the overall framework for the study and has been split into two parts: 1) participatory observations and unstructured interviews and 2) semi-structured interviews. The methods are presented and are followed by reflections on the process and outcome. Figure 12 illustrates fieldwork as the overall framework and the two parts of the study.

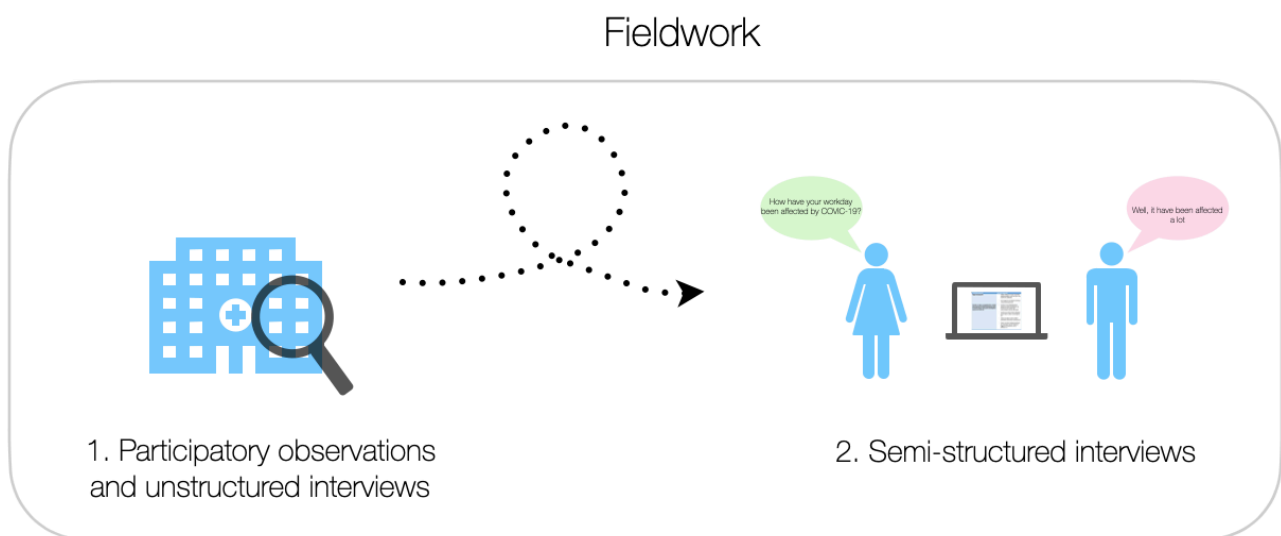


Figure 12: Showing fieldwork as the overall framework and the first part of the study with participatory observations and unstructured interviews to the left and the second part with semi-structured interviews to the right.

5.1 Fieldwork

Fieldwork has been chosen as one of the methods for this study as it can contribute to knowledge about social communities and what takes place between people. Fieldwork is useful as it takes place in the world that is being studied. For the people in the field, their actions are a natural part of their every day (Hastrup 2015) and fieldwork can help unfold real-life phenomena within Aalborg UH (Hastrup 2010). Being situated in the world that constitutes the physicians' and nurses' social communities, it is possible to study how it is all connected. Fieldwork is suitable for this study as it can help gain accumulated knowledge about how the physician and nurses world encourage and impede certain actions in their natural world (Hastrup 2015). Accessing the field, it is possible to gain knowledge about how truisms emerge,

changes and is maintained at Aalborg UH (Hastrup 2015). The physical room is Aalborg UH and the field has been delimited to this location. According to Kirsten Hastrup (2010), there has to be something else that makes it meaningful to do fieldwork in this location: a social community. Aalborg UH has many social communities, departments, and disciplines (Fieldnotes 1). The empirical object has been delimited to Aalborg UH and the analytical object is HAI and hand hygiene (Hastrup 2010). As a part of doing fieldwork, participatory observations will be used to get close to people within the field, their everyday experiences, and activities (Emerson, Fretz, and Shaw 2011). It is impossible to take in everything, therefore, the analytical object will help define the focus regarding which situations to engage in and which relationships to further develop (Emerson, Fretz, and Shaw 2011). This will help delimit the focus of the study. Doing participatory observations, some locations, and situations can require permission and you need to establish contact with the field (Spradley 1980). Not all areas at the hospital are allowed to be explored by visitors and therefore, the Work Environment Coordinator is considered as the main gatekeeper in this study.

5.1.1 Participatory observation

In the course of doing fieldwork, participatory observation will be used to develop roles within the field. The social anthropologist Cato Wadel (1991) explains how gaining access can happen through different roles. Whether you take on one or several roles depends on what you want to engage in and with (Wadel 1991). By doing participatory observations at Aalborg UH, different situations will be studied. Wadel's categories of participation and observation will be used in situations where it is necessary to distinguish between participation and observation as it can be important to shift between being a participant and observer in the field (Wadel 1991). Figure 13 shows the four sub-categories participatory observations have been divided into by Wadel.

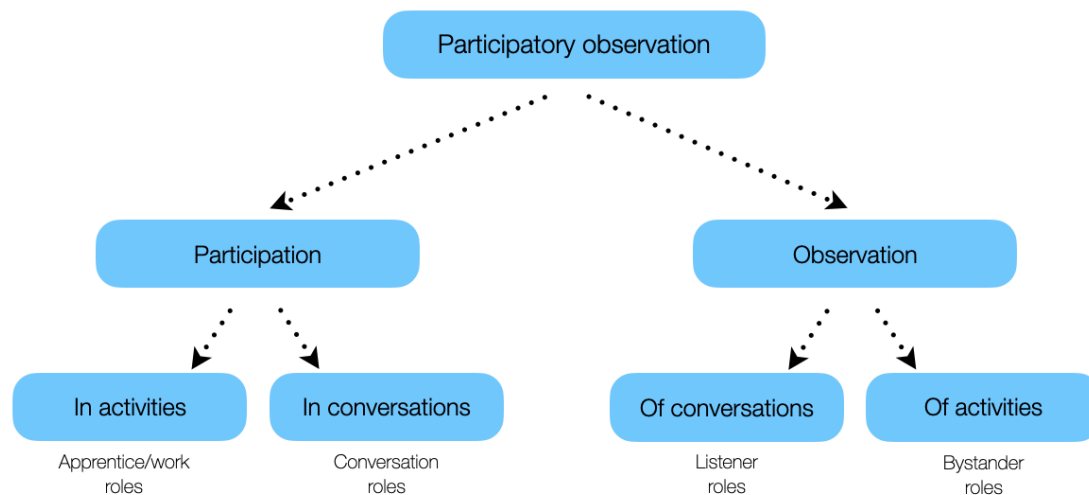


Figure 13: Cato Wadel's categories for participatory observations (Wadel 1991).

Being situated in the field, I will participate in and observe different situations. Writing fieldnotes will be used as a tool to manage the different impressions and conversations from the field. After a visit to the field, fieldnotes will be used to write down material, impressions, and thoughts from the field while it is still fresh the memory (Bernard 2011). Jottings are the type of fieldnotes that will be used as the keywords are easy to write on the spot. The keywords will be useful later when writing out the fieldnotes (Bernard 2011). Some situations can make it difficult to write down keywords, therefore, headnotes and pictures will be used as well to recall from later when writing fieldnotes (Emerson, Fretz, and Shaw 2011).

5.1.1.1 Reflections on participatory observations

This section will reflect on doing participatory observations and if the method has provided empirical data that can help answer the problem statement. Although the plans for doing fieldwork changed, participatory observations have still constituted an important source of empirical data despite the limited time spent in the field. The meetings held with the Work Environment Coordinator and the Hygiene Unit as well as the field visit to the Pandemic Department on March 11 have formed the basis of the second part of the study: Semi-structured interviews. Figure 14 is a visualization of the social situations in which participatory observation was used:

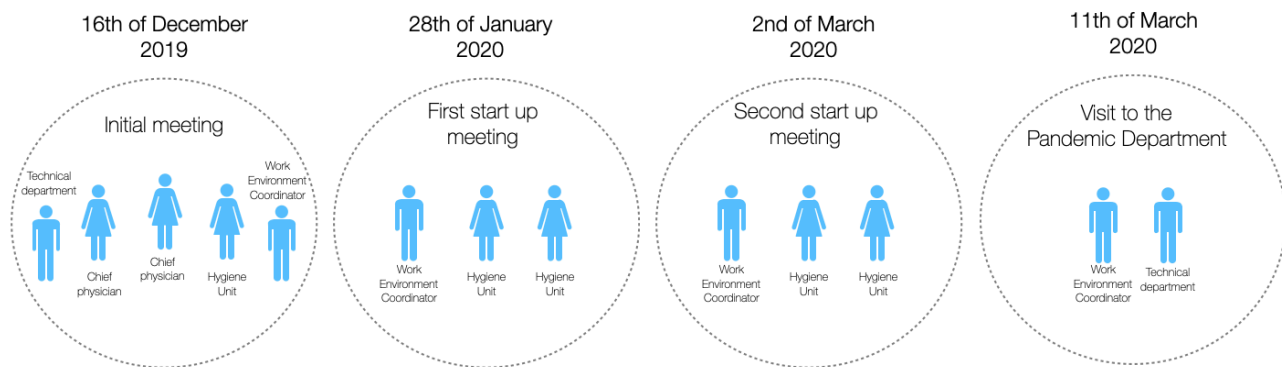


Figure 14: The four situations with participatory observations. The first meeting was in December and the last meeting in March due to COVID-19.

Using participatory observations in meetings has provided insight into the HAI problem. By focusing on the analytical object, hand hygiene and HAI, the focus of the study was maintained despite the changes that were made, and it has been possible to study physicians' and nurses' hand hygiene practices in a different way. The field visit to the Pandemic Department made it possible to see and feel the surroundings of the staff working at the department. Knowledge about how the department was designed as well as how the processes with COVID-19 patients were going to be, from testing to hospitalization, was acquired and useful in the further data collection.

The outcome of using participatory observations

Starting out this study, the plan was to be situated in the field for a longer period than ended up being the case. Therefore, the participatory observations did not provide knowledge about physicians' and nurses' hand hygiene practices the way it was intended. However, the field visit to the Pandemic Department opened up for new perspectives in the study and have entailed a more profound insight into the technologies that are used to help prevent transmission of the virus to the staff and other hospitalized patients. Participatory observations have provided insights that can help answer the second question regarding how technological solutions have prevented COVID-19 from spreading at the hospital. Additionally, the field visit has helped answer the first question about how the pandemic has affected physicians' and nurses' hand hygiene practice as the experiences from the visit have shaped the foundation of the questions for the semi-structured interviews. Visiting the Pandemic Department have given experiences that have proven to be useful during the interviews and have constituted the foundation of

many follow up or clarifying questions. The experiences from the visit have helped narrow down important focus point and what to further explore in the informants' statements. The experiences from the field have also a shared knowledge between me as an interviewer and the informants as we were able to discuss the Pandemic Department and processes. Therefore, participatory observations have provided a foundation for further empirical data gathering in the study which will be elaborated in the following section about interviews.

5.1.2 Interview

Two different forms of interviews have been selected for this study. The unstructured interview was used as a part of participatory observations in the first part of fieldwork. In the second part, the semi-structured interview was used to gain knowledge about how the physicians' and nurses' work and hand hygiene practices had been affected by the pandemic. Interview has been chosen as a method to gain knowledge about physicians' and nurses' lifeworld and their experienced phenomena (Kvale and Brinkmann 2015).

The unstructured interview has a minimum of predefined questions which create the possibility to be open and explore different directions in that many decisions are made during the informal conversations (Kvale and Brinkmann 2015). The purpose of using this interview form during conversations with the collaborators, the Work Environment Coordinator and the hygiene unit, and during participatory observations, like the field visit to the Pandemic Department, is the loose instructions and the everyday-conversation atmosphere (Kvale and Brinkmann 2015). The unstructured form can provide knowledge about the collaborators' own experiences, thoughts, and opinions about hand hygiene practices at Aalborg UH.

The semi-structured interview form will provide insights about how physicians' and nurses' work tasks have been affected by the pandemic. Additionally, it will be used to gain insight into the way their hand hygiene practice has been affected. The semi-structured form is beneficial as it seeks to understand the informants' lifeworld. It is conducted with an interview guide with predefined questions. Semi-structured interviews provide the opportunity to deviate from the interview guide to ask clarifying and new questions as the conversation develops during the interview (Kvale and Brinkmann 2015). The number of informants included in the semi-

structured interview has been decided based on the framework of thesis of four months and the resources of one person to conduct the interviews (Tanggaard and Brinkmann 2015). The selected number of informants was five physicians and 5 nurses. The target characteristics for the informants was, that they should not be working at the Pandemic Department but have maintained their work at their 'department of employment', which is the expression used to indicate that the informants are working at the department, they normally work on.

5.1.2.1 Reflections on doing interviews

This section will be reflections on whether interview have been useful to provide answers to the problem statement. The reflections on the use of unstructured interviews will be presented first and are followed by semi-structured interviews.

Unstructured interviews as a part of fieldwork

The unstructured interview was used in two different situations: meetings with the collaborators and the field visit to the Pandemic Department. The meetings with the collaborators contributed with knowledge about correct hand hygiene practice, access, and sparring about what to focus on in the study. This interview form was mostly used to communicate and gain insight from the collaborators' as well as being kept updated on the situation at the hospital.

In relation to the field visit at the Pandemic Department, the unstructured interview was used to gain knowledge about the processes, the redesign of the department, and the technologies that play an important role to prevent transmission of the virus. The information acquired during the informal conversations while exploring the Pandemic Department has helped answer the problem statement as the technical processes that made the department safe for the staff and other hospitalized patients were explained.

Selecting informants for semi-structured interviews

The semi-structured interviews were conducted late in the process of collecting empirical data. Therefore, it was decided to spend three weeks on finding informants, conduct the interviews, and transcribe. It was further decided, that 5-6 informants would be fine if it was hard to get in contact with possible informants within this limited timeframe and due to the circumstances in this situation. It had not been possible to use contacts from the field as I had not met any

physicians or nurses before the participatory observations stopped. The snowball method was used to get in contact with informants, and it started with the use of my network and collaborators. This method proved to be useful in a situation where it was sought to get in contact with informants with the target characteristics (Naderifar, Goli, and Ghaljaie 2017), in this case physicians and nurses who work at Aalborg UH and do not work at the Pandemic Department. All informants were contacted through this method where the informants contacted some of their acquaintances (Naderifar, Goli, and Ghaljaie 2017) and it ended up being a successful way to get in contact with informants with the target characteristics. Figure 15 shows the snowball sampling process and the 11 informants acquired using this method.

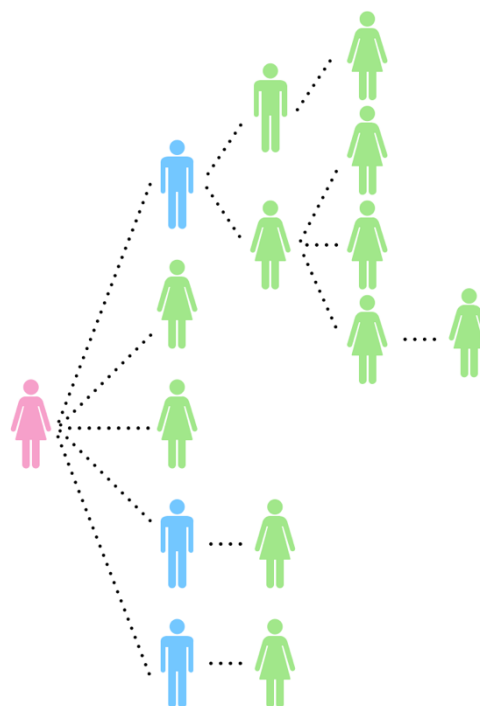


Figure 15: The snowball sampling process and the people and informants involved in the process. The green colour is the informants.

This way of getting in contact with informants caused the target characteristics to become blurred as it was discovered during an interview that the informant worked at the Pandemic Department. However, the interview gave some interesting perspectives on the pandemic, preventing transmission and the use of technologies to carry out their work which ended up with a decision of broadening the target characteristics to include physicians and nurses working at the Pandemic Department.

The initiating thoughts about interviewing five physicians and five nurses were to gain several perspectives from the two groups. This changed as it mainly was nurses who responded. It was chosen to gain a higher number of informants instead of focusing on the “right” distribution. Additionally, the distribution of physicians and nurses ended up reflecting the situation at Aalborg UH as the number of nurses employed is higher than the number of physicians (Aalborg Universitetshospital 2019).

Within the three weeks, 11 interviews were conducted with physicians and nurses working at their department of employment and the Pandemic Department. The reason why 11 informants were interviewed, which was one more than planned, was due to the information and experiences this informant could contribute with (Tanggaard and Brinkmann 2015). Table 1

shows the characteristics of the interviewed informants, the interview form, and the communication tool used to conduct the interviews as they were conducted online.

Interview number	Profession	Department	Employment in years	Form of interview	Technology mediated communication
1	Nurse	Department of employment	8	Semi-structured	Skype
2	Physician	Pandemic Department	17	Semi-structured	Phone call
3	Physician	Department of employment	18	Semi-structured	FaceTime
4	Nurse	Department of employment	20	Semi-structured	Messenger video chat
5	Nurse	Pandemic Department	4	Semi-structured	Phone call
6	Nurse	Department of employment	25	Semi-structured	FaceTime
7	Nurse	Pandemic Department	1	Semi-structured	Phone call
8	Nurse	Pandemic Department	18	Semi-structured	FaceTime
9	Nurse	Department of employment	14	Semi-structured	Skype
10	Physician	Pandemic Department	5	Semi-structured	FaceTime
11	Nurse	Pandemic Department	40	Semi-structured	FaceTime

Table 1: The different characteristics of the informants and the type of online communication tool used to conduct the interview.

Prepare and select research questions for the interview guide

Based on the experiences from the first part of fieldwork, research questions were prepared. The questions were directed to gain insights into their experiences with how physicians' and nurses' work practices had changed, which technologies they used, and if they had become more aware of their hand hygiene practice. The research questions were formulated in accordance with the problem statement.

The process of preparing an interview guide and contacting informants happened so fast that there was no time to test the questions before the first informant was interviewed. The research questions worked well, and no changes were made moving forward. The impression after having conducted all 11 interviews is, that the semi-structured interview has been able to gain

insight into the informants' experiences and have provided multifarious and detailed empirical data to answer the problem statement. The topics about how their work and hand hygiene practices had been affected as well as the use of technological solutions to prevent transmission of the virus and maintain their work were clarified. The decision of broadening the target characteristics to include physicians and nurses from the pandemic department have provided detailed data about the use of technology mediated solutions used in their work.

The following chapter will present the empirical data gathered from the two parts in the fieldwork.

6 | Presentation of empirical findings

This chapter presents the findings from fieldwork. First are the 11 semi-structured interviews which are followed by observations from the Pandemic Department. The purpose of the chapter is to create an overview of the data. In Chapter 7, the empirical findings will be analyzed with theory.

6.1 Baseline data

At the beginning of the interview, the informants were asked a couple of baseline questions. The questions had the purpose of setting the context; are they working at their department of employment or the Pandemic Department? The baseline questions were (Appendix A):

- What position are you employed in and which department are you currently working at?
- How long have you been working at Aalborg University Hospital?

These questions were asked to gain insight into the different departments they were employed in as well as the number of years they had worked there. Additionally, the questions had the purpose of acquiring knowledge about how much of an impact the pandemic and the Pandemic Department have had on their normal workday. To maintain the informants' anonymity, their employment position and the department they are employed in will not be linked together. Figure 16 show an overview of the six different departments the physicians' and nurses' worked at before the pandemic influenced their working position. The informants have worked at the hospital between 1 year and 40 years (Interview 1-10).



Figure 16: The different departments that are the 11 informants department of employment.

The interview guide (Appendix A-B) provided knowledge on the informants' agreements and disagreements, how COVID-19 has had an impact on their work tasks and practices. The physicians and nurses told about being asked, volunteering, and selected to work at the Pandemic Department. Figure 17 shows the number of informants working in the department of employment and those who have worked at the Pandemic Department (Interview 1-10). In the following, their experiences about the changes in the communities, they are a part of, and their practices are presented.



Figure 17: Distribution of informants respectively working at the department of employment and the Pandemic Department.

6.2 How COVID-19 have affected physicians' and nurses' communities of practice

The next questions the informants were asked were related to their work. In which way their work had changed and how it had influenced their work tasks. The most repeated and similar answers were, that the pandemic had definitely influenced how they carried out their work tasks. The way physicians and nurses had been impacted, as to how they carry out their work, was multifarious (Interview 1-10). The communities and practices at Aalborg UH have been affected and changed as colleagues were relocated to the Pandemic Department. Physicians and nurses experienced guidelines, among others in relation to patient contact, keeping distance and hand hygiene, which they had to follow, and impacted the communities and practices within the hospital. Furthermore, they had to deal with canceled meetings, find other ways to hold conferences, canceled operations and consultations. Especially the intensive care departments experienced being challenged as patients' relatives were not allowed to visit their family. These relatives are normally a big source of information in regard to the patient's wellbeing and how the patient normally live. Additionally, the staff had to keep a distance of two meters, were not allowed to shake hands with patients, relatives, and colleagues, old and new, which have been difficult to adjust to. Especially keeping a distance and shaking hands has been difficult to adjust to as it is a deeply integrated part of their work and nature. Some

informants were able to work from home, others were not, and some have consulted patients via phone consultations if it were possible within the different departments and areas of specialization. Only critical and acute procedures, operations, and other activities at the hospital were carried out as normal until further notice. To what extent they were affected was varying, but they had all been affected somehow, as some had been given completely different work tasks than before the pandemic. Others experienced having to find different ways to carry out their tasks (Interview 1-10).

In relation to the guidelines, several informants expressed the struggle of complying with them. During the interviews, we mostly talked about the five guidelines from the Danish Health Authority, and the ones they mentioned the most were keeping distance and not shaking hands as they were habits that were hard to break. The physicians and nurses explained how they used laughter to get through mistakes like shaking hands and not keeping distance. In addition to that, they expressed how extremely difficult it was to keep distance in situations like helping out a colleague, during an operation or examining a patient. When it came to the overall distancing in halls, coffee rooms and other areas, the experiences and opinions about whether the five guidelines from the Danish Health Authority have been kept were mixed. Informants expressed experiencing people leaving the room to make room for others whereas others experienced more than 10 people closed-packed (Interview 1-10).

The focus on cleaning technologies used throughout the day had increased. Mouses, keyboards, phones, and dictaphones were mentioned as examples of technologies that were often touched by many colleagues. Also, other elements like door knobs, armrests, and other surfaces were being cleaned more to prevent transmission of virus and bacteria (Interview 1-10).

Their hand hygiene practices were discussed with all informants. The informants had mixed experiences as to whether the pandemic had affected their hand hygiene practices. Some had expressed an increase in performing hand hygiene and using hand sanitizer. Others said it has been the same, but some people were panicking a little (Interview 1-10).

The following will present physicians' and nurses' opinions about working at the Pandemic Department.

6.3 Working at the Pandemic Department

The attitude towards working at the Pandemic Department, being surrounded by the virus, infected patients, and working with new colleagues from different departments, communities,

and practices was mixed. They have had to balance expectations, learn each other's strengths and weaknesses to get the job done. The informants had different experiences with how preventing transmission was handled around the hospital. Surprisingly, informants indicated that they would feel safer at the Pandemic Department as the patients had already tested positive and the level of uncertainty was lower as the staff always was wearing personal protective equipment around patients. Although, a few informants, who indicated the above, expressed they did not wish to work at the pandemic department. Some expressed having colleagues that could not take the pressure at the Pandemic Department as well as many new and different work tasks at once. Additionally, employees at the Pandemic Department expressed the uncomfortableness of wearing the personal protective equipment, how they are making sacrifices, and gets headaches (Interview 1-10).

6.4 The field visit to the Pandemic Department

This section will highlight elements from the Pandemic Department. It will describe what it looked like inside the department and the most obvious technologies: The ventilation, the respiratory machines, and hand sanitizer (Interview 1-10).

Walking towards the Pandemic Department, I was enlightened in the renovation process. Standing outside the department, we were looking at a small tent, seen on the photo to the left, that had been placed in front of the entrance. Patients arriving with the ambulance were coming to this tent before entering the entrance. Going through the entrance you enter a long hall with examination rooms to the right. The ground floor, P1, was examination rooms, first floor, P2, was for intensive care patients and second floor, P3, for COVID-19 patients who were not requiring intensive care, but still too ill to be discharged (Interview 1-10).



Photo 2: The tent outside the entrance of the Pandemic Department (Nordjyske 2020) (Photo: Claus Søndberg).



Photo 3: One of the examination rooms at the Pandemic Department.

Photo 3 shows that the department had not yet been used as they still were making the finishing touches. Most of the bed facilities had four beds and were ready for patients to arrive. Each bed facility had a washbasin, soap, and hand sanitizer mounted to the wall right next to the door. While going around exploring the department, two people were about to mount more hand sanitizer dispensers around the department in the halls. Between the examination rooms and the bed facilities were locks where the physicians, nurses, and other staff had to put on personal protective equipment before entering the bed facilities. The personal protective equipment consists of a suit, gloves, mask, and glasses/visor. The examination rooms and the bed facilities are low pressure areas whereas the lock and the halls are high pressure areas:

“The windows had been taped to create a low pressure. The lock as well is a low pressure area which prevents the virus from flying out into the hall and transmit everyone walking out there.”

(Interview 6, 50).

The isolation section for COVID-19 patients was established in a rebuilt wing in order to isolate them from the rest of the hospital. The isolation of the COVID-19 patients transmitted with the virus have the purpose of prevent transmission of the infection to other hospitalized patients as well as employees (Fieldnotes 3). Figure 18 shows the Pandemic Department, as seen in Chapter 3. Arrows have been added to show the different departments, the physicians and nurses was employed in before the pandemic and where the departments are placed compared to the isolation wing. The newly renovated department is connected to the two largest buildings

on the map: The main building and the House of Medicine. These are two of the buildings the informants working at their department of employment are located (Interview 1-10). The Pandemic Department is marked with the magnifying glass and the locations of the different departments are marked with arrows.

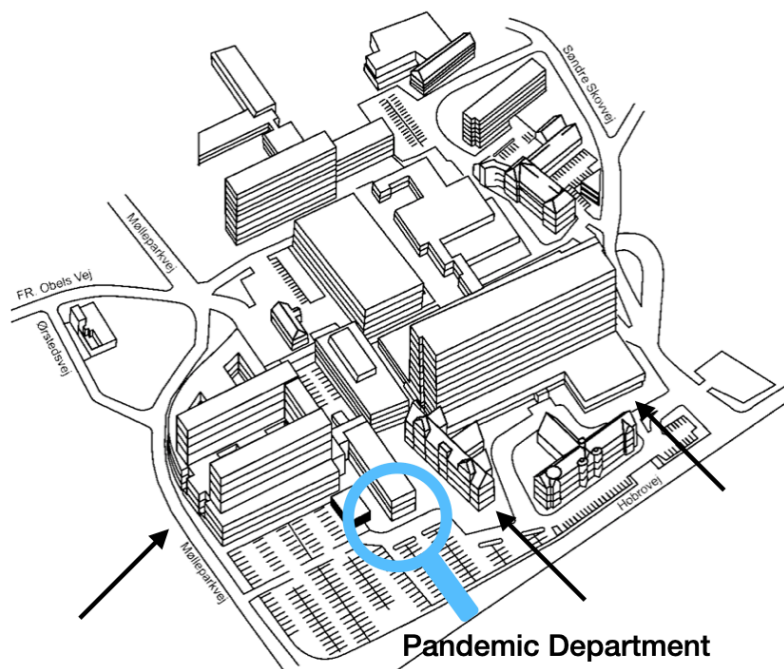


Figure 18: Map showing the area of Aalborg University Hospital South. The magnifying glass is the Pandemic Departments and the arrows indicate the departments of employment the informants normally work at ("Aalborg Universitetshospital," n.d.).

In the following chapter, the findings presented above will be analyzed. The chapter starts with the perspective of the physicians' and nurses' who have maintained their work at their normal department.

7 | Analysis

This chapter presents the analysis. It has been divided into two parts. The theory used to analyze the informants' experiences are shortly presented and will be elaborated further in the analyzes. Communities of Practice are the overall theoretical framework in the analysis. In the second part, Postphenomenology is used as a complementary theory to support the technology mediated actions described. The two parts respectively focus on:

- 1) Analyzes COVID-19's influence on the physicians and nurses who maintained their practices at their department of employment and how the situation affected the communities of practice.
- 2) Analyzes the physicians and nurses who worked at the Pandemic Department, how they were affected, and the technologies used to prevent transmission of the virus.

Citations used in the analysis have been translated from Danish to English and rewritten to be more readable. The original statement can be in the Appendix. The [...] symbolizes either that the informant have mentioned something before or after the statement used in the analysis. Likewise have [...] been used to indicate that the informant has mentioned something between the used statements in a citation.

7.1 How COVID-19 have affected physicians and nurses working at their department of employment

As stressed in Chapter 6: Presentation of empirical findings, the staff had experienced changes in their work. Several informants answered that it definitely had been affected; as they were now carrying out other work tasks. Other informants expressed how they did not experience carrying out new work tasks, but all informants expressed at some point during the interview that their workday had been affected somehow by the Pandemic (Interview 1-10). Even though the informants had maintained their work at their department of employment and did not work at the Pandemic Department, they were still experiencing the changes in preparing for COVID-19 patients to arrive at the Pandemic Department. As elaborated in Chapter 2: Problem analysis, time is a relevant factor used to assess whether an infection is a community acquired or hospital acquired. As the patients who arrived at the Pandemic Department were already ill and being tested for this virus, it can be said the infection was community acquired. The

isolation of these COVID-19 patients is, as mentioned, to limit the virus from spreading around the hospital, as other patients that are hospitalized could risk acquiring the virus as a HAI. The time that must pass before an infection will be classified as a HAI is 48 hours. The incubation time for COVID-19 is between 2-12 days (Sundhedsstyrelsen 2020j) which means that a patient testing positive for COVID-19 during hospitalization, will be classified as having acquired a HAI based on the assessment tool as the infection was not present when the patient was admitted. As the Danish Health Authority has clarified in *Guidelines for handling of COVID-19 within the healthcare system*, patients admitted to the hospital with symptoms that could be related to COVID-19 need to be tested to prevent HAI at the hospital (Sundhedsstyrelsen 2020i).

The informants expressed how the communities and practices have been affected and changed due to this Pandemic situation. To analyze the physicians' and nurses' experiences of working at Aalborg UH during a time where the society is affected by a Pandemic, Etienne Wenger's (1999) theory of social learning will be used to understand how participation is a social process that constitutes learning. Additionally, as already stated, the informants' workday was affected by the pandemic, therefore, Communities of Practice will be used to understand the changes the staff went through in this situation, as it was learned that they work closely with their colleagues. The theory is shortly elaborated below.

Communities of Practice

Communities of Practice is a term that originated in a collaboration between Jean Lave and Etienne Wenger. Later, Etienne Wenger (1999) published the book "Communities of Practice. Learning, Meaning, and Identity" which will be the theoretical framework for this analysis.

The social learning theory focuses on how people form "communities of practice" while they over a period of time have shared enterprises. It is our engagement in practices, of a social character, that constitute processes within we learn, and they are a part of shaping who we are.

The different departments at Aalborg UH can be viewed as communities of practice as they share an understanding of how to engage and to do things together. They know what each other can do, what they know, and how they are able to contribute to the shared enterprise. They have inside jokes, shared stories, shortcuts, and jargon through which they communicate. Another point, which makes it possible to view the departments at Aalborg UH as communities, is that the participants in a community do not all have to interact with everyone and not everything they do have to be a part of their joint enterprise (Wenger 1999).

First and foremost, the staff does not belong to a single community. They belong to several as they are everywhere and are both within and outside of work (Wenger 1999). This analysis will focus on the communities of practice the informants have shed light on within Aalborg UH, while they were sharing their experiences during the interviews. The physicians and nurses become who they are by learning through engaging in social practices. Wenger explains how physicians and nurses organize their lives with their immediate colleagues. They do that to get the job done and therefore, the informants either preserve or develop a sense of themselves in order to fulfill the employer's requirements:

"No matter what their official job description may be, they create a practice to do what needs to be done. Although workers may be contractually employed by a large institution, in day-to-day practice they work with – and, in a sense, for – a much smaller set of people and communities."
(Wenger 1999, 6).

The social learning theory has four components: Community, identity, meaning, and practice. In figure 19, the four components are shortly explained. The components will be used to support the presented findings. Throughout the analysis, the components will be further elaborated with the informants' experiences and opinions. The following section will analyze the technologies the informants working at their department of employment have mentioned using to mediate communication and maintain their work.

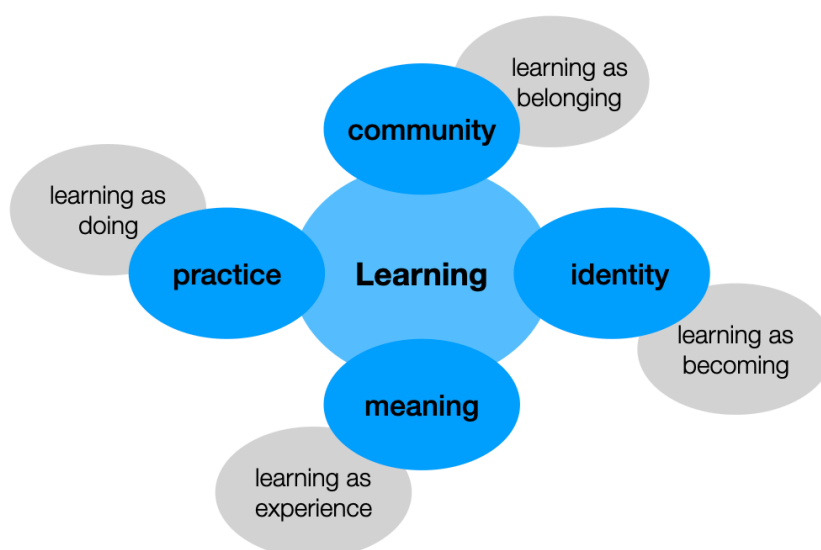


Figure 19: Visualization of the four components of learning in Communities of Practice. Based on Wenger (1999).

7.1.1 Having to reorganize to phone consultations

As Wenger (1999) writes, learning cannot be seen as a separate activity. It is not something we do when we do nothing else, and it is not something we stop doing. Wenger further writes how we may experience times where learning has been intensified:

"[...] when situations shake our sense of familiarity, when we are challenged beyond our ability to respond, when we wish to engage in new practices and seek to join new communities. There are also times when society explicitly places us in situations where the issue of learning becomes problematic and requires our focus [...]" (Wenger 1999, 8).

It can be said, that all the informants experienced what has been specified above. Society has explicitly put them in a situation where they had to learn how to handle a pandemic situation. Several informants expressed how they learned from this situation. Staff across different departments was working together and technologies were used in different ways. A physician explained how old methods were reintroduced to help COVID-19 patients (Interview 3). Nurses voiced their opinions about using phones, iPads and other technological tools to maintain contact with patients or relatives. It was mentioned in chapter X that non-critical consultations have been canceled to prevent and reduce virus from transmitting as well as extricate staff to take care of COVID-19 patients (Sundhedsstyrelsen 2020d). One of the Government's recommendations was a suggestion of changing consultations to phone- or video consultations if it was possible. The informants expressed experiencing both kinds of changes as some had changed to technology mediated consultations. Staff had been extricated to take care of COVID-19 patients so the informants' experienced several changes in the communities of practice. Some informants said, that it was not possible for the staff to use technology mediated solutions according to their practices and others experienced reorganizing scheduled patients to phone consultations instead. The informants were asked if they did not use video mediated consultations. They said no (Interview 1-10). It sounded like it all had happened so fast that the quickest and most accessible solution was chosen. Furthermore, informants expressed that the elderly were their most common patient group which could be a reason for choosing phone over video as many elderly probably do not have a smartphone or computer that supports video mediated communication. One nurse commented that they had an app for consultations, with video, but she had not tried it. She used phone consultations instead (Interview 1).

Learning is not done, when we do nothing else, it is an integrated part of our lives on an everyday basis. Physicians and nurses learn as they participate in the communities of practice within the hospital. They have within the communities constructed local practices to get the work done and meet the expectations, demands, and requirements of the institution (Wenger 1999). A physician expressed this process of changing to phone consultations and how she was a bit skeptical about how it would work in the long run:

"[...] normally, I have a lot of patients, but I have managed to talk on the phone with most of them. I would say, that phone consultations are manageable in a certain period of time, but we are concerned because it is necessary for us to see many of the patients at some point [...]"

(Interview 2, 19).

She further explained:

"All patients have been reviewed and we just finished reviewing those who were supposed to come in this April. Based on our booking lists, the physicians made assessments about which patients could be revised to phone consultations." (Interview 2, 20).

The informants were asked about how the situation of the pandemic had influenced their relation to the patients. The physician who expressed the above about phone consultations mentioned being offered an app solution, but they had declined that in her community. One nurse explained how phone consultations had been a part of their work at their department and community of practice before the pandemic and how some patient groups mostly are handled this way:

"[...] in the beginning, we experienced a hump as people were calling in. Therefore, we rejected the app offer, but it was also because we asssed that it would give too much extra work with our patients belonging to the elderly generation." (Interview 2, 20).

"One of the patients, he is actually a younger guy on my own age, he wanted to come in for a consultation. Most of the patients in that age group are handled via phone consultations. That is just easier. [...] But this young guy had declined that possibility because he wanted to sit face-to-face. [...] we tried it and made it work, and when he was forced into it, he was actually quite positive." (Interview 1, 12).

Making this change and having less activity at the hospital affected the communities of practice. As illustrated in figure 19 with the four components, meaning is one of them. It says "Meaning: Learning as experience". As the informants participate in communities, their practice can have patterns. A pattern can be viewed as something they do day after day, and it is the production of these patterns which they add to anew that gives the physicians' and nurses' an experience of meaning (Wenger 1999). It is the actions the physicians and nurses do over and over again, like call in a patient, eat lunch with their colleagues, chat with their collages, and so on. Those patters have been changed. Canteens were closed, they were not all able to meet up in the coffee room more than 10 people, and the patients were not coming in as they used to (Interview 1-10).

To carry out work tasks differently, like phone consultations, is one aspect of how the pandemic has affected the communities of practice. It seemed to have worked for some of the informants to carry out work tasks via phone consultations. Therefore, it can be discussed whether this technology mediated solution could work as a more integrated part of the practices in the future? It would have a positive impact on the number of HAI.

The following section analyzes how relocating staff from the different departments have affected the communities and work teams within the departments of employment.

7.1.2 How the Pandemic Department have affected the informants' communities

A change in the communities was expressed by informants working at their department of employment as well as the Pandemic Department. Continuing to look into the experiences of

those who had maintained work tasks at their department of employment, a physician said: “[...] everything has been set in to have enough staff for this.” (Interview 3, 27) and likewise, a nurse expressed how the community has been affected: “Well we are not the same number of employees working as we usually are.” (Interview 4, 33). Physicians and nurses still working in their department of employment felt the effects of the Pandemic. The informants had become aware that the communities they belong to changed due to COVID-19. Colleagues had been relocated to the Pandemic Department, and some expressed how they were getting new colleagues to replace those who were missing. The newcomers, to the community, who had to work at different departments were coming into another community with other practices. Wenger describes it as unfamiliar territory (Wenger 1999). Practices are a way for physicians, nurses, and their colleagues to organize their lives. They do that in order to get their work done and therefore, they preserve or develop a “version” of themselves to fulfill work tasks and requirements from their employers. The staff has an official job description, but the practice within the community has been created in order to get the job done (Wenger 1999). One of the physicians shared how the community within his department had changed and how their collective and tacit knowledge about how to do things, their practice, is a big part of getting the job done. The Pandemic department caused a redistribution of the staff in the different departments as some were working at the Pandemic Department and others had to work at a different department than their department of employment to distribute the staff resources properly. A physician expressed:

“We are dealing with new routines and new partners. It is other surgeons and we are capable of handling it. It is not a problem but when you have been anonymized* and surgeon working together, there is a large team function within that collaboration. You know your surgeons and they know their *anonymized*. As I said before, we know our *anonymized* nurses but we do not now. [...] We will be able to do that again. It may work but you have to verbalize more things, and you have to ask: what is the next step and what are you doing now? And we have a personal relationship and it differs from person to person, but you do no longer know your people.”*

(Interview 3, 28).

The influence the Pandemic Department had on the communities of practice, which are something that not often explicitly comes into focus according to Wenger (1999), was that their

implicit knowledge now had become explicit as the new staff did not understand the enterprise in the community. The physician described the staff's shared references they use and how the new colleagues did not know them (Wenger 1999). This community had a shared practice when they were, for example in an operating room. They know each other, they know what each other do, and how they prefer to do it. The establishing of the Pandemic Department had resulted in a restructuring of the communities of practice. They no longer had the patterns which they keep adding to anew, but when they once again become the same team in the operation room, they will have to restructure that pattern.

Mutual engagement is what matters for the physicians and nurses to have a "membership". As the physician described above, the community is defined by their mutual engagement (Wenger 1999), and when their usual patterns were affected, they became suddenly explicit aware of who was a part of the community. What had made this community of practice function was not mentioned explicitly, but some aspects that could be involved was having a friendly atmosphere in the room, their conversations about work and personal life. All those aspects are a part of what makes the colleagues involved and considered full participants in the community. Being what Wenger characterizes as a full participant is about knowing as well as understanding the latest gossip. It is just as important as knowing and understanding the community of practice's latest memo (Wenger 1999). The newcomers to the community do not know these things which, at first, does not make them full participants. Going to work every day, the members of the community are getting more and more similarities, but have also differences. When the physicians and nurses began to work at Aalborg UH, they were more different in the beginning, than they are now. The informants have worked at Aalborg UH between a few years and several decades, which means that some informants have added to the patterns anew for many years. One nurse expressed the encounter between different communities of practice:

"We have received physicians from other places [departments] as some of our physicians are over there [Pandemic Department]. Us old nurses who have stayed back we sometimes feel like we have to tell them. It cannot help that the new physicians who are coming here start to regulate and fiddle with equipment. We are not used to that. We are used to talk about it and do it together. Instead of coming back from the bathroom and something has been regulated. That is not good. I think the patient safety is suffering a little." (Interview 6, 53).

According to this nurse, it sounded like the effects the pandemic had on the community of practice could result in reduced patient safety and the communication was challenged due to this situation. The established practices within the department had been affected by staff coming from different departments that were not familiar with their practices. The nurse further expressed a difference in how they make sure to keep things clean from microorganisms that can cause an infection in relation to hand hygiene and touching equipment when doing patient care:

"[...] we have been used to [at her department], or at least I have been used to, sanitize our hands before opening a cabinet to take things. [...] For the things inside the cabinet to not get transmitted, it is important that the one opening the cabinet has clean hands. [...] I am a little hush about the new [colleagues] washing their hands and sanitize every time they have been with a patient [...]" (Interview 6, 54).

Hand hygiene was a theme that was discussed with all informants. They were asked about hand hygiene and whether their thoughts and practices had been influenced by the Pandemic. Although some said yes, they had changed behavior, they also expressed considering themselves as being much aware before the pandemic, but they had become extra aware now. Some informants said no, they considered themselves as being aware and prepared for this situation (Interview 1-10). It is hard to say whether an increased focus on hand hygiene is due to a more relaxed approach before or it just have been intensified even more. Something that was expressed by several informants was the use of phones, keyboards, mice, and dictaphones which indicate that it is an area that could need improvements. This will be further analyzed in the next section.

7.1.3 Physicians and nurses being aware of microorganisms on work related technologies

The informants were asked if there had been something, they had paid special attention to in relation to their work during this pandemic situation. Several informants mentioned the technologies they used in their daily work: phones, dictaphones, keyboards, and mice. How they were handling these technologies and the cleanliness was expressed by a nurse:

"We are always super attentive of our hygiene. But now you can say, that you get a little more

attentive. We have two phones in our unit, and we are around 6-8 nurses. We share those phones and we are tossing them around. [...] Who answers the phone is about who got time. It might be a good idea if we had one each or you were responsible for the phone on certain days. And then we should wipe them [the phones] off with alcohol before passing them along to the next ones. [...] In regard to cleaning, it definitely has given me some thoughts about making sure that those things everybody touches all the time, phones, mouses for computers, keyboards, dictaphones, and stuff like that, are something we can be better at. Relating to cleaning them every day."

(Interview 1, 14).

Turning to Wenger's statement about how we create a practice in order to get work done in agreement with what is expected by the institution and the management. Choosing not to wipe the technologies they touch during their workday can be a part of their practice, their way to get the job done. This could be due to lack of time or just to get the job done faster. According to a nurse, then, wiping these technologies is something that is supposed to be done every day: *"[...] We are actually supposed to clean keyboards and mouses every day, but we do not."* (Interview 1, 15). One nurse indicated that the cleaning staff was the ones who were supposed to clean the keyboards and mouses: *"[...] the cleaning staff do not usually do it as often as we have done it ourselves."* (Interview 9, 69). Additionally, another nurse commented on the technologies in their workday and expressed how their attitude relating to cleaning had changed: *"[...] We wipe our phones every day when we go home. I have never done that before."* (Interview 11, 91). It was clear that the situation had influenced their thoughts about the microorganisms they get on their hands when using technologies. One physician explained how they, at her department, had acted on the dirty technologies that can be hard to clean:

"The keyboard I am sitting in front right now has been replaced by a keyboard that is easy to wipe. [...] I would like it to stay that way. You should have more keyboards that do not collect all sorts of crap." (Interview 10, 72).

In Chapter 2 some of the ways a patient can acquire a HAI were clarified. As seen in figure 2 patients can acquire an infection from employees. They can also acquire an infection from inventory, visitors, and other patients. Have the employees touched some of the above-mentioned technologies, then it is possible for them to transfer microorganisms to the patients

and thereby they can acquire an infection if they forget to use hand sanitizer. As previously mentioned, hand hygiene is one of the best ways to prevent transmission. The next section will analyze the informants' hand hygiene practices and how it has changed during this pandemic.

7.1.4 The physicians' and nurses' hand hygiene practice

The informants were asked whether they felt that COVID-19 had affected their hand hygiene practice. The question got mixed answers, as some said they have always been aware, and others expressed performing hand hygiene more often. One nurse expressed that there was hand sanitizer everywhere (Interview 2). The informants who had become more aware made some changes in their practice:

"I think that in the group of nurses at least, we have a great focus on our hand hygiene. We do not wear nail polish, jewelry, or watches and we know exactly when to sanitize and wash [...]" (interview 1, 17).

"[...] I have actually been ready. I have not changed much, and I think my hand hygiene is great. [...] I think we are great at prioritizing hand wash and hand sanitizer when we have patient contact. I cannot imagine any of my nursing colleagues relaxing on that front."

(Interview 3, 28).

A physician and another nurse also commented on having good hand hygiene and felt prepared for this pandemic. They both further expressed how focusing more on hand hygiene had become a part of their workday. Three informants who had maintained their work at the department of employment said that they had become more aware of their hand hygiene:

"I think we have always had great hand hygiene, but it can be changed is in our offices. We do not usually sanitize our hands all the time, but we do now. Everybody has hand sanitizer at their offices now."

(Interview 2, 23).

"I sanitize my hands more than usual. It is not unaccustomed for us to sanitize our hands, but I guess I am doing it one time extra compared to what I usually do. I also wash my hands more, of course." (Interview 4, 34).

Another nurse also elaborated on how it is not unaccustomed for them to wash and sanitize their hands. It is a part of their practice. It is something they do, again and again, day after day. It is a part of their pattern. They have done it many times, and every time they do it, it is a new experience added to the pattern. It is what Wenger calls producing patterns anew (Wenger 1999). The answers among the informants were various, and it is difficult to say whether an increased focus is caused by an awakening from the pandemic, some sort of personal fear for themselves or their acquaintances, or something else that has caused the change in behavior and practice.

The Danish Health Authority has issued guidelines about performing correct hand hygiene as one of the most important ways of preventing transmission of COVID-19 (Sundhedsstyrelsen 2020c). That could also be a reason for the increased focus. As clarified in Chapter 2, hand hygiene should be performed after clean and unclean procedures as well as after using gloves. Being able to see the invisible is important as to acquiring correct hand hygiene behavior. The staff needs to reflect in the situations. Reflect on their actions and they should be able to be considerate of others, among these are patients, colleagues, and relatives (Statens Serum Institut 2019b). In the *National Infection Hygiene Guidelines* it is also mentioned that studies show a variation in how to act up to the guidelines, situations involving the use of personal protective equipment, and other situations that can require to be handled like a situation that has an infection hygienic risk (Statens Serum Institut 2019b). Furthermore, within the guidelines, it is described how studies show that knowing what to do is not enough, but actions and opinions are important and are created in practice (Statens Serum Institut 2019b). It is the interplay between employees and the management that creates the practice and Wenger writes about identity, see figure 19, as a part of communities of practice:

"Talking about identity in social terms is not denying individuality but viewing the very definition of individuality as something that is part of the practices of specific communities."

(Wenger 1999, 146).

Physicians and nurses expressed being more aware of their hand hygiene because of the patients. Others were being aware of not bringing something home or getting the virus themselves. Among the informants, it was also elaborated not really thinking about the possibility of acquiring the virus whereas some of their colleagues were the first to volunteer if

they were offered the possibility to leave early (Interview 1-10). The pandemic was affecting the communities of practice as the staff was not acting as usual.

The following will analyze guidelines from the management that have caused changes in the staff's work. Guidelines that both have been possible as well as impossible to follow.

7.1.4.1 Guidelines from the management

The informants were asked if the nearest management had implemented some guidelines. Many of the informants expressed that they were not allowed to shake hands with patients and colleagues (Interview 1-10). This was very strange for the staff and hard to get used to. Some employees started to use files or other things to hold in their hands. This worked as a reminder to not put their hands out to patients. Others laughed as they expressed that they were supposed to keep distance and not shake hands, but shortly after they were standing close to the patients and touching them to do an examination (Interview 1-10). Shaking hands is a part of their practice to initiate contact with the patients before the examination, like a skin-to-skin contact before having to touch their bodies. The overall impression among the informants was contradictory, some expressed having the impression that the staff was good at keeping distance. Likewise, informants were mentioning seeing people standing close together and ignore the guidelines. During patient care, examinations, operations, and other procedures it was hard to keep a distance. One physician explained coming from an operating room. She explained how the four colleagues were standing close together around the patient (Interview 10). The informants had on their own mentioned having to consider their everyday behavior during this pandemic situation. They were asked more about the five guidelines from the Danish Health Authority which will be elaborated in the section below.

7.1.4.2 The five recommendations from the Danish Health Authority

The informants were asked if they knew the five guidelines from the Danish Health Authority and was shown the poster as seen to the right (Appendix C). The physicians and nurses were asked if one or several of the guidelines were more visible in their work than others, figure 20. Almost all informants mentioned the same two guidelines: 1) Wash your hands frequently or sanitize your hands with alcohol-based hand rub and 2) Limit physical contact – avoid handshakes, refuse kisses on the cheek and avoid hugging. Keep your distance and ask others to be considerate was the third most mentioned. Some informants added that it was hard to scale the five guidelines as they were all important. One informant mentioned a concern about the reintroduction of handshakes as a part of our everyday life again: *“Some people are saying, are we ever are going to introduce handshakes again.”* (Interview 10, 76).

In the discussion, it will be discussed if keeping distance, to the extent possible, and not reintroducing handshakes could be a step in the right direction to reduce the number of HAI?

Informants expressed they did not want to work at the Pandemic Department, others surprisingly expressed that they would feel more secure working over there. The main reason was, that the staff working at the Pandemic Department was dressed in personal protective equipment. The physicians and nurses working at the department of employment did not wear personal protective equipment unless there was a suspicion of a patient being infected with COVID-19. One physician explained:

I think, that we in some way actually think that it is more secure to be at the Pandemic



Figure 20: The poster with the five guidelines from the Danish Health Authority the informants were shown during the interview in an English version (Sundhedsstyrelsen 2020g).

Department because you know they [the patients] are positive. Then you take your precautions. This is in relation to all the patients [at the other departments] that have all sorts of things. Here you take the usual precautions. [...] But not all hospitalized patients are tested. One patient here [department of employment] had been hospitalized at the hospital for days before anyone thought about Corona as a possibility.” (Interview 10, 77).

The situation explained above says something about the uncertainty of the situation. At the beginning of the pandemic, in particular, the COVID-19 virus was difficult to diagnose as we were still learning about the different symptoms. This has also been clear throughout the fieldwork as information about the situation has been updated every day. This is also something the informants mentioned. They have to check their e-mail more often as new information is sent out almost several times every day (Interview 1-10).

The next part of the analysis will take a closer look at the technologies used to prevent the virus from spreading and transmit between patients and staff.

7.2 Technology used to prevent transmission of COVID-19

During the visit to the wing that had now been rebuilt into the Pandemic Department, we entered the admission room and I was asked whether I could feel the pressure in the room. The ventilation system was explained. It had the purpose of securing clean and unclean areas by pressurization, as mentioned in Chapter 3. The clean areas had a high pressure and the unclean areas had a low pressure. Moving further into the hall the pressurization was explained as it had an important function in regard to the transmission of the COVID-19 virus. In the areas with high pressure, the air was denser and therefore, the air traveled to the areas with low pressure. In the different examination rooms, as well as the bed facilities, the air pressure was low, and the purpose was for the virus to stay away from the high pressure areas where the staff was working when they were not with the patients (Fieldnotes 3-4). Photo 4 show the bed facility and the lock, low pressure areas, and the lang hall as a high pressure area.

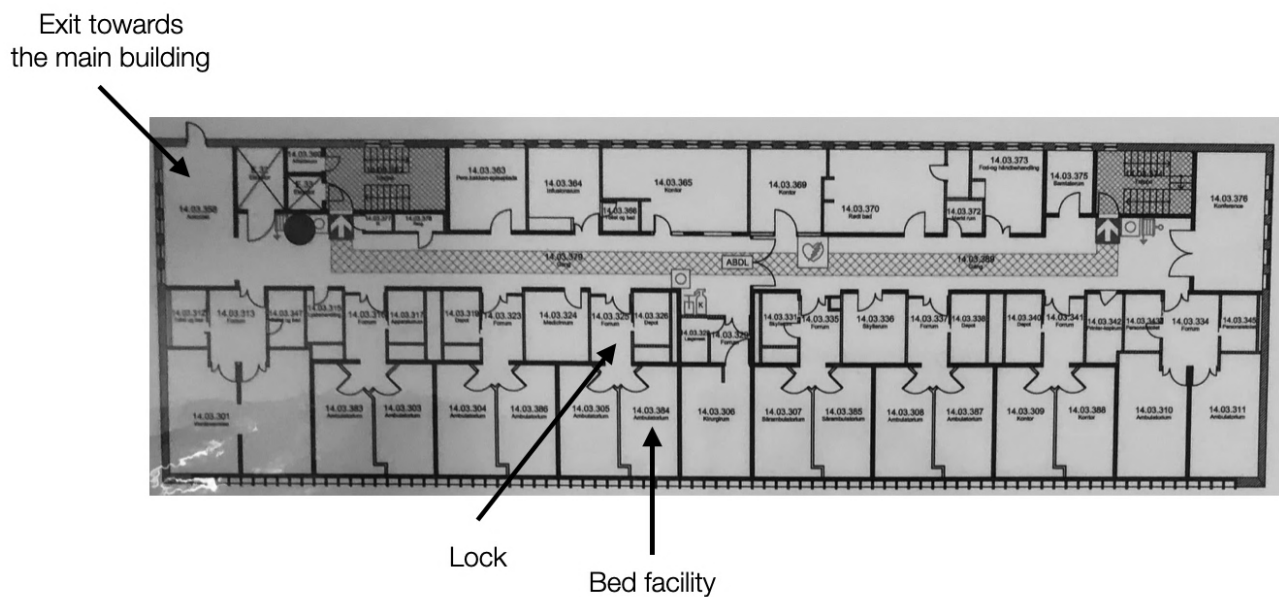


Photo 4: Floor plan of the first floor intended for intensive care patients at the Pandemic Department

If no one had explained the purpose of the pressurization, I would not have noticed it as it was hard to feel and see. Sometimes things we do not see make a difference, therefore, postphenomenology will be used to understand technology as playing a role in human beings' relations to their world. The postphenomenological approach is useful when studying the developing relationship between physicians' and nurses' presence at the Pandemic Department

and the technologies used within the department. The technologies that surround us influence our understanding of our experiences (Rosenberger and Verbeek 2015).

Postphenomenology

Don Ihde is a founding figure in Postphenomenology which study human-technology relations. The technologies we use are viewed as objects we use for our own purposes. At the same time, these objects are considered to be influencing us. Technologies work as mediators of our experience and practices and are not just objects that are instrumental and functional. Within Postphenomenology, it is argued that the relations humans have to their world, Human – World, typically has technology as the mediator and instead looks like Human – Technology – World. Technology is the mediating entity that shapes a relation between us and the world. The technologies which mediate our experience and practices are some we can interact with, read, and incorporate (Rosenberger and Verbeek 2015). Ihde's form of human-technology relations will be used in the analysis to understand how they mediate physicians' and nurses' experiences of being at the Pandemic Department. The human-technology relations used are elaborated and incorporated in the analysis.

Every day, the staff working at the Pandemic Department was surrounded by technologies, some they interacted with physically, and others that stayed in the background. These technologies were not only instrumental objects that were functional as their practices and experiences were mediated through them (Rosenberger and Verbeek 2015). The different ways that technologies mediate our practices and experiences are through interaction with them. We incorporate and read them. The way physicians and nurses experienced the Pandemic Department, as the environment they were situated in, were organized by these relations (Rosenberger and Verbeek 2015). How they engaged with the Pandemic Department was also organized by the relations they had with the technologies they were surrounded by. Common questions within postphenomenology that can be asked in relation to the developing relationship between technologies and the staff using them are:

“How do technologies shape our choices, our actions, and our experience of the world? How are technologies at once objects what we use for our own purposes, and at the same time objects that have an influence on us?” (Rosenberger and Verbeek 2015, 1).

The analysis will departure from Don Ihde's forms of human-technology relations. Ihde's forms of human-world relations will be used to understand how the staff interact with and see the world through technologies. The illustration below shows the human-technology relation which can take different forms depending on the embodied relation. Some of these forms will be used throughout the analysis to make the mediation of human experiences and practices explicit.

Human – Technology – World

Additionally, Communities of Practice will once more be used to analyze the way the pandemic has affected physicians' and nurses' work, as they, like the informants who continued working at their department of employment, experienced being affected by the Pandemic. They had either been told to work at the pandemic department or volunteered. One physician expressed not even being told about getting shifts at the Pandemic Department and finding out via the on-duty schedule. The second citation is a nurse who expressed how she volunteered:

"I have just been chosen for it. And I was not even informed about I was going over there, I just saw it on my on-duty schedule."

(Interview 10, 78).

"I worked from home and then I actually volunteered for the readiness group for the Pandemic Department [...]"

(Interview 1, 11).

Some of the informants also expressed how they and other colleagues did not want to work at the Pandemic Department. It was further elaborated on how some had not been asked due to having family in the risk group or not being able to handle that much change at once. The staff working at the Pandemic Department was educated in using the respiratory machines. This could be another reason why some employees would not like to go to the Pandemic department as they could be concerned about using equipment they do not know or are used to use:

"It is not caused by a fear for Corona, it is because she does not think she will be able to handle that many different and new work tasks." (Interview 10, 79).

As established in the first part of the analysis, the informants had communities of practice with patterns they keep adding to anew. At the Pandemic Department, there was no community of practice as it was a completely new department. There was no community to join and they had to establish a new community of practice together to get the job done. It was expressed how the lack of a joint practice and knowledge about each other was a challenge. They had to express their competencies in order to create an overview of their individual strengths and weaknesses. They did not know what each other could contribute to the shared enterprise. Below have to nurses expressed how they tried to find a way to communicate and achieve a shared enterprise:

<i>"When some of those things that matters come to the surface, then we have to balance. Which part do we do or how do we do it? In this way, everything gets streamlined."</i>	<i>"To do that balancing of expectations with the different staff. Which tasks are they supposed to take and who is responsible for what."</i>
(Interview 7, 65).	(Interview 8, 56).

In the situation of the Pandemic Department, all staff had not decided for themselves to work there and the community was shaped by conditions the informants were not in control of themselves. The day-to-day reality, as Wenger describes it, was produced by the staff working at the Pandemic Department and it was their responses to the conditions that became their joint enterprise (Wenger 1999). One nurse expressed enthusiasm for the positive moral that had been within the department. The staff had a desire to make things work. It can be said they had a desire to establish a new community of practice and work together during this pandemic situation:

"We are all in the same boat [situation]. I actually think that it has given an amazing feeling of solidarity. I think this is what I am leaving the department with, a feeling of solidarity."
(Interview 11, 99).

The following section will analyze the personal protective equipment as a technology mediation that helps prevent transmission. It was a part of the job description, that the staff was supposed to use personal protective equipment during a situation like an air born virus (Statens Serum Institut 2019b).

7.2.1 The use of personal protective equipment

While the staff at the Pandemic Department was establishing a practice, there were some recommendations they had to follow. The staff needed to use personal protective equipment when being near the virus infected patients. During one of the interviews, a nurse elaborated the process of putting on the personal protective equipment:

“We have locks to all rooms [bed facilities]. It is a room before you enter the room [bed facility]. [...] first, we put on the suit, then you put on a mask and glasses, then you take on gloves. Due to the low pressure in the room [bed facility], you have to knock before going in. This makes sure that they [the staff in the bed facility] are ready for you to enter. Then you go into the room [bed facility]. The first while being in there [bed facility], or you have performed care that requires a lot of energy, the glasses get really steamy. I have not yet figured out what happens, I think you breathe a bit more under the mask.” (Interview 7, 58).

Turning towards Don Ihde’s forms of mediation, the embodiment relations will be used to analyze the use of personal protective equipment in order to prevent transmission of the virus to the staff as well as prevent hospitalized patients from acquiring a HAI. Embodiment relations are understood as technology that transforms physicians’ and nurses’ actual as well as perceptual engagement. They were wearing the personal protective equipment, among these the glasses/face shield that had to be closed at the top. A physician explained the virus as being a droplet infection and therefore, the equipment had to be closed at the top. The personal protective equipment was reshaping their experience. Below is an illustration of the embodiment relations that is: (Human – Technology) → World.

(Physician/nurse – personal protective equipment) → Pandemic Department

Several explained the use of the personal protective equipment and how it was hot and not breathable wearing it. Nurses had complained about the uncomfortableness, but also the importance of the personal protective equipment and respecting the ventilation system with the high- and low pressure areas:

"[...] It can be hard to see anything if you are feeling hot in there, and then they [the glasses/face shield] gets steamy. That is because of the low-pressure in there. If I open the door [to the bed facility] and a window is open in there, then all the air from the room blow out in my face. Then I am exposed if I do not wear personal protective equipment. As for those walking around in the department [the hall and other high-pressure areas [...]]" (Interview 7, 59).

When they wear the personal protective equipment, among these the glasses/face shield, they may not perceive them. They can be viewed as a mediation that is transformative in regard to the bodily-perceptual between the staff and the world. The technology, the personal protective equipment, can fade out of the staff's awareness and into the background. They can become accustomed to the technology over time and the perception evolves. When they use the personal protective equipment it can become a familiar character in their everyday work and it can, therefore *"[...] take on a degree of transparency."* (Rosenberger and Verbeek 2015). It can become something the physicians' and nurses' barely notice as a part of their everyday work as it is a part of the pattern they add to anew. They put it on several times a day, day after day. The personal protective equipment transforms their relationship to the world as the staff can take care of patients and do their job with a lower risk of being infected. To say that the personal protective equipment takes on a degree of transparency and disappears from the physicians' and nurses' awareness is not what they express. It made it hard for them to do their job as the glasses/face shields get steamy, they were feeling very hot and getting headaches (Interview 1-10). According to Ihde, the awareness of the technology can be interrupted (Rosenberger and Verbeek 2015) and in the case of the personal protective equipment that was hot and steamy, then it did not seem particularly transparent for the staff. Although it had an important function in order to prevent the transmission of the virus to the staff and other patients. It is possible that the personal protective equipment will take on a degree of transparency after the staff has used it for weeks or months as they get more used to it. One nurse expressed how they were

getting faster and faster putting on the protective equipment (Interview 5) which could indicate that they were getting more used to it. It also depends on which department they come from if they have done it before and maybe have been used to putting it on once in a while with isolation patients. The personal protective equipment could also fail to take on a degree of transparency as it is used to prevent infections in the staff. It was used to prevent something that caused them danger. One nurse mentioned that there had been a fear of getting transmitted. It was expressed as a new kind of fear, a fear they had not experienced before: *“This time, there has been a kind of worrying to a degree you have not experienced before.”* (Interview 11, 103). The fear and worrying the staff experienced could also be a reason for why the personal protective equipment could fail to take on a degree of transparency.

Photo 5 to the right shows a guide on how to put on the personal protective equipment. Below are the gloves that are a part of the personal protective equipment and the hand sanitizer that is frequently used. The hand sanitizer as well as hand wash was also expressed as important step in regard to prevent transmission. A nurse explained the process they go through when they exit the bed facility, a low-pressure area, into the lock, another low-pressure area, and going out in the hall which was a high-pressure area:

“[...] you take off the suit and gloves in one inside the room [bed facility]. [...] Then you sanitize your hands and go out into the lock. Here, you sanitize your hands again, and then you take off the mask, sanitize again, take off the glasses, sanitize those, sanitize your hands again, and then you go out into the hall. I think it is around four-five times you sanitize your hands.”

(Interview 7, 59).



Photo 5: Guide for putting on the personal protective equipment, gloves, and hand sanitizer in the lock.

As the nurse expressed, they were often sanitizing their hands in processes related to the personal protective equipment. Even though they were sanitizing their hands often during that process, the overall impression was, that they throughout a workday sanitized their hands less at the Pandemic Department as they were sitting inside the bed facility taking care of patients for many hours without leaving the room. The statement below was the nurse explaining how she thought she used more sanitizer when she was at her department of employment:

"I was just about to say, that I use just as much or maybe more sanitizer because I am going into the room [bed facility] and having different contacts throughout the day. As I said earlier, when I am inside the room [bed facility at the Pandemic Department], I do not use as much sanitizer or new gloves." (Interview 7, 60).

Additionally, the difference between working at the Pandemic Department and the department of employment and sanitizing hands was explained as a way to protect the vulnerable patients against microorganisms from the coffee rooms, offices, and the staffs' own homes (Interview 1-10). This was compared to the patients at the Pandemic Department who already had the virus. The nurse also explained hand hygiene as something they know like the back of their hand (Interview 7).

In the following, the initiatives the staff had taken in regard to mediate contact between the patients and their relatives, as well as the staff and the relatives, will be analyzed.

7.2.2 Using technology to be in contact with relatives

Something the physicians and nurses experienced both at the Pandemic Department and the departments of employment was contacting relatives to hospitalized patients through phone calls or FaceTime. It was expressed by several informants, how patients' relatives are an important source of information. Different situations were mentioned like elderly patients need a relative to be another set of ears and intensive care patients need relatives to give information that can help the staff take care of the patients (Interview 1-10). The staff working at the departments of employment used phone calls to talk to relatives as they were only allowed at the hospital if the patient were in very critical condition or terminally ill (Interview 1-10). At the Pandemic Department, they had implemented similar methods; one nurse was in charge of updating and being in contact with the relatives to COVID-19 patients (Interview 1-10). An iPad

was used to FaceTime relatives, so they could talk to their hospitalized family members. The iPad was placed by the patient's ears so their relatives could talk to them as they were very ill and not capable of having a conversation. One informant expressed how relatives are very important in a patient's recovery process:

"[...] We have tried with the iPad, and give the relatives a voice by holding it close to the ear [of the patients], because we know that the patients actually hear for a long time and it is the last they are losing [their hearing]. We have used the phone to lay close to the relatives [patients] head so they could hear the voice, and they knew that somebody was out there caring for them."
(Interview 11, 85).

The nurse further talked about using this after the pandemic in situations where relatives cannot come to visit the patient. It had been a success during this time, and she said that they had not enough iPads at the Pandemic Department in case more patients were admitted (Interview 11). The nurse expressed trying new things was exiting:

"[...] I think it is a bit exciting we are exploring all of these options. [...] that is definitely something I am taking with me [going forward] [...]." (Interview 11, 92).

Using Ihde's forms of human-technology relations, the alterity relation is regarding technology that we view as having similarities to how humans interact. The interface of the technology, in this case an iPad, mimic and have similarities with person-to-person interaction. The alterity relation will be used to analyze the interaction between physicians and nurses who interact with the patient's relatives via the iPad. Although the iPad should not be mistaken for actual people. Using FaceTime on an iPad as an example of an alterity relation is a bit of a grey area as the staff interact with people through the device. I argue that the alterity relation fit for this example. The alterity relation is: $I \rightarrow \text{Technology} - (- \text{World})$.

Physician/nurse \rightarrow iPad – (– Pandemic Department)

Ilde specifies the alterity relation as: “[...] *the special experience of engaging with another human being, that significantly encounter with otherness.*” (Rosenberger and Verbeek 2015, 18). As several physicians and nurses expressed the importance of talking to relatives, and they expressed it as a part of their practice to get information about patients that cannot speak for themselves as they were in a severe condition or sedated. They had found a solution to maintain this practice which was to talk to relatives through technology: using iPads and phones. These solutions were great to prevent transmission of the virus as patients, if they were capable of it, and relatives could maintain communication while being hospitalized and not having to meet in person. It can be discussed whether the hospital should further technological solutions targeted to support online communication between patients and their relatives as well as the communication between staff and relatives?

The next section will analyze the ventilation system which creates the low- and high pressure areas at the Pandemic Department. It has an important function relating to preventing transmission of COVID-19.

7.2.3 The ventilation system as preventing transmission

The nurses from the Pandemic Department expressed feeling very hot, getting headaches, and having trouble working when dressed in the personal protective equipment. During the visit to the Pandemic Department, some doors and windows had been taped with red tape indicating that you were not allowed to open them. Two informants who experienced working at the Pandemic Department told about the guidelines being in-process all the time and often changed. Even on a day off, they felt like they had to check their e-mail to keep themselves well informed about new and outdated guidelines. The example below is guidelines about the ventilation system and how these changed:

“In the beginning, they had big difficulties with the heat over there. Now they have to wear all that extra isolation clothes, and the sun was very hot and there was no air-conditioning system in that building. It gets 45 degrees inside the rooms [bed facilities] and they had actually taped the windows in order to get low-pressure with a lock arrangement [...]” (Interview 6, 50).

They had later changed the guidelines to allow an open door or window. It was explained earlier, that it was very important to be cautious about not having a door and a window open

at the same time in order to maintain high- and low-pressure areas (Interview 1-10). Some of the staff at the Pandemic Department had not worked with isolation patients, personal protective equipment, and pressurization before and it was therefore not a part of their practice. Being a part of this new community, the newcomers on this area gained knowledge and learned, see figure 17, from their experiences (Wenger 1999). The physicians had expressed being aware of the pressurization system and the purpose of it: keeping the virus within the low-pressure areas. It had a function, but it was hard to see what it did. Ihde's form of human technology relation called background relations will be used to understand the situation of the ventilation system that helps keep the virus from infecting the staff and other patients. Background relations are technologies that constitute the staff's environmental context. It is technologies that are present, but the physicians and nurses do not directly use them. Although they did not directly use the technology, the ventilation system they still interacted with it as it shaped their experiential surroundings. The background relation is: Human → (Technology/World).

Physician/nurse → (Ventilation system / Pandemic Department)

Technologies that take the form of background relations are not in our awareness. This can be said to be true for some of the staff at the Pandemic Department, as some were mainly staying at the other side, the high-pressure areas, whereas others, like the physicians and nurses, move back and forth between the areas, and therefore the ventilation system does not really come out of their awareness (Interview 1-10). In that many of the informants had expressed the process of the ventilation system, it does not sound like it was out of their awareness. Although, as some informants also expressed, changing into the personal protective equipment was a process that gets faster and faster as they produced patterns anew and the ventilation system eventually would be something they were used to (Rosenberger and Verbeek 2015). The ventilation system is something that does not require the physicians and nurses to directly interact with it.

7.2.4 Summary of technology relations

The different elements highlighted in this analysis are the informants' most mentioned technologies that have been used during the pandemic. They make a difference in their work in relation to preventing transmission of the COVID-19 virus. Almost all informants have at some point during the interview expressed experiences or opinions about: hand hygiene, personal protective equipment, the Pandemic Department, the ventilation system, and communication technologies.

The discussion will further exemplify how the different technologies highlighted throughout the analysis can help prevent HAI and discuss whether they would work in practice after the pandemic.

8 | Discussion

The analysis has highlighted the physicians' and nurses' experiences on how their work tasks changed during the pandemic. The staff has experienced changes in the communities as they have had to team up with new colleagues from different departments and carry out work that was either new or technology mediated. The majority have become more aware of hand hygiene although they expressed it as a practice that has always been deeply integrated into their work. The physicians and nurses working at the Pandemic Department have also had to deal with a new environment and different technologies that have mediated their actions. In the following, it will be discussed how COVID-19 has influenced the staff to learn, viewed from a Communities of Practice perspective, as they have engaged in social practices whereof some have been new and unfamiliar. The following will be discussed: 1) The learning experience is discussed as being connected to the attitude towards hand hygiene and handshakes. 2) It discusses how technology mediated consultations and communication will have a positive impact on patients acquiring HAI.

The Pandemic Department is a temporary solution and for that reason, it will not be further discussed as a future solution for reducing the number of HAI after the pandemic.

8.1 The Pandemics influence on physicians' and nurses' hand hygiene practice

In the analysis, it was stated how physicians and nurses faced an unfamiliar situation. Wenger describes how situations can bring us in a position where our sense of familiarity is shaken and in those situations learning is intensified (Wenger 1999). Based on that statement, it is clear that the staff have found themselves in a learning situation during the pandemic. The majority of the staff expressed being more aware of their hand hygiene. They have become more aware by having hand sanitizer at the office or performing hand hygiene more frequently (Interview 1-10). Hand hygiene has always been stated as an integrated part of their practice, but the pandemic has caused the pattern to change. It can be discussed whether they will keep adding to this pattern anew or they will go back to the usual pattern and practice. When they were asked about keeping up with the new pattern, they have gotten during the pandemic, most informants answered that they did not know what the future would look like. The pandemic

may have influenced them to change their practice and be more aware of hand hygiene going forward. One nurse stressed being able to see the difference in the increased awareness of hand hygiene has resulted in. Not only have the hospital staff become more aware but also citizens have adapted to the new situation and followed the guidelines from the Danish Health Authority. During this situation, the staff has noticed that the number of hospitalized patients with influenza, community acquired infection, has dropped drastically. The nurse explained:

“In the beginning, patients were admitted with both Corona and influenza, but according to our electronic data, the number of hospitalized patients with influenza completely decreased. That made me aware of the sensibleness of using hand sanitizer in different fora.” (Interview 11, 101).

It seems like an extreme situation like the pandemic has influenced the staff to think more about, or being reminded of, the importance of hand hygiene. They have expressed the increased awareness as a result of taking extra good care of the patients but also due to underlying thoughts about being able to get the new virus themselves due to the aggressiveness in how it transmits. The seriousness of the situation can have caused their pattern and practice to change. The fact that they have added experiences anew to the “old” pattern for years compared to the new pattern, they have created during the pandemic, then it is possible that they will go back to the old pattern, as old habits can be hard to break (Interview 10).

In the first part of the analysis, it was stated that actions and opinions are important to create a practice. Three of the informants have not been influenced to be more aware of their hand hygiene practice. Therefore, they could end up affecting those who actively have been influenced in a negative direction. Taking into consideration that some of the informants have been influenced in a positive direction, and have changed the pattern in their practice, they may be able to influence others to be more aware and thereby take a step in the right direction with reducing the number of HAI by preventing transmission through hand hygiene. One nurse addressed that this pandemic situation, with a virus that aggressively transmits, has allowed her to ask family and acquaintances to wash their hands before eating and say could you please not cough in my direction. She stresses that it is okay do to now and that they as health care professionals know all about it already, but the situation has allowed them to comment on others' behavior (Interview 9).

In the following, the staff's difficulties with getting used to not greet patients with a handshake will be discussed. The temporary restrictions on this area could have some benefits concerning HAI in the future.

8.2 Breaking the habit of introducing oneself with handshakes

One nurse questioned whether we will ever be able to shake hands again. It is a part of their practice to introduce themselves to patients with a handshake. Some have had to be creative to break the pattern, like holding a folder. Others mentioned the irony of not being allowed to greet the patients by shaking their hands but being allowed to perform an examination having to touch the patients' bodies. It can be discussed if not reintroducing handshakes in the hospital can have positive consequences concerning the transmission of microorganisms and thereby reduce the number of HAI? Correct hand hygiene has been addressed as an effective way of preventing transmission. It is therefore imaginable that avoiding skin-to-skin contact through a handshake will influence the number of HAI positively. During an examination, the staff should perform hand hygiene as it is required before and after contact with the patient. If the patient does not do the same, they risk getting infected by microorganisms that have been transferred to the staff's hands. The patients are surrounded by objects, such as door knobs, handrails, and elevator buttons, that can hold many microorganisms. As stated in the interviews, the staff have become more aware of properly cleaning the technologies they are in touch with through their work, keyboards, mouses, dictaphones, and phones, compared to before the pandemic. Have the staff not been aware of performing hand hygiene before a handshake, then the patient could get infected. A recommendation against handshakes will prevent this from happening and help reduce the number of HAI.

In the following, phone- and video consultations will be discussed as another method to reduce the number of HAI.

8.3 Video- and phone consultations as a future solution

The informants expressed using phone consultations during COVID-19 as a way to maintain their work. Phone- and video consultation has been widely used during the pandemic. Before the pandemic, phone- and video consultations were already becoming a more integrated part of the Danish health care system (Caspersen and Kristensen 2020). The interviews clarified that phone consultations already were a part of some of the informants' practice and others have

started exploring it. It can, therefore, be discussed whether video- and phone consultations, as a solution to reduce the number of HAI, is wanted? None of the informants expressed the use of video consultation but the pandemic situation can have triggered other departments to try or further explore this technology mediated solution. Informants expressed that it would work as temporary solutions and that some patients are not enthusiastic about technological solutions and prefer personal attendance. Additionally, none of the informants expressed a desire to further explore the technology mediated solutions and mentioned that phone- and video mediated consultations will only be a possibility when a physical examination is not required. Although technology mediated consultations will not be able to replace personal attendances, the technologies will be able to help reduce the number of HAI as the daily number of patients at the hospital will be reduced through phone- and video consultations. During the interviews, it was mentioned how phone consultations already are solutions used in their work which means that it is possible in situations that do not require personal attendance and the patients will therefore only have to show up to a consultation when a physical examination is necessary.

The following will discuss the use of online communication tools to mediate contact between patients and their relatives.

8.4 Technology mediated “visiting hours” as a replacement for personal attendance

Only relatives to a patient who was terminally ill or in a critical condition have been allowed at the hospital. At the Pandemic Department, the staff decided to use technology mediated contact to achieve knowledge about the patients as relatives can provide information that is important for patient care. The physicians and nurses who had maintained their work at the department of employment also started to use technology mediated communication with relatives. At the Pandemic Department, the staff had implemented online communication to update relatives about their family members' condition. It was expressed as new for the informants to use Skype or FaceTime to communicate with relatives. The relatives felt comforted being able to put a face on the caretakers during a time where they were not able to comfort and care for their ill family members themselves. The importance of letting the patients know that there are people “out there” who care for them was stressed and therefore using technologies to mediate the relatives' voice by placing a phone or an iPad to the patients' ears was widely used. This new way of handling “visitors” was mentioned as a surprisingly positive experience by some

informants. It was further expressed as a learning experience that could be useful in the future. But will this type of technology mediated “visiting hours” work and should the hospital invest more in technologies meant for patient/visitor communication?

Taking into consideration that patients can acquire an infection from other people, then patients with a decreased immune response could benefit from technology mediated communication. The physicians and nurses expressed that the different age groups do not possess the same level of skills regarding the use of online communication and the staff would probably have to allocate resources to help patient groups, relatives, and staff who lack technology skills. Additionally, the attitude towards the use of technology conflicted among the informants as some preferred face-to-face conversations and others could see the potential of technology mediated communication. Some informants further expressed how patients used their own devices to communicate with relatives and others were not enthusiastic about this solution as a replacement for physical contact (Interview 1-10). It was addressed that the patients’ age groups reflected their attitude towards using devices to communicate with family. One nurse was positive about this method but also expressed concern for how it would work looking forward as she experienced a great need for relatives to be with the family member:

“My interpretation is that the patients have needed human contact. The relatives too wanted to be with their ill family members.” (Interview 11, 83)

The nurse further shared how she uses FaceTime to communicate with family which could indicate they live far from each other. Technology mediated communication can be used in situations where the family live wide apart, cannot come to visit, or for other reasons that make a visit difficult.

In the next chapter, it will be concluded if the empirical data have provided knowledge to answer the problem statement. It will reflect on the solutions and how they can help reduce the number of HAI in the future.

9 | Conclusion

This Master Thesis attempt to answer the following two questions in the problem statement:

- 1) *How has the pandemic affected physicians' and nurses' practice in relation to hand hygiene?*
- 2) *In which way have technological solutions prevented the COVID-19 virus from transmitting at Aalborg University Hospital?*

The pandemic has affected most of the informants to an increased awareness of hand hygiene. The social learning theory, Communities of Practice, has contributed to the analysis of the changes in the informants' communities and practices. Its focus on what defines a community and practice has helped understand what the relocation of staff has entailed for the different communities and how it has affected their practices. The physicians and nurses stressed how getting new colleagues have resulted in having to verbalize what is implicit in the community as the newcomers do not know their practice. Hand hygiene has been expressed as a part of the practice and how it has been necessary to voice the importance of it in different situations as the newcomers have another practice in regard to hand hygiene. The changes in the communities at the hospital as well as the hand hygiene practices can have caused the hand hygiene practice to look different after the pandemic. However, it is not possible to conclude what these changes will entail based on the informants' statements as they did not know what they would proceed with from the learning experiences, for example not shake hands, wipe off technologies, and be more aware of hand hygiene.

Furthermore, Communities of Practice have contributed to gain knowledge about how the virus has affected the communities as the staff has different opinions about the virus. Some of the informants expressed colleagues fearing the virus and others were not concerned. This has likewise contributed to changes in the hand hygiene practices. It is not possible to conclude if the pandemic has caused permanent changes in the communities and hand hygiene practices. However, it is possible that this aggressive virus, which can result in critical illness or death,

has been an eye-opening experience for the informants. It can have become a reminder that hand hygiene is not only important in regard to taking care of and prevent transmission of microorganisms to the patients but also to take care of themselves. One nurse stressed never having experienced anything like this pandemic in her many years at the hospital. COVID-19 has caused her to be concerned like no other experience. Additionally, the data showing the reduced number of hospitalized patients with influenza can too have been an eye-opening experience. The conclusion is, that the pandemic has affected the physicians' and nurses' hand hygiene practice but whether the changes will proceed, or they go back to old habits after the pandemic is uncertain. When the Pandemic Department is reestablished into its original functions, the guidelines for how to handle the pandemic, the posters, and the personal protective equipment is in the past, then it is possible that what the informants have learned about hand hygiene will be forgotten and they will fall back on old habits and patterns.

The empirical data have shed light on the technologies the informants have used to maintain their work practice and prevent transmission: personal protective equipment, ventilation system, phone consultations, and online communication. Postphenomenology have been used to analyze the human-technology relations and have given insights into how these technologies have helped formed a relation to their world, in this case, the hospital. Additionally, Postphenomenology have help understand the nurse's complaints about the personal protective equipment and the lock as it does not fade out of their awareness. The Pandemic Department, the ventilation system, and the personal protective equipment are solutions that are a part of preventing transmission during the pandemic but will not be used to the same extent afterward. The usage of phone consultations and online communication with patients and relatives have proven to be useful technologies to mediate communication. Some of the informants could see the benefit of exploring more in these solutions in the future. Among the departments included in this study, some have already integrated technology mediated communication in their work practices. The informants' opinions about using technology mediated communication as a replacement for a personal appearance in the future have been two-fold. Phone- or video mediated consultations will be possible when a physical examination is not required and the patients' appearance at the hospital could be reduced. This would have a positive effect on the number of HAI. Technology mediated communication between staff and relatives and patients and relatives could also help reduce the number of HAI. Patients and

relatives could benefit from this solution if the relatives live far from the patient, are hindered in paying a visit, or the patient is admitted for a brief period. How these technologies would work in practice have not been possible to study within the timeframe of the study.

The pandemic has caused, as several informants have stressed, that they think more about handshakes, hand hygiene, and the technologies they use in their everyday work. Their awareness of the microorganisms the technologies like keyboards, mouses, phones, and dictaphones hold has increased. One nurse mentioned, that they did not work with their personal phones in their pockets over ten years ago. Now the staff uses it while being at work and had, due to the pandemic, started to wipe it off before going home. But what about when they turn up for work? The pandemic has caused an increased awareness of the technologies and it is possible that the hospital will focus more on using technologies that are easy to clean in the future.

An increased focus on hand hygiene, handshakes, cleaning of technologies and technology mediated consultations and communication will help reduce the number of HAI.

10| Bibliography

- Aalborg Universitetshospital. 2019. "Nøgletal." <https://aalborguh.rn.dk/genveje/om-aalborg-universitetshospital/noegletal>. (Accessed: 26 May 2020)
- Allegranzi, Benedetta, Sepideh Bagheri Nejad, Christophe Combescure, Wilco Graafmans, Homa Attar, Liam Donaldson, and Didier Pittet. 2011. "Burden of Endemic Health-Care-Associated Infection in Developing Countries: Systematic Review and Meta-Analysis." *The Lancet* 377 (9761): 228–41.
- Bernard, H. R. 2011. "Field Notes and Database Management." In *Research Methods in Anthropology. Qualitative and Quantitative Approaches*, 291–305. London.
- Bundgaard, Helle. 2010. "Lærlingen." In *Ind i Verden. En Grundbog i Antropologisk Metode*, edited by Kirsten Hastrup, 2nd ed., 51–69. Hans Reitzels Forlag.
- Caspersen, Jimmy, and Inge Kristensen. 2020. "Videokonsultationer Hitter under Corona - Men Pas På Patientsikkerheden." <https://patientsikkerhed.dk/blogs/videokonsultationer-hitter-corona-pas-paa-patientsikkerheden/>. (Accessed: 25 May 2020)
- Cassini, Alessandro, Liselotte Diaz Högberg, Diamantis Plachouras, Annalisa Quattrocchi, Ana Hoxha, Gunnar Skov Simonsen, Mélanie Colomb-Cotinat, et al. 2019. "Attributable Deaths and Disability-Adjusted Life-Years Caused by Infections with Antibiotic-Resistant Bacteria in the EU and the European Economic Area in 2015: A Population-Level Modelling Analysis." *The Lancet Infectious Diseases* 19 (1): 56–66.
- Emerson, Robert M., Rachel I. Fretz, and Linda L. Shaw. 2011. *Writing Ethnographic Fieldnotes*. 2nd ed. The University of Chicago Press.
- European Centre for Disease Prevention and Control. 2018. "Infographic: Healthcare-Associated Infections – a Threat to Patient Safety in Europe." <https://www.ecdc.europa.eu/en/publications-data/infographic-healthcare-associated-infections-threat-patient-safety-europe>. (Accessed: 3 June 2020)
- Gesser-Edelsburg, Anat, Ricky Cohen, Mina Zemach, and Adva Mir Halavi. 2020. "Discourse on Hygiene between Hospitalized Patients and Health Care Workers as an Accepted Norm: Making It Legitimate to Remind Health Care Workers about Hand Hygiene." *American Journal of Infection Control* 48 (1): 61–67.
- Girard, R., M. Perraud, A. Prüss, A. Savey, E. Tikhomirov, M. Thuriaux, and P. Vanhems. 2002. "Prevention of Hospital-Acquired Infections."
- Gould, M. Ian, and Jos W. M. van der Meer. 2011. "Antibiotic Policies: Controlling Hospital Acquired Infection." *Journal of Chemical Information and Modeling* 53 (9): 1689–99.
- Hastrup, Kirsten. 2010. "Introduktion. Den Antropologiske Videnskab." In *Ind i Verden. En Grundbog i Antropologisk Metode*, edited by Kirsten Hastrup, 2nd ed., 9–33. Hans Reitzels Forlag.
- . 2015. "Feltarbejde." In *Kvalitative Metoder. En Grundbog*, edited by Svend Brinkmann and Lene Tanggaard, 2nd ed., 55–80. Hans Reitzels Forlag.
- Jacobsen, Kurt, and Klaus Larse. 2017. "Kampen Om de Syge." In *Ve Og Velfærd. Læger, Sundhed Og Samfund Gennem 200 År*, 2nd ed., 58–66. Fagl's Forlag.

- Kadar, Nicholas, Roberto Romero, and Zoltán Papp. 2018. "Ignaz Semmelweis: The 'Savior of Mothers.'" *American Journal of Obstetrics and Gynecology* 219 (6): 519–22.
- Kvale, Steinar, and Svend Brinkmann. 2015. *Interview: Det Kvalitative Forskningsinterview Som Håndværk*. 3rd ed. Hans Reitzels Forlag.
- Lessler, Justin, Ron Brookmeyer, and Trish M. Perl. 2007. "An Evaluation of Classification Rules Based on Date of Symptom Onset to Identify Health-Care-Associated Infections." *American Journal of Epidemiology* 166 (10): 1220–29.
- Naderifar, Mahin, Hamifrh Goli, and Fereshteh Ghaljaie. 2017. "Snowball Sampling: A Purposeful Method of Sampling in Qualitative Research." *Strides Dev Med Educ*.
- Padoveze, Maria Clara, Luíze Fábrega Juskevicius, Talita Raquel Dos Santos, Lúcia Izumi Nichiata, Suely Itsuko Ciosak, and Maria Rita Bertolozzi. 2019. "The Concept of Vulnerability Applied to Healthcare-Associated Infections." *Revista Brasileira de Enfermagem* 72 (1): 299–303.
- Politi. 2020a. "Coronavirus/Covid-19: Regeringen Opfordrer Virksomheder Til at Sende Medarbejdere Hjem." <https://politi.dk/coronavirus-i-danmark/seneste-nyt-fra-myndighederne/regeringen-opfordrer-virksomheder-til-at-sende-medarbejdere-hjem>. (Accessed: 29 May 2020)
- . 2020b. "Nye Tiltag Mod Covid-19." <https://politi.dk/coronavirus-i-danmark/seneste-nyt-fra-myndighederne/nye-tiltag-mod-covid-19>. (Accessed: 29 May 2020)
- Rosenberger, Robert, and Peter-Paul Verbeek. 2015. "A Field Guide to Postphenomenology." In *Postphenomenological Investigations. Essays on Human-Technology Relations*, edited by Robert Rosenberger and Peter-Paul Verbeek, 7–41. Lexington Books.
- Sagar, Sadhana, Shilpa Kaistha, Amar Jyoti Das, and Rajesh Kumar. 2019. "Era of Antibiotic Discovery." In *Antibiotic Resistant Bacteria: A Challenge to Modern Medicine*, 1–14. Springer.
- Spradley, James P. 1980. *Participant Observation*. Harcourt Brace Jovanovich College Publishers.
- Statens Serum Institut. 2018a. "HAIBA." <https://www.ssi.dk/sygdomme-beredskab-og-forskning/sygdomsovervaagning/h/haiba>. (Accessed: 25 May 2020)
- . 2018b. "HAIBA Årsrapport 2018."
- . 2018c. "Nationale Infektionshygiejniske Retningslinjer - Om Håndhygiejne."
- . 2019a. "HAIBA." <https://miba.ssi.dk/haiba>. (Accessed: 25 May 2020)
- . 2019b. "Nationale Infektionshygiejniske Retningslinjer."
- Statsrevisorerne Rigsrevisionen. 2017. "Forebyggelse Af Hopsitalsinfektioner."
- Storr, Julie, Anthony Twyman, Walter Zingg, Nizam Damani, Claire Kilpatrick, Jacqui Reilly, Lesley Price, et al. 2017. "Core Components for Effective Infection Prevention and Control Programmes: New WHO Evidence-Based Recommendations." *Antimicrobial Resistance and Infection Control* 6 (1).
- Styrelsen for patientsikkerhed. 2020a. "59 Personer Bekræftet Smittet Med COVID-19 i Danmark." <https://stps.dk/da/nyheder/2020/59-personer-bekraeftet-smittet-med-covid-19-i-danmark/>. (Accessed: 3 June 2020)
- . 2020b. "Yderligere Fire Personer Bekræftet Smittet Med COVID-19." <https://stps.dk/da/nyheder/2020/yderligere-fire-personer-bekraeftet-smittet-med-covid-19/#>. (Accessed: 3 June 2020)
- Sundhedsstyrelsen. 2020a. "COVID-19: Nye Anbefalinger Til Borgere." <https://www.sst.dk/da/nyheder/2020/nye-anbefalinger-fra-sundhedsstyrelsen-om-at-blive-hjemme-i-to-uger>. (Accessed: 29 May 2020)

- . 2020b. "COVID-19: Nye Krav Til Sundhedspersonalet." <https://www.sst.dk/da/Nyheder/2020/Nyt-krav-fra-Sundhedsstyrelsen-om-at-personale-paa-sundheds--og-aeldreomraadet>. (Accessed: 29 May 2020)
- . 2020c. "Håndtering Af COVID-19: Retningslinjer for Brug Af Værnemidler Og Øvrige Tiltag Mod Smittespredning i Sundheds- Og Ældresektoren Og i Indsatser for Socialt Udsatte Mv." <https://www.sst.dk/-/media/Udgivelser/2020/Corona/Haandtering-af-COVID-19/Haandtering-af-COVID-19---Retningslinjer-for-brug-af-vaernemidler-mv>. (Accessed: 16 May 2020)
- . 2020d. "Hvilke Indsatser i Sundheds- Og Ældreplejen Skal Opretholdes under Coronavirus-Epidemien?" <https://www.sst.dk/da/Nyheder/2020/Hvilke-indsatser-i-sundheds-og-aeldreplejen-skal-opretholdes-under-coronavirus-epidemien>. (Accessed: 14 May 2020)
- . 2020e. "Novel Coronavirus - Still Only Low Risk in Denmark." <https://www.sst.dk/da/Nyheder/2020/Ny-Coronavirus--fortsat-kun-lav-risiko-i-Danmark/Novel-coronavirus---still-only-low-risk-in-Denmark>. (Accessed: 29 May 2020)
- . 2020f. "Novel Coronavirus from Wuhan." <https://www.sst.dk/da/Nyheder/2020/Ny-coronavirus-fra-Wuhan/Novel-coronavirus-from-Wuhan>. (Accessed: 29 May 2020)
- . 2020g. "One Person Who Has Been Examined at Rigshospitalet, Is Now the Second Confirmed Case of COVID-19 in Denmark." <https://www.sst.dk/Nyheder/2020/En-person-der-er-blevet-undersoegt-paa-Rigshospitalet-er-det-andet-bekraeftede-tilfaelde-af-COVID-19/One-person-who-has-been-examined-at-Rigshospitalet-is-now-the-second-confirmed-case-of-COVID-19>. (Accessed: 29 May 2020)
- . 2020h. "Questions and Answers on Coronavirus." <https://www.sst.dk/corona-eng/faq#uk-corona-faq-corona>. (Accessed: 29 May 2020)
- . 2020i. "Retningslinjer for Håndtering Af COVID-19 i Sundhedsvæsenet."
- . 2020j. "Spørgsmål Og Svar Om Ny Coronavirus Og COVID-19." <https://www.sst.dk/corona/faq#corona-faq-corona>. (Accessed: 14 May 2020)
- . 2020k. "Sundhedsstyrelsen Inviterer Til Pressebriefing Om Status På COVID-19 i Danmark." <https://www.sst.dk/da/nyheder/2020/sundhedsstyrelsen-inviterer-til-pressebriefing-om-status-paa-covid-19-i-danmark-28-feb>. (Accessed: 29 May 2020)
- . 2020l. "The Danish Emergency Management Is Continuously Updating in Order to Prevent Transmission of COVID-19." <https://www.sst.dk/Nyheder/2020/Det-danske-beredskab-tilpasses-loebende-for-at-forebygge-smitte-med-COVID-19/The-Danish-emergency-management-is-continuously-updating>. (Accessed: 29 May 2020)
- . 2020m. "The Patient Admitted to Aarhus University Hospital, Skejby Is Not Infected with the Novel Coronavirus." <https://www.sst.dk/Nyheder/2020/Patient-indlagt-paa-Aarhus-Universitetshospital-Skejby-er-ikke-smittet-med-coronavirus/The-patient-admitted-to-Skejby-is-not-infected-with-the-novel-coronavirus>. (Accessed: 29 May 2020)
- . 2020n. "Updated Guideline for Health Personnel on Novel Coronavirus (2019-NCoV)." <https://www.sst.dk/da/Nyheder/2020/Opdatering-af-retningslinje-til-sundhedspersonalet-om-ny-coronavirus-2019-nCoV/Updated-guideline-for-health-personnel-on-novel-coronavirus-2019-nCoV>. (Accessed: 29 May 2020)
- . 2020o. "WHO Declares Coronavirus Outbreak a Global Emergency." <https://www.sst.dk/Nyheder/2020/WHO-erklærer-global-noedsituation-paa-baggrund-af-ny-coronavirus/WHO-declares-coronavirus-outbreak-a-global-emergency>. (Accessed: 29 May 2020)
- Tanggaard, Lene, and Svend Brinkmann. 2015. "Interviewet: Samtalen Som Forskningsmetode." In *Kvalitative Metoder. En Grundbog*, edited by Svend Brinkmann and Lene Tanggaard, 2nd ed., 29–

53. Hans Reitzels Forlag.

Transport- og Boligministeriet. 2020. "Transportministeren Forbyder Flyvninger Fra de Hårdest Coronaramte Områder." <https://www.trm.dk/nyheder/2020/transportministeren-forbyder-flyvninger-fra-de-haardest-coronaramte-omraader/>. (Accessed: 3 June 2020)

Udenrigsministeriet. 2020. "Nyheder Fra Udenrigsministeriet." <https://um.dk/da/nyheder-fra-udenrigsministeriet/newsdisplaypage/?newsID=6A907C87-94DF-4F0C-ACC2-59429CBAF5DC>. (Accessed: 29 May 2020)

Vermeil, T., A. Peters, C. Kilpatrick, D. Pires, B. Allegranzi, and D. Pittet. 2019. "Hand Hygiene in Hospitals: Anatomy of a Revolution." *Journal of Hospital Infection* 101 (4): 383–92.

Wadel, Cato. 1991. "Rolleutvikling under Feltarbeidet." In *Feltarbeid i Egen Kultur: En Innføring i Kvalitativt Orienteret Samfunnsforskning*, edited by Flekkefjord: SEEK, 1st ed., 45–57.

Wenger, Etienne. 1999. *Communities of Practice. Learning, Meaning, and Identity*. Edited by John Seely Brown, Roy Pea, Christian Heath, and Lucy A. Suchman. Cambridge University Press.

World Health Organization. 2009. "The Burden of Health Care-Associated Infection." In *WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care Is Safer Care*.

———. 2016. "Health Care without Avoidable Infections. The Critical Role of Infection Prevention and Control."

———. 2020. "Coronavirus Disease (COVID-19) Pandemic." <http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov>. (Accessed: 29 May 2020)

Frontpage illustration:

A little bit about organisms and illness. 2016. <https://www.resonance-wellness.com/post/2016/11/08/a-little-bit-about-organisms-and-illnes>