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**Title:**
A Study on Patient Safety and Implementation of FMK at Vendsyssel Hospital, Hjørring

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1001

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**Abstract:**

**Introduction**: The objectives for all doctors are to ensure patient safety and limit medical errors. IT systems can help doctors to get an overview of the medication of a patient. FMK, a national database containing medical information, was developed to ease communication between doctors of different sectors. The implementation of FMK has been problematic and doctors do not use the system consistently.
**Methods:** Status of implementation of FMK was examined using the percentages for performed medication updates locally, regionally, and nationally. To investigate the doctors' attitude towards FMK, interviews with doctors at Vendsyssel Hospital, Hjørring, was carried out. FMK should limit medical and medication errors, and these were studied.
**Results:** The percentages for performed medication updates reveals that the goal of 100 % has not been reached. Doctors agree that the idea of FMK is good however currently they do not trust information in FMK to be correct. Many doctors are uncertain about the definition of tasks which they perform in FMK. The doctors found the implementation to be sudden and with insufficient information prior to the implementation. Results of medical and medication errors indicate that FMK has not yet had the desired effect on these.
**Conclusion:** Results for the status of implementation reveals that the implementation goal have not yet been reached. Doctors stated that FMK will be helpful however currently they do not trust the information due to the fact that not all use it as intended. Since numbers of medical and medication errors have not decreased, FMK has not yet had the expected positive effect on patient safety.

# Danish Summary


**Introduktion**
Medicineringsfejl er en hyppig årsag til hospitalsindlæggelser [19]. Mange af disse sker på grund af lægemiddelinteraktioner og utilsigtede hændelser hvilket resulterer i lavere patientsikkerhed [19] [42]. I Danmark er der fokus på patientsikkerhed og læring af de fejl, der sker. Derfor er alt sundhedspersonale i Danmark forpligtet til at anmelde utilsigtede hændelser til den Danske Patient Sikkerheds Database (DPSD) [12] [16].
Da patienter ofte har kontakt med flere læger, kan det være svært for lægerne at danne sig et overblik over patientens totale medicinforbrug. Dette gør at lægerne hver især kan udskrive medicin til patienten, som kan resultere i lægemiddelinteraktioner og bivirkninger [19] [25] [42]. For at løse denne problemstilling er Fælles Medicinkort (FMK) blevet udviklet. FMK er en national database indeholdende alle danske borgeres nuværende medicinering, og gør det muligt for alle læger at have adgang til informationen [4]. Implementering af FMK har dog ikke været problemfri, men er tværtimod blevet forlænget og har overskrevet budgettet [61]. Desuden har det været svært at få alle læger til at bruge systemet [51] [52] [53] [54].

**Formål**
Dette projekt er udarbejdet i samarbejde med Sygehus Vendsyssel i Hjørring.
Formålet er ved hjælp af interviews at undersøge lægers holdning til FMK samt brugen af det. Derudover undersøges FMK's effekt på patientsikkerheden ved brug af data om utilsigtede hændelser.

**Metode**
Status af implementeringen af FMK er undersøgt ved brug af afstemningsprocenter på nationalt, regionalt og sygehus niveau.
For at få et repræsentativt udsnit af lægerne på Sygehus Vendsyssel i Hjørring, blev det valgt at interviewe læger fra flere kliniker og med variende erfaring.
Anonymiserede utilsigtede hændelser fra perioden april 2014 til december 2014 blev analyseret. Kun utilsigtede hændelser i forbindelse med FMK og OPUS Medicin var relevante. De utilsigtede hændelser blev grupperet efter årsag for at danne et overblik over typer af utilsigtede hændelser.

**Resultater**
FMK er stadig ikke fuldt implementeret omend Nordjylland og Sygehus Vendsyssel ligger højere i afstemningsprocenter i hele 2014 end det nationale gennemsnit for sygehuse.
13 læger fra fire forskellige klinikker deltog i interviews vedrørende FMK. Generelt synes lægerne at FMK er en god ide, men samtidig at FMK ikke har nået sit fulde potentiale. Blandt andet kritiserede lægerne mængden af undervisning og implementeringsprocessen. Desuden blev det tydeligt at mange af lægerne var usikre på definitionen af termerne: medicinstatus, medicingennemgang og medicinafstemning, samt hvornår disse skal udføres.
Det totale antal af utilsigtede hændelser er steget de seneste fire år, dog er dette et udtryk for at flere er blevet forpligtet til at rapportere dem samt en ændret holdning til utilsigtede hændelser og de, der begår dem [11] [12] [16] [28]. Antallet af tilsigtede hændelser på sygehusene ligger i perioden 2012-2014 på et stabilt niveau. Procentdelen af medicineringsfejl ud af antallet af utilsigtede hændelser ligger også på et stabilt niveau, hvilket burde ændre sig i takt med at FMK tages i brug i alle sektorer. Ved undersøgelse af utilsigtede hændelser vedrørende FMK på Sygehus Vendsyssel, blev ti typer fejl fundet. Nogle af disse kan forhindres ved systemforbedringer hvorimod andre altid vil forekomme for eksempel skrivefejl.

**Konklusion**

Lægerne udtrykker at de finder ideen om FMK god men at de ikke stoler på informationen i FMK på nuværende tidspunkt. Implementeringen af FMK er blevet udskudt flere gange og man har endnu ikke nået målet på 100 % afstemte medicinkort for patienter, der er i kontakt med sygehusene i Region Nordjylland. Antallet af utilsigtede hændelser og medicineringsfejl er ikke faldet som forventet, og dermed tyder det ikke på at FMK har haft en effekt på patientsikkerheden endnu.

# Abbreviations and Definitions

### Abbreviations

| | |
|---|---|
| DPSD: | Danish Patient Safety Database |
| EPJ: | Electronic Patient Journal |
| EPM: | Electronic Patient Medicine module |
| FMK: | Shared Medication Record. In Danish called 'Fælles Medicinkort (FMK)' [4] |
| GP: | General Practitioner |
| NHI: | National Health IT |

### Definitions

| | |
|---|---|
| EPJ: | System constructed to contain all medical information about patients [2] |
| FMK: | Database containing information about current medication of all people living in Denmark available for all relevant health care personnel [4]. |
| Medical errors: | Events occurring due to failure completing a planned action as intended or the use of a wrong plan [42] |
| Medication errors: | Type of medical error related to medicine [44] |
| Medication revision: | Complete evaluation of all current medications of a patient with the purpose of the patient only receiving the relevant medication. In Danish called 'Medicingennemgang' [32] |
| Medication status: | Evaluation of which of the current medication the patient will get during the hospital stay . In Danish called 'Medicinstatus' [32] |
| Medication update: | Update of the list of medication from EPJ to the FMK system. In Danish called 'Medicinafstemning' [32] |
| OPUS Medicine: | An EPM used in hospitals in the North Denmark Region [3] [29] |

# Contents

# 1 Preface

An Danish estimation stated that drug-related incidents are the cause of 10-20 % of hospital admissions [19]. Some of these incidents are due to medical errors and drug-drug interactions. Medical errors are a burden to society because of higher hospital admissions, loss of trust in health care system by patients, and lower satisfaction by health professionals. Furthermore, medical errors decrease patient safety and may therefore impact the well-being of patients negatively [42] [19]. Drug-drug interactions have been determined in some studies to be accountable for up to 3 % of hospital admissions. Some of these could be prevented if the medication consumption of patients was monitored more closely [19]. Generally, it is considered good practice to limit the number of drugs for patients however this is sometimes impossible [19]. For patients who receive medication from multiple doctors, it is challenging for their general practitioner (GP) to get an overview of the total number of drugs consumed by the patient which can lead to increased risk of drug-drug interactions [19]. For these challenges, IT systems may be the solution.

For multiple IT-projects in the public sector, problems such as delays and higher costs than expected have been common [20]. It is crucial for the public sector to benefit from the advantages of technology [20]. When implementing new IT-systems in the public sector, the technology is rarely the limiting factor whereas the ability of the public sector to realize the technological potentials is often more challenging [20].

The IT-system 'Shared Medication Record' (FMK) was developed for the health care sector of Denmark by Ministry of Health. At first, the system was distributed to the regions of Denmark which were responsible for further distributing the system to the hospitals and GPs [61]. At Vendsyssel Hospital, Hjørring, FMK has been implemented however many challenges have arisen during the implementation process and some are yet to be solved.

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# Introduction 2

## 2.1 Patient Safety

Patient safety is defined as 'the freedom from accidental injury due to medical care or from medical errors' [45]. It is important to increase patient safety from both social and economic points of view since lack of patient safety endangers the well-being of patients as well as increases health costs causing problems for society. It seems to be an international challenge to prevent medical errors and thereby increase the safety for patients [31].

### 2.1.1 Medical Errors

A report from 1999 estimated that between 44,000 and 98,000 people die in hospitals each year in the U.S. due to preventable medical errors [42] [55]. In Denmark, it is estimated that approximately seven people die of preventable medical errors on a daily basis [62]. Medical errors can be divided into groups depending on the seriousness of the error.

In Denmark, the categories seen in table 2.1 are used [11].

| **Category of medical error** | **Harm** |
|---|---|
| No harm | No harm |
| Mild | Temporary harm needing no extra treatment or care |
| Moderate | Temporary harm demanding admission to hospital, treatment from GP, additional care, or for patients in hospital extra treatment |
| Serious | Permanent damage demanding admission to hospital, treatment from GP, additional care, or for patients in hospital extra treatment, or other inquiries demanding immediate life-saving treatment |
| Fatal | Fatal |

***Table 2.1.*** Medical errors in subgroups depending on seriousness of the error [11]

Medical errors can occur in any department of a hospital however intensive care units, operating rooms, and emergency departments have high occurrence of medical errors with serious consequences [42].
Medical errors can also be divided into subgroups depending on when the medical error occurs. This division is seen in table 2.2 along with some example in each subgroup [42].

| Process | Example of error |
|---|---|
| **Diagnostic:** | Error in diagnosis<br>Failure to start test<br>Use of outdated tests<br>Failure to act upon results |
| **Treatment:** | Error in procedure<br>Error in administration of treatment<br>Error in dose or method of using a drug<br>Delay in treatment |
| **Preventive:** | Failure to provide prophylactic treatment<br>Inadequate monitoring or follow-up of treatment |
| **Other:** | Failure of communication<br>Equipment failure |

***Table 2.2.*** Medical errors in subgroups depending on when the error occurred and examples hereof [42]

In the report of Kohn et al. from 1999, it was concluded that medical errors often were caused by systems, procedures, and conditions leading the health care personnel to make mistakes or fail to prevent the mistakes [42]. Thereby it was evident that most medical errors do not occur as a result of individual recklessness [42]. In 2001, the focus was more on the medical errors themselves with not much attention on how to reduce them [63]. During the last decade, the view on medical errors has shifted from the person making the error to the error itself and how to prevent it [28].

Medical errors can be detected by different methods. The medical errors can be revealed retrospectively for example through morbidity and mortality rates and malpractice claims. This method does not focus on reduction of errors leading to little or no development of error reduction strategies. In addition, this method is not able to detect all errors [63]. In Denmark, to detect medical errors the hospital personnel is required to report critical incidents to the Danish Patient Safety Database (DPSD) [12] [16]. Denmark was the first country to legislate about patient safety which has been in effect since 2003 [12].

There are several approaches to reduce medical errors for example Østergaard et al. investigated the effect of team training to lower medical errors caused by ineffective or insufficient communication [56]. Another way to prevent medical errors from occurring is by designing health safety systems making it easier for the health care personnel to do it right than to do it wrong [42] since changing the systems are easier than changing the human cognition [50].

One of the most common types of medical errors is medication errors [59]. It is estimated that 25 % of adverse drug events are caused by medication errors [44]. In hospitals, 60 % of medication errors occur at admission, transfer between departments, or discharge [73]. Since the hospitals administer high amounts of drugs, especially dispensing errors are common leading to potentially serious complications for example drug-drug interactions [15].

### 2.1.2 Drug-Drug Interactions

Drug-drug interaction is when the effect of a drug is influenced by another drug taken simultaneously, before, or after [39]. When drug-drug interactions occur, it most likely impacts the patient safety. Some studies have shown that up to 3 % of hospitalizations have been due to drug-drug interactions [19].

Some patient groups have a higher risk of experiencing drug-drug interactions, one of these groups is the elderly population [19] [40]. Since the elderly patient group is known for having multiple diseases, they therefore often receive multiple drugs [25]. Patients taking multiple drugs have a higher risk for drug-drug interactions [19] [25] [40] leading to increased risk of hospitalization and higher health costs [25].
Other factors associated with increased risk of drug-drug interactions are using multiple therapeutics classes [25] as well as having multiple doctors prescribing medications to the same patient [19] [42]. For patients seeing several doctors, the number of prescribed drugs may increase, and it can be difficult for the GP to keep an overview of all the drugs and interactions between them [19]. A study from 2008 showed that 31 % of Danish elderly patients were prescribed drugs from more than one doctor, however their GP did not have knowledge about all the drugs. The study revealed that the GP was unaware of approximately 25 % of the prescribed drugs used by his or her patients [19]. It could therefore be beneficial to develop IT systems containing all information about the medications of the patients to avoid medication errors or drug-drug interactions, or at least try to minimize them in order to improve patient safety.

## 2.2 IT Systems in Health Care

The use of IT-systems in the health care sector of Denmark has changed significantly during the last decades [20]. In the mid 1990s, it was evident that there was a need for standardizing the data on patients in Denmark and an IT system to enable exchange of the data between health professionals [2]. Between 1998-2001, many Danish counties acquired different Electronic Patient Journal (EPJ) systems which are systems containing medical information about the patients [2]. Since the EPJs only contain information about patients in each Danish region, there was a need for a national system to improve the safety for patients [37]. A national system would allow access to patient information regardless of where the patient is located [37].
A national system for registration of patient data could improve treatment of patients as well as resulting in cost reductions in health care [20].
In general, when designing a system for the health care sectors, many criteria ought to be met for example: [50]:

1. Ability to prevent errors
2. When errors do occur, make them visible for easy interception
3. Limit the consequences of undetected errors

For these criteria to be met, a successful implementation of the system is crucial.

### 2.2.1 Implementation of IT Systems

Every renewals of IT systems need proper considerations before initiating. An united vision for the IT system is needed and the solution should be considered from every angle [18].

A thorough preliminary examination is important in development of IT systems. It is crucial to focus on all functions of the systems and not just the most commonly used functions [18]. For the IT system to be successful, the developers need extensive knowledge about the work tasks. Therefore, it is important to have employees participating throughout the process of development of the system in order to create a mutual knowledge exchange to get the best result. To exchange knowledge between employees and developers, methods such as observations,

in-situ interviews, and think-aloud experiments can be used [18].
Table 2.3 shows the knowledge needed in a preliminary examination [18].

| | **The employees current work routines** | **New IT system** | **Technological possibilities** |
|---|---|---|---|
| **Abstract knowledge** | Relevant description of current work routines | Visions and design proposals | Overview over technological possibilities |
| **Specific experience** | Specific experience of the current work routines | Specific experience with the new IT system | Specific experience with technological possibilities |

***Table 2.3.*** Knowledge needed in preliminary examination for development of new IT systems [18]

For the employees, it is important to be involved in the process because their work is often affected by changes in IT systems. By participating in the development process, the employees aim to ensure that the system reflects the actual need in the workplace. When workers participate extensively in the preliminary examination, they will become superusers of the system thus creating a gap of knowledge between superusers and other employees. To limit this gap, all employees should be consulted in the process [18].
Furthermore, it is important that the employees are motivated to understand and accept change [18] as well as the employees being trained in the system to be able to use the system as intended [20]. However in many IT projects, there is a tendency to expect that the new system has advantages which alone will motivate the employees to change. This assumption often creates problems with implementation of the system [18].

When a prototype is created, it has to be tested extensively by the employees or in the work environment in order to identify any problems with the system. Often new requirements will be discovered resulting in need for further development of the system [18].
If the development process has been thorough, problems with the system will be discovered during testing and the system can be improved. Contrary, if the development process has not been thorough, the employees will end up facing the challenges. If these problems are not improved during the development of the system, delays of implementation and exceeding the budget will be expected [18]. For the Danish health sectors, a new system has been designed called FMK.

### 2.2.2 FMK

FMK was developed as a national system to contain current medicinal data about all people living in Denmark to enable access for health care professionals. The doctors treating the patient have access to and can change current medication using FMK and thereby declines in drug-drug interactions and medical errors are expected [4].

The health sectors use different systems, and FMK is designed to collaborate with these systems [4]. In the North Denmark Region, the hospitals use Clinical Suite as an EPJ system [29] which contains the Electronic Patient Medicine module (EPM), OPUS Medicine [10], and a FMK integration [49]. OPUS Medicine contains medicinal information about patients living in and admitted to the hospitals in the North Denmark Region [3]. When being admitted to the hospital, OPUS Medicine does not necessarily contain the updated medication list thus FMK was created to assist the communication between health professionals. In the long term, all health sectors should have access to FMK in order to gain full benefit from the system [4].

### Tasks in FMK

When a patient is admitted to the hospital, FMK for the patient has to be suspended in order for other health professionals not to edit in the medication list during the hospital stay. When the patient is discharged from the hospital, FMK is released so other health professionals have access to make changes [4]. Currently, the doctors have to suspend and release the data in FMK but when new updates to the system are implemented, these step will be completed automatically according to Andrea Welzel.

Doctors at the hospitals are obligated to complete the following tasks in the OPUS Medicine and FMK systems: medication status, medication revision, and medication update. In this project, task will refer to the performance and term will refer to the definition of the task.

Medication status should be performed initially at the hospital admission as well as whenever medication is changed. It is an evaluation of which of the current drugs the patient will receive during the hospital stay [32]. To complete the task, the drugs have to be copied from FMK to OPUS Medicine [49] [61] which is shown in figure 2.1.

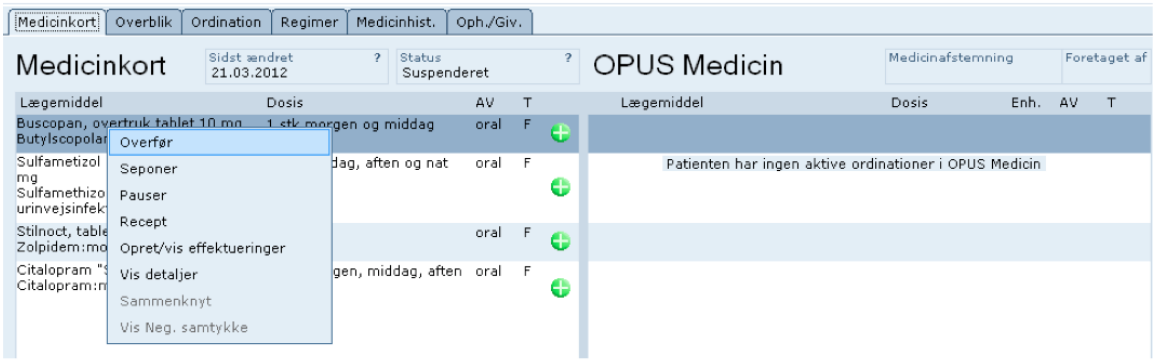


***Figure 2.1.*** Copying medicinal information from FMK in the left side of the figure to OPUS Medicine on the right side

In figure 2.2, the red box to the left shows the button that has to be clicked after performing medication status. The red box to the right shows who last documented that medication status was performed and when it was performed.

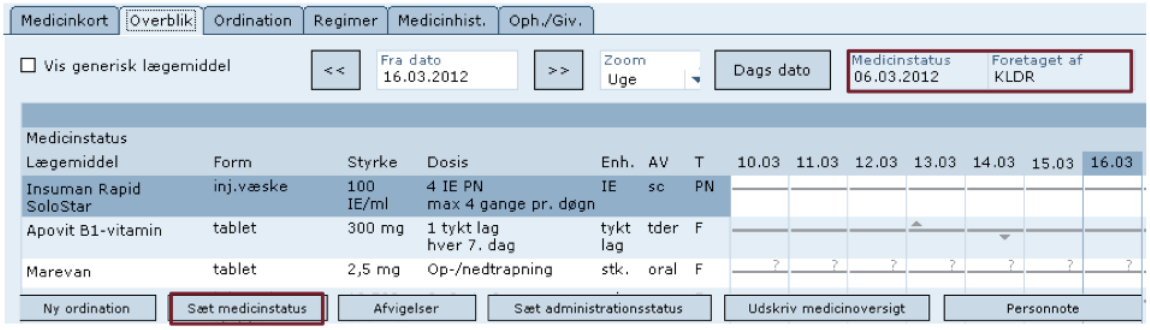


***Figure 2.2.*** Medication status in OPUS Medicine is documented by clicking the button in the red box in the bottom left corner. In the top right corner, it is written when medication status was performed and by whom

During the stay at the hospital, a medication revision should be performed which is a critical evaluation of the current medication of a patient with the purpose of the patient only receiving the relevant drugs and ensuring no drug-drug interactions [32]. The doctor has to go through all the drugs even if it is not within his or her field of expertise [49]. This step is shown in figure 2.3.

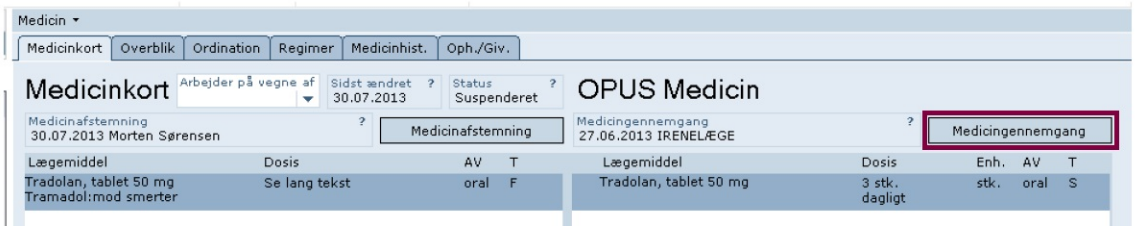


***Figure 2.3.*** Medication revision is documented by clicking the button 'Medicingennemgang' to the right

Medication update is a process where the doctor updates the list of drugs and copies it into FMK and this task should be performed before or immediately after discharge of the patient [32] and can be seen in figure 2.4.

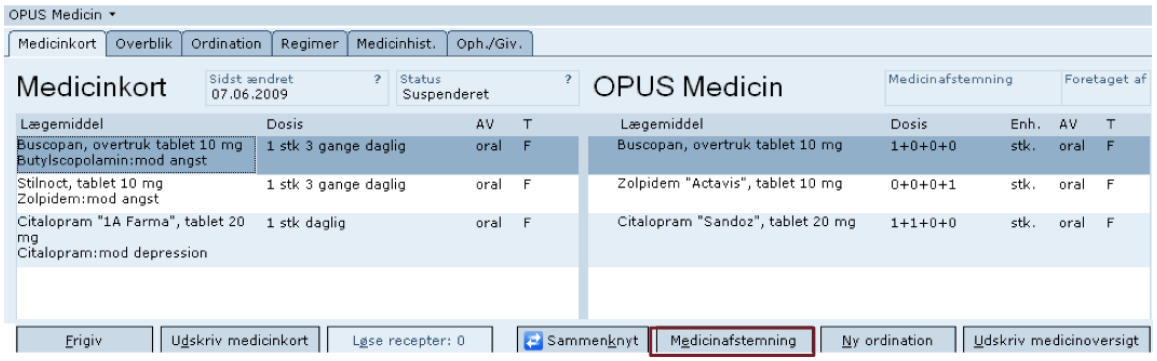


***Figure 2.4.*** Medication update is documented by clicking the button 'Medicinafstemning' in the red box in the bottom part of the picture

In the literature, the tasks are internationally often seen under the term medication reconciliation [17] [44] [57] [70]. More than 40 % of medication errors are caused by inadequate medication reconciliation [17] [46]. An accurate medication reconciliation will limit drug-drug interactions [46] and potential harm to patients [44] thereby improving the safety of drug use [74]. However, some health care institutions have been challenged with the implementation of medication reconciliation [70].

**Advantages of FMK [4] [38]:**

- Overview of current medications
- Health professionals have access to see and change medication
- Increased patient safety, especially between sectors
- Reduction in hospital admissions
- Reduction in drug-drug interactions
- Easier access to data for health professionals
- Less coordination issues between sectors

- Simplified work routines for the doctors
- Less critical if the patient cannot remember own medication when performing anamnesis

### Delays in Implementation

FMK should have been fully implemented by the end of 2011 [4] [61] however delays have caused multiple postponements of the deadline [61].
The latest deadline for fully implementation of FMK is set for the summer 2015 [61]. Status of summer 2014 was that neither hospitals nor GPs use FMK to the full extent. 98 % of the Danish hospitals were technically implemented and medication updates were documented for 63 % of all patients in June 2014 [61]. 94 % of GPs and 75 % of specialist medical practitioners were technically implemented in June 2014. However, only 88 % of GPs and 72 % of specialist medical practitioners made at least one entry during a four week period [61]. By September 2014, all doctors are obligated to report all medical changes for patients in FMK [61].

### Training of Health Professionals

For the health professionals, the offers of FMK training have varied. In the North Denmark Region, it was expected that the approximately 6,500 users of FMK could be trained within 1.5 months [49]. The training was optional and it was not registered who participated [61]. The training for the doctors at Aalborg University Hospital consisted of three hours of training [5] from IT personnel and clinicians [38] whereas doctors in the Psychiatry in the North Denmark Region were offered 6 hours of training [37] [48]. It could seem that the hours of training correlate with the percentage of medication updates hence in November 2013 the percentages of medication updates were 60 % and 81 % for Aalborg University Hospital and the Psychiatry, respectively [65].

### Challenges with FMK

The departments in the hospital have experienced different challenges with the use of FMK for example it was expected that the outpatient department would experience time challenges to do the tasks in FMK for each patient simply because this department consults more patients on daily basis [49].

Many challenges have been detected during the implementation of FMK in Denmark [8] [35] [36] [49] [61]. Examples are summarized in table 2.4.

| Challenges with the system | Personnel challenges |
|---|---|
| - Problems with release of medication update to FMK [49]<br>- Problems with copying data from FMK to EPJ system [8] | - The system is not user-friendly for the doctors [36]<br>- Lack of quality control of FMK data since quality personnel do not have access to FMK [35] [61] |

***Table 2.4.*** Example of challenges with FMK

Evaluation of implementation of FMK in September 2014 concluded that there has been a lack of management and leadership in the implementation process [61]. National Health IT (NHI), who developed the system, was criticised for not having the required knowledge of work procedures, testing the use of FMK, and testing the quality of the data in FMK [61].

The following tactics can be used if changing the system in order to reduce medical errors [50]:

- Reduce complexity
- Preventing the user to rely on memory by containing the information needed
- Use automated tools wisely for example application of robots
- Use procedural constraints to increase the difficulty of performing the wrong action
- Limit the unwanted consequences of change of the system

To investigate the current view on FMK by the employees, interviews would be required.

## 2.3 Interviews

To interview employees, different methods can be applied. The two types of questionnaires are: interview-administered and self-complete surveys [72]. The advantages of self-complete surveys are: easy administration, lower cost, and the fact that larger samples can be collected [1] [72]. Contrary, interviews have the advantage of the ability to ask open-ended questions thereby collecting a larger range of complex responses [1] [72]. Thus, interviews are the best option when identifying problems with implementation of IT systems experienced by the employees.

There are three types of interviews: structured, semi-structured, and in-depth [22]. Structured interviews contain questions with fixed options asked in a specific order [22]. The semi-structured interviews consist of open-ended questions and questions may diverge during the interview [22]. In-depth interviews are less structured than the other types of interviews and can cover only few issues but in greater detail [21] [22]. The type of interview is chosen based on the purpose of the interview [22].

### 2.3.1 How to Conduct an Interview

The first step is to plan the interview involving research of the topic and identification of the target group for the interview [21]. Based on the research, the questions can be formulated [1]. The questions should be asked in simple language, be short and specific, and loaded words should be avoided [1] [22] [43] [72]. Avoiding leading questions is important in order to receive non-biased responses [43] [72]. Within a topic, the factual questions should be asked prior to opinion questions [21] just as easy questions should be asked first [1]. The order of the questions is essential and questions should be in a logical order keeping the flow of the interview [1]. The number of questions has to be considered since the more questions the longer the interview will be, which can influence the motivation for participants [27].

The next step involves considerations regarding how to conduct the interview itself [21]. These considerations are [1] [21]:

- How to recruit the participants
- What to say before, during, and after the interview
- How to follow up the interview
- How to translate data if necessary

Prior to interviews, it is important to train the interviewer and consider the interview set-up [21] [43].

The next step is the actual interviews and collection of data [21]. After the interviews, the data is analyzed depending on the type of data [21]. If transcribing interviews, it should be

considered who transcribes the interview, how to transcribe, and how to use the transcribed data [43]. Last step is to present the findings to those who are relevant [21].

To validate the interview design, a pretest has to be conducted. A pretest is a well-known method to validate interviews however only few textbooks provide information about methods of pretesting. Not all publications provide information about whether or not an interview was pretested and if it was, the method applied is not necessarily disclosed [58].

A pretest can determine [1]:

- If the questions are understood as intended
- If the target group is able to answer the questions
- If the questions are too complex or difficult to ask

Even though a pretest is conducted by trained interviewers, issues with the interview are not always discovered [58]. There is a growing interest in pretesting and new methods have been developed for example cognitive interviews, behaviour coding, and debriefing [58].
In cognitive interviews, the employee is asked to think aloud when being asked a question. The objective is to clarify the interpretation of the question in order to identify potential problems with the question [58].
Behaviour coding is used to analyze the interviewer and the employee's verbal behaviour [58]. When using debriefings, the interviewers informs the employee of the purpose of the interview prior to the interview questions [58].

After analyzing the results of the pretest, questions can be altered in order to improve the quality of the questions. If questions are changed, the new questions have to be validated to ensure that the clarity of the new questions exceeds the original questions [58].

### 2.3.2 Ethical Considerations when Conducting Interviews

Throughout the process, ethical considerations must be taken into account. Examples of ethical considerations are listed below [43]:

- Is the study beneficial for the employees
- Motivation for employees
- Informed consent
- Confidentiality
- Anonymity
- Access to interviews and data from interviews
- Legal problems
- Consequences for employees participating in the interview
- Role of researchers conducting the study
- How to avoid the results of the study being influenced

# 3 Aims and Hypotheses

This project is completed in collaboration with Vendsyssel Hospital, Hjørring, to gain knowledge of doctors' attitude towards FMK and the use of FMK. Furthermore, this project focuses on the effect of FMK on patient safety in the current use.

**Primary Aim:**
Investigating doctors' attitude towards FMK and the use of it through interviews with doctors

**Secondary Aim:**
Investigating the effects of FMK on patient safety using data on medical errors

**Hypotheses:**

1. Even though the implementation of FMK was delayed, the implementation has now been completed successfully
2. All doctors find FMK useful and the implementation of FMK successful
3. The current use of FMK improves patient safety in terms of a decline in medical errors in hospitals, medical errors occurring in hospitals being less serious, and lower number of medication errors in hospitals

# Methods 4

## 4.1 Status of Implementation of FMK

In order to investigate the status of implementation of FMK, the percentages for performed medication updates were collected locally, regionally, and nationally.
Data for the hospitals for this section have been provided as followed:

- Data for Vendsyssel Hospital, Hjørring have been provided by the hospital
- Data for the North Denmark Region have been provided by FMK Project Leader, Andrea Welzel
- Data for Denmark have been provided by NHI [51] [52] [53] [54]

## 4.2 Pretest

It was chosen to conduct interviewer-administered surveys because it would be less time-consuming for the participants. The pretest was conducted in order to validate the interview questions and ensure that the questions would be interpreted as intended. Furthermore, the pretest was conducted to train the interviewer and transcriber hence both had no prior experience with scientific interviews. It was chosen to conduct semi-structured interviews due to fact that the questions should be open-ended and that it was chosen only to ask specific questions.

### 4.2.1 Prior to Pretest Interviews

In order to validate the questions for the doctors, a pretest was carried out. The questions of the pretest were constructed based on knowledge from the literature and focus of the project. Supervisor, Vivi Pedersen, gave inputs to the questions which were designed in agreement with the following points from the literature:

- Easy to understand
- Short and specific
- Avoid loaded words
- Avoid leading questions
- Easy questions first
- Logical order of questions

To test the pretest interview questions, the pretest was added validation questions about the interpretations of the questions. All the validation questions were asked after completing all the pretest interview questions to ensure that the questions were understood as intended. The validation questions were asked in the second part of the interview since it was expected that their answers would change if they knew the real aim of the pretest.
The questions for the pretest interviews can be seen in Appendix A.

Background information was asked in a paper questionnaire which the participant had to fill out prior to the interview. This questionnaire can be seen in Appendix B. The questions regarded:

- Gender

- Age
- Department at the hospital
- Experience
- Country of birth
- If foreign birth country, how many years have the doctor lived in Denmark
- Country of education
- Percentage of daily work used for medication status, medication revision, and medication update

It was expected that doctors would answer differently depending on their background. The background questions were asked in order to have ability to group the participants afterwards.

Since the pretest interviews should resemble the interviews, the instructions for the participants which can be seen in Appendix C contained information about the aim of the interview, anonymity, recording of interview, and the length of the interview with no information about the pretest participants actually were participating in a pretest.

### 4.2.2 Recruitment for Pretest Interviews

Since doctors are known for being busy, it was expected that they would be difficult to recruit for a pretest. The pretest was constructed mainly to validate the interpretation of the questions and therefore the pretest did not necessarily have to include doctors but could involve other health care personnel with knowledge of FMK and the use of the system. Medical students at the Master level of Medicine have knowledge of FMK and have seen it in use multiple times in the clinic, and could therefore be included in the pretest interviews. The students of this project have had most courses on the Bachelor Degree with the medical students at Aalborg University which therefore gave an advantage in recruitment since it was assumed that the medical students were interested in helping out fellow students.

There was no set number of pretest interviews prior to recruiting however only one week was dedicated to pretest. As many as possible were recruited.
It was expected that the medical students would be hard to reach because of their work schedules at the hospital. Therefore, an e-mail would be expected to have little success as a recruitment strategy. However, many young people are frequent users of social media for example Facebook [26] and it was therefore expected that a post on Facebook would be more successful. The post which can be seen in Appendix D was posted February $10^{th}$ 2015 in the group called 'AAU Medis/Medicin netværk'. The group has different purposes, one of them being recruitment of participants for project experiments.
Two medicine students on the Master pointed out that the medicine students do not have access to make changes in FMK, and they were therefore not sure if they fulfilled the criteria for participating in the pretest. The criteria was clarified in a comment specifying that participants should only know the system and have seen the use of FMK in the clinic. Three responded positively and interviews were set up individually to match the schedule of the participants.
On February $12^{th}$ 2015, a reminder was posted with the hope of recruiting more participants for the pretest interviews. This post can be seen in Appendix E. However, no positive replies were received.

### 4.2.3 Conducting Pretest Interviews

The location of the pretest interviews was considered thoroughly. The most important criterion for location was that it should be convenient for the participants. Furthermore, it was important that the location for the pretest interviews would resemble the location of the interview at Vendsyssel Hospital, Hjørring. Since the education of the medicine students take place at Aalborg University Hospital, the location of the pretest interviews should be in Aalborg. The apartment of student, Sanne Andersen, was used because of its location close to the hospital and its lay-out.

It was decided that one student would be the interviewer throughout the project and the other student would transcribe all the interviews. The student with the computer used to record the interviews was therefore chosen to be the transcriber.

Since participants were former fellow students, it was crucial to keep the professional distance by trying to avoid personal conversation prior to the pretest interview. The instructions for the participants were read aloud to the participants and if they had no questions regarding the pretest interview, the recording was started. The interview was recorded on a Samsung Ativ Book 9 Lite computer using the application 'Lydoptager'. It was decided not to take notes during the interview to avoid disturbing the participants. The computer was placed as close to the participant as possible to ensure highest possible quality of the recording however the screen was turned away from the participant to avoid pressure from looking at the recording time appearing on the screen.

To avoid bias, it was decided that the interviewer was not allowed to comment on the answers of the participants, however to encourage participants to answer the questions, the interviewer was allowed to use body language signalling interest in the answer such as smiling and nodding.

### 4.2.4 Transcribing Pretest Interviews

Prior to conducting pretest interviews, a guide was constructed for transcribing the interviews.

The guide contained the following:

| | |
|---|---|
| ...: | A pause in the answer |
| .: | A small pause in the answer |
| (): | Transcriber can not hear part of the response |
| [description of sound]: | Background noise which is not a part of the interview stage |
| {}: | The participant laughs. If the person laughs while talking, the words said while laughing is written in the curly brackets |

Transcription of a response was not initiated until participants had said any actual words. There was no limit of the number of times, the transcriber could listen to the interview. However, if the transcriber could not hear part of a response after listening through the sequence three times, the transcriber could use the () code.

Background noise was defined as an unexpected sound in the surroundings which could influence the answer. For example, if an interview is conducted at Aalborg University, the sound of an ambulance would be unexpected however if the interview was conducted at the hospital, the sound would be considered as part of the interview stage.
For the codes: ., ..., and {}, it was a judgement of the transcriber when to use them. However, it was attempted to be consistent and unbiased in the use of these codes.

## 4.3 Education in the Use of Health Systems

To gain knowledge about the use of the systems, OPUS Medicine and FMK, an education session was set up with FMK Project Leader in the North Denmark Region, Andrea Welzel. The session was not the same as the education for doctors because no actual training in the systems was needed, however it was needed to get an introduction to the systems, the way the systems interact, and the challenges within the systems. The main focuses of the session were about the performance of the three tasks: medication status, medication revision, and medication update.

## 4.4 Information for the Hospital Administration

Since no human material was used for this project, an ethical approval from the Ethical Committee was not necessary [6]. However, when setting up interviews with doctors at Vendsyssel Hospital, Hjørring, an approval to use the doctors' duty hours to conduct interviews from the Hospital Administration was needed.
To get approval from the Hospital Administration to conduct the interviews with the doctors, a paper with the following points were constructed:

- Presentation of students
- Purpose of the project
- How the project can be useful for Vendsyssel Hospital, Hjørring
- Timeline
- Inquiry
- Number of participants
- The interview
- Current interview questions

The information sent to the Hospital Administration can be seen in Appendix F.

On March $10^{th}$, 2015, an approval from Hospital Medical Director, Per Sabro Nielsen, was received.

## 4.5 Interviews with Doctors

The students of this project had signed confidentiality agreements on the $1^{st}$ semester on the Bachelor Program which were still valid for the conduction of this project.

### 4.5.1 Background Information

The background information from the pretest was revised. It was decided to limit the number of questions since literature states that many questions could influence the motivation of participants negatively [27].

Questions regarding: age, country of education, and if foreign birth country, how many years have the doctor lived in Denmark were taken out. The question regarding age was taken out due to the idea that age and medical experience would be correlated and therefore both questions would not be needed. The country of education was taken out due to low number of participants and thereby potential lack in significance. The question for the doctors with foreign birth country regarding years spent in Denmark was taken out because of low number of participants and to keep the number of questions limited.
A question was added to the background information which can be seen in Appendix G. The question regarded the number of years which the participant had been employed by the North Denmark Region. The reason for the the first options: 0-3 years and 3-5 year were chosen due to the fact that OPUS Medicine was implemented approximately 3 years prior to the interviews. The participants answering 0-3 years have therefore been employed after the switch from one system to OPUS Medicine integrated with FMK. Participants answering 3-5 years have been briefly introduced to the old system and soon thereafter been a part of the implementation of OPUS Medicine and FMK.

### 4.5.2 Interview Questions

The participants of the pretest interpreted the question regarding how they would describe the scheduled training very differently. Therefore the specific question had to be changed. The introduction to the systems and the pretest answers gave ideas for new questions and improvements of existing questions. Furthermore, the interview questions were revised by supervisors at Vendsyssel Hospital, Hjørring: Vivi Pedersen and Bente Jensen as well as FMK Project Leader Andrea Welzel.

The questions regarding the terms: medication status, medication revision, and medication update, were put in an unlogical order to test whether the participants knew the terms from one another.
The final interview questions can be seen in Appendix H.

### 4.5.3 Recruitment for Interviews

In collaboration with supervisors at Vendsyssel Hospital, Hjørring, the realistic number of participants was discussed. Each clinic at the hospital should be represented however doctors working in Clinic for Anaesthesiology do not regularly work in FMK and doctors from the Clinic were therefore excluded from the interviews.
The distribution of doctors from the clinics were desired as following:

- Clinic for Woman- and Child Diseases: 4
- Clinic for Surgery: 2
- Clinic for Acute Medicine: 4
- Clinic for Internal Medicine: 5

The Clinic for Woman- and Child Diseases is divided in a paediatrics department and a gynaecology and obstetrics department. Two doctors were desired from each of these departments. It was decided to invite more from Clinic for Acute Medicine and Clinic for Internal Medicine due to the fact that doctors in these clinics use FMK more often. Supervisors at Vendsyssel Hospital, Hjørring, thought these numbers of participants were realistic.

Invitations to all clinic were sent March $20^{th}$, 2015, and these invitations can be seen in Appendices I-L.
For those clinics which had not answered close to deadline, a reminder e-mail was sent by supervisor, Vivi Pedersen.

As a consequence of the work of doctors being unpredictable, the distribution of doctor ended up as following:

- Clinic for Woman- and Child Diseases: 3
- Clinic for Surgery: 2
- Clinic for Acute Medicine: 5
- Clinic for Internal Medicine: 3

For the Clinics for Woman- and Child Disease and for Internal Medicine, less doctors than intended were recruited due to the clinics being busier than usual and the doctors not being available. Contrary, for Clinic for Acute Medicine one more doctor than intended was recruited as a result of low number of patients in the clinic on the days of interviews.

### 4.5.4 Conducting Interviews

When conducting interviews with doctors at Vendsyssel Hospital, Hjørring, the same method as with the pretest interviews was applied to the best possible extent. However, on a few parameters the interviews differed from the pretest interview. The first parameter was the fact that the doctors were not acquainted with the interviewer and the transcriber prior to interviews. The other parameter was that interviewer and transcriber came to the clinic to conduct the interviews to make the interview convenient for the doctors.

The first doctor to be interviewed answered in a low voice. After conducting the first interview, it was decided that the interviewer and the transcriber were allowed to encourage the doctors to provide longer answers by using the words 'Yes' and 'Okay'. Furthermore, the interviewer was more attentive on the importance of asking the questions in a clear and loud voice.

The roles as interviewer and transcriber remained the same as from the pretest interviews. Expect for two interviews, which were conducted by the transcriber due to the interviewer being sick at the day of the interviews.

### 4.5.5 Transcribing Interviews

The following codes were used when interviews were transcribed:

| | |
|---|---|
| ...: | A pause in the answer |
| .: | A small pause in the answer |
| (): | Transcriber can not hear part of the response |
| [description of sound]: | Background noise which is not a part of the interview stage |

It was decided that it was of no relevance to the project if the doctors laugh during interviews, and the code for laughing was therefore not used for the interviews with doctors.

## 4.6 Medical Errors

To investigate FMK's effect on patient safety, reports of medical errors were examined.
Using the reports from the DPSD, number and seriousness of medical errors were obtained to create graphs illustrating the progress of medical errors in general and for the hospitals only as well as the progress of the nature of the medical errors.

Vendsyssel Hospital, Hjørring, provided anonymous lists of medical errors reported from April 2014 to December 2014. The specific medical errors are confidential and could not be included in this project. All lists were studied and medical errors regarding FMK were divided into groups depending on type of error. A list of the most common types of errors is included in this project.

# 5 Results and Data Analysis

## 5.1 Status of Implementation of FMK

The status of implementation of FMK is evaluated using percentages of performed medication updates in the FMK system.

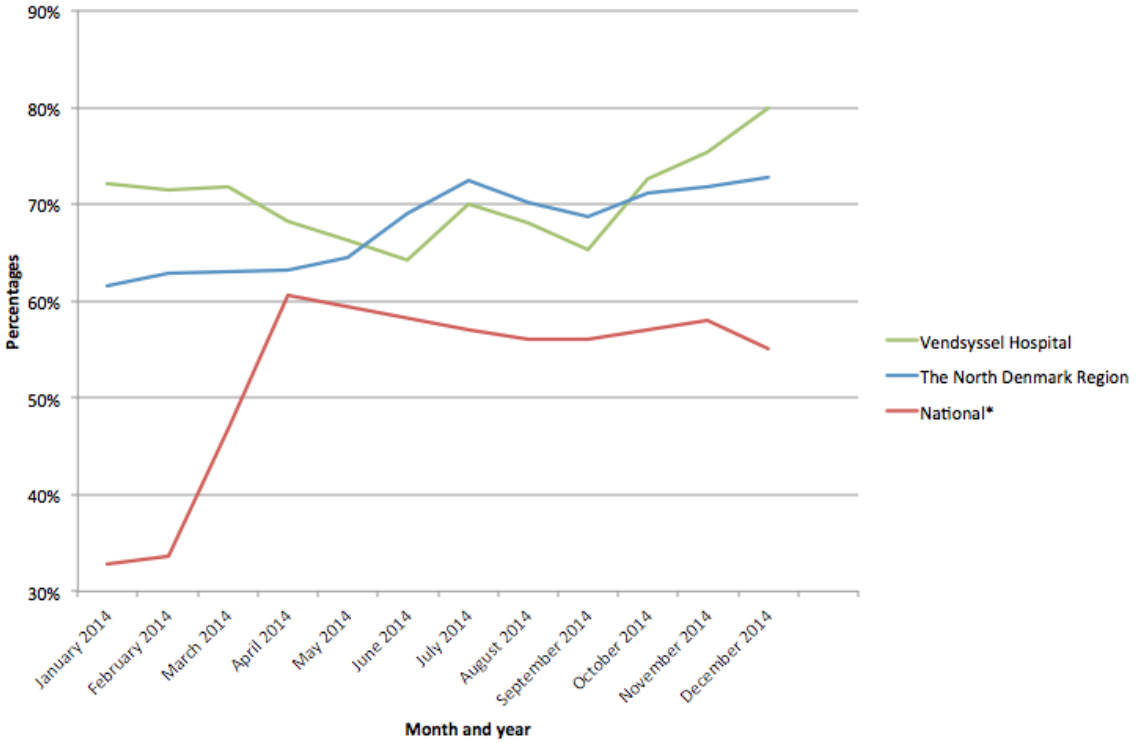


***Figure 5.1.*** Percentages of performed medication updates for Vendsyssel Hospital, the average for hospitals in the North Denmark Region, and the average for all Danish hospitals combined. *Data do not include national numbers for the months: May and June

Figure 5.1 shows the percentages of performed medication updates for Vendsyssel Hospital, hospitals in the North Denmark Region, and hospitals nationally combined. The figure clearly shows that the national percentages are lower than the regional and local numbers. Regions have implemented FMK at different times starting in 2011 [61]. The percentages for the national implementation have been affected by the challenges met in each Danish region. This explains the tendency for the national numbers in the beginning of 2014. In the period from April to December, the numbers are similar, however numbers for the following months: May and June were not available. Therefore these months could have deviations though this does not seem realistic due to the fact that the other months have approximately similar percentages with small deviation.

## 5.2 Interviews

### 5.2.1 Background Information

The results of this section is on the basis of 13 interviews with doctors.
Eight male and five female doctors participated in the interviews.

Figure 5.2 shows the distribution of the doctors' experience within the medical field.

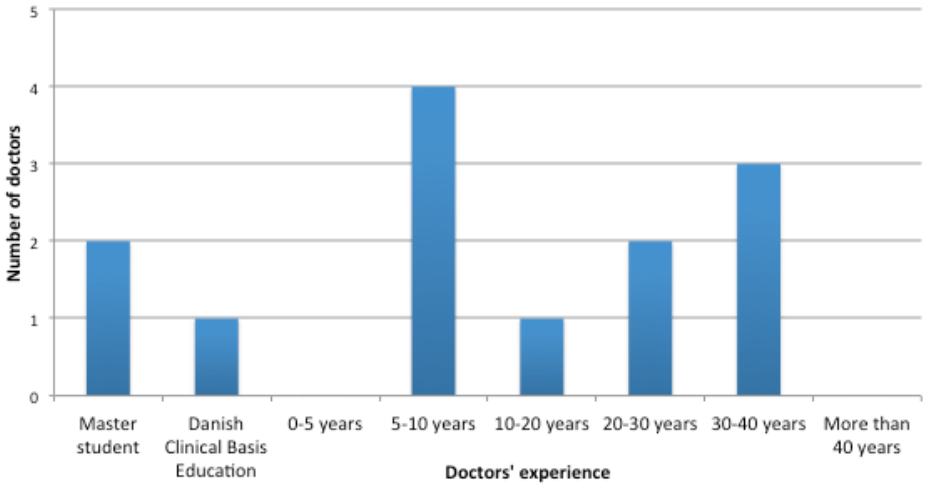


***Figure 5.2.*** Distribution of doctors' experience based on the level in education or years of experience after taken the Hippocratic oath

Figure 5.2 reveals that doctors with different level of experience participated in the interviews. This proves that the recruitment was successful on this point.

To investigate how long the doctors had been employed in the North Denmark Region, the question was asked as a background question. Figure 5.3 shows the distribution of doctors for this question.

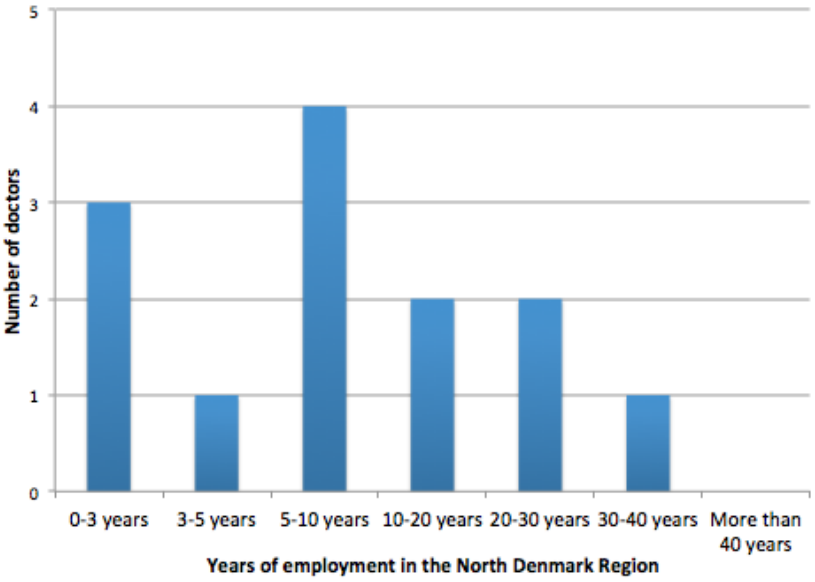


***Figure 5.3.*** Distribution of doctors' employment in the North Denmark Region

Figure 5.3 shows how the doctors were distributed in regard to years of employment in the North Denmark Region. Taken into account that only 13 doctors participated, the distribution of employment is acceptable.

For the background question regarding the country of birth, all participants answered the same option: Denmark.

The participants were asked how much of their work which consist of performing tasks in FMK. Figure 5.4 shows the distribution of answers. One doctor answered two options and where therefore counted twice.

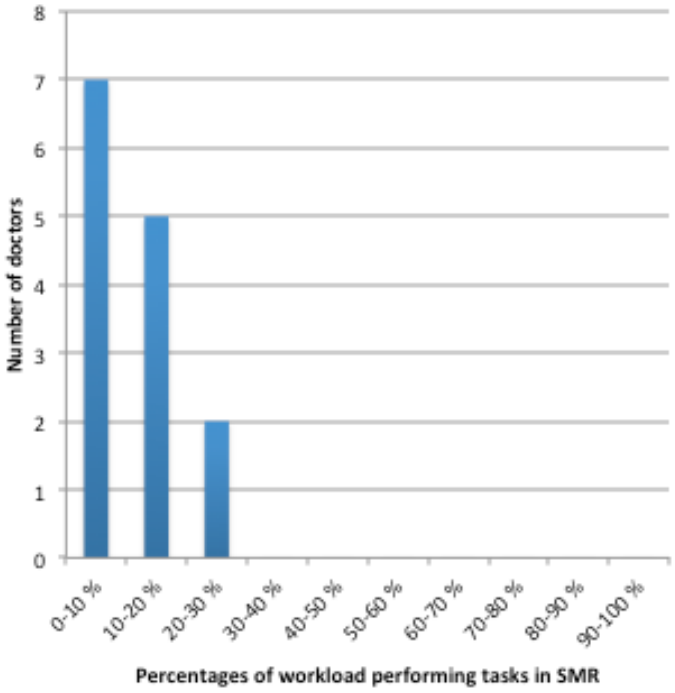


***Figure 5.4.*** Doctors' estimation of time spent performing tasks in FMK

In figure 5.4, it is seen that the doctors estimated that the tasks in FMK takes up to 30 % of their work. Half of the doctors answered the option of 0-10 %. It is important to note that this reveals the estimation of doctors thus it might not be the actual distribution.

### 5.2.2 Interview Questions

Due to the confidentiality agreement and because the doctors participating in the interviews should not be recognizable, background information and interview responses cannot be disclosed coupled.

#### Training

On average, the doctors had received approximately three hours of training in FMK and OPUS Medicine. When grouped, the distribution was as following:

| Hours of training | Number of doctors receiving the amount of training |
|---|---|
| Less than one hour | 3 |
| 1-3 hours | 5 |
| 3-5 hours | 1 |
| More than 5 | 4 |

***Table 5.1.*** Distribution hours of training in OPUS Medicine and FMK for doctors

As seen in table 5.1, the amounts of training which the doctors had received were diverse. There seems to be a correlation between experience of doctors and hours of training received. The more experienced doctors primarily received the most training, some of these being superusers.

The doctors were asked how much training they specifically had received regarding FMK. The distribution was as followed:

| Hours of training | Number of doctors receiving the amount of training |
|---|---|
| Less than one hour | 8 |
| 1 hour | 2 |
| More than one hour | 1 |
| Cannot remember | 2 |

***Table 5.2.*** Distribution hours of training in FMK for doctors

As seen in table 5.2, more than half of the doctors received less than one hour of training in FMK.

When asked to judge the training session, six doctors evaluated the training positively. Three doctors were not asked the question due to them not having participated in any training session. The training was criticised regarding the following topics:

- Time of training: the training came to early compared to the implementation of the system
- The training was not sufficient: some feel that they learn to use it by using it
- The training session was too long
- It was evident during the training session that the system was new and therefore no one had sufficient knowledge on how to use it

Some of the points, which were criticized, contradicted each other. For example, some found the training to be too short and some found it too extensive.

When asked for improvement of the training, the doctors gave the following ideas:

- Some wished to participate in training sessions
- The system and the training should be implemented simultaneously
- To have case based training where the test system is used
- To receive written material
- Follow-up training
- The training could be expanded to include why to do the tasks and not just how to do them
- Training regarding updates. Less updates equals less need for training and vice versa

The most mentioned idea was that the training should resemble the realistic use of the system.

When asked who the doctors would go to for help, most answered that they get help from other colleagues. Some answered that they could get help from IT personnel. Only few expressed knowledge about the existence of superusers.

The doctors were asked to describe what they had done to acquaint themselves with the use of the system. The most common answers were that they had participated in the training sessions, learned by doing, and consulted other colleagues. Some of the doctors are responsible for training of other doctors and therefore expressed that they had put a lot of effort into learning and understanding the tasks and the system.

**Knowledge of Terms and Tasks**

For each task, the doctors were asked about when to perform the task and the definition of the term. The tasks were deliberately not listed logically in the interviews. This was done in order to investigate if the doctors knew the definitions of the terms since Vendsyssel Hospital, Hjørring, was interested in investigating this point. The tasks were listed in this manner in the interviews: medication update, medication status, and medication review.

**Medication update:** the majority of the doctors knew when to perform medication update. However, four doctors were either insecure or did not know when to perform the task.
For the term, the majority were aware of the definition but five doctors did not know the full definition of the term or were uncertain about it.
The doctors were asked to evaluate the system regarding the process of performing medication update. Half found it acceptable as it is. Here are some example of positive feedback:

- Easy to get an overview of the medication
- Easy to perform medication update
- The function which gives the opportunity to couple the two lists to get an easy overview works satisfactory

However, many commented on different challenges for example:

- Problematic that the system uses trade names and not generic names for drugs. This is a known challenge for doctors of the different sectors [23]
- Problematic when doctors do not transfer drugs between OPUS Medicine and FMK but prescribe the drug in both systems with the result of the drug appearing twice
- Problematic to have two system. There should be only one in order to limit mistakes
- The system is too slow
- Some were not aware that it is possible to transfer several drugs between the systems simultaneously causing medication update to be more time consuming

**Medication status:** three doctors stated that they do not perform medication status. Of the rest of the doctors, half were sure when to do it. Approximately, a third of all doctors did not know that medication status should be performed each time the medication is changed or did not say so.
Regarding the definition of medication status, nine doctors were certain of the purpose of performing the specific task.

**Medication revision:** of the 13 doctors, three stated that they do not perform medication revision. Of the rest of the doctors, the majority did not know when to perform it or did not answer the question sufficiently.
Approximately half of the doctors were sure of the definition of medication revision. The doctors were asked which patient group they consider to be the most difficult when performing medication revision. The majority answered that the elderly patient group and patients with multiple diseases and receiving a lot of drugs are the most difficult when performing medication revision. Some mentioned the patients for which not much information is available. This could be due to lack of information in the system or the patients being unable to help clarify their drug consumption.

The regional definitions of the terms and tasks are available for doctors at www.pri.rn.dk. But it was not investigated if doctors were aware that the information exists online.

### FMK

**Purpose of FMK:** All doctors answered correctly when asked about the purpose of FMK however one did not describe the full purpose of FMK.

When asked to describe three good things about FMK, the doctors answered the following:

- Is helpful especially when patients cannot remember own drug consumption
- Improves communication between hospital and GPs
- Able to see if prescriptions are filled or expired
- The medication lists in paper format are no longer necessary
- Easier to prescribe medication
- Easy to get an overview of the medication of a patient when FMK has been updated
- Increase patient safety because the system enables doctors to communicate opposed to from doctor to patient to doctor communication
- The system documents who last performed medication update and when it was performed
- The system is national and therefore health care professionals can have access to data on all Danish patients
- When all sectors use FMK as intended there will be less confusion about the medication
- The webpage for FMK: fmk-online.dk is satisfactory

In the same way, the doctors were asked what could be improved in FMK and they criticized the following:

- Problematic that the system uses trade names and not generic names for drugs
- FMK should delete old prescriptions when two prescriptions of the same drug are available for the patient
- Simplification of terms
- Problematic when people have no civil registration number
- System errors
- Would be better if there was only one system instead of both OPUS Medicine and FMK
- FMK should work faster
- Simplification of the use of FMK
- Improve the overview of drugs so it is easier to see when drugs should be terminated and if they should
- Drugs should be transferred automatically to FMK when prescribed in OPUS Medicine

- All public health care professionals should be obligated to use the system as intended
- All systems should describe when the patient is supposed to take their medication in the same manner
- It should be more clear when the medication is updated
- The tasks do not always make sense due to the fact that the hospital doctors do not know the patients and their medical history as well as their GP
- It is difficult to perform medication revision due to insufficient knowledge of all drug-drug interactions
- Difficult when patients have to increase or decrease treatment
- Restriction on text amount
- Not all products can be prescribed for example vitamins
- Some find that medication revision and medication update are part of the same task

Doctors were asked about how user-friendly, they find FMK. Eight were positive regarding this point for example they find FMK easy to use compared to other IT systems in the hospital. On the other hand, some find the system challenging due to reasons already mentioned in the list above.

Overall, the doctors found that there is a need for such a system, however they all agree that it has not yet reached the full potential especially because not all health care professionals use it.

#### FMK and Patient Safety

Three doctors were not asked the question or did not answer the question. Of the rest, nine doctors answered that FMK affects the patient safety positively if updated. The last doctor explained that FMK currently does not affect patient safety however when implemented fully it will have a positive effect.

#### Implementation of FMK

The doctors found the implementation process to be sudden and with lack of training and knowledge for employees. Some stated that it is frustrating that not all sectors implement the system at the same time.

### 5.2.3 Debate after Interview Questions

After the interview questions, the recording was still active and most participants further discussed FMK. The following sections are based on the ideas and comments from these discussions.

#### Training

Several commented that the training is insufficient and should be given regularly for example when the system is updated and especially when extensive changes are made in the system. One of the young doctors suggested that training in IT systems should be a part of the curriculum during medical education. When the system is updated, the doctor receive an email regarding the new features, however one stated that it seems that many do not read the information.

### Terms

Some doctors stated that they find it difficult to understand the terms: medication status, medication revision, and medication update, and when to use them. One even said that nobody ever told why and when to perform the tasks. Another said that the person pushes all buttons just to make sure that everything is done. A couple of doctors suggested that all doctors get written material or booklets with the definition of the terms and when to perform the tasks.
Doctors found the tasks bureaucratic and were aware that they are only measured on the performance of tasks and not the quality of it. Some discussed that doctors can push the button without performing the task and vice versa. When the quality is low, there will potentially be more medical errors. One doctor suggested that instead of examining percentages of performed tasks, it would be better to investigate random samples of medication updates.

### Responsibility

One doctor stated that doctors not necessarily are aware of their responsibility in FMK. Another doctor stated that it does not always seem like any doctor is taking responsibility for the medication of a patient. This could be due to the fact that some doctors have a fear of interfering with the work of another doctor [30]. Doctors generally agree that all doctors in the health care sector should take responsibility for the implementation of FMK. A doctor stated that in the outpatient departments there is not enough time per patient to complete all tasks. This is supported by a report stating that it takes 20-30 minutes to perform a thorough medication revision [38] and for patients in the Clinic for Internal Medicine it takes between a couple of minutes to an hour to discharge the patient [24]. Generally, these tasks are time consuming [57]. It was evident that some doctors did not feel responsibility to complete all tasks in their clinic. Maybe they feel the tasks as an extra burden which has been stated in the study by Vogelsmeier et al. [70].

### FMK Technically

Many find that the medication lists quickly become chaotic. One questioned why FMK has to be suspended during hospital admission due to the fact that FMK has to be released when a patient is discharged and many forgot to do this in the beginning [38]. A new update of the system will automatically let other doctors know that a patient is admitted to the hospital and therefore suspension of FMK will not be required [66]. A doctor stated that the system seems not to be developed for medicating children due to lack of typically doses for this patient group and that medication, for which certain permission is needed, cannot be prescribed in OPUS Medicine. Some stated that FMK and OPUS Medicine should be able to automatically delete outdated prescriptions which the patient no longer takes.
Contrary to most doctors, one doctor mentioned that even though FMK is not perfect, using paper journals to keep track of medication for a patient had some difficulties especially because many patients cannot remember own medication which is supported by several articles [30] [46]. Some stated that it could be beneficial if FMK and OPUS Medicine was more integrated so doctors would not spend time on things that could be more automatic. One stated that even if FMK is not fully updated, it still provides an idea of the type of patient.

### Compliance

Several doctors discussed the issues with compliance. Some patients do not take their medication as prescribed and a list in FMK therefore might not reveal the correct picture of a patient's drug consumption. One doctor calls the GP of the patients because the GP should have a better

insight to the medication, however the doctor stated that the GP does not always know either. When patients arrive from nursing homes with a medication list, it is more credible due to the fact that the medicine on the list reflects the medicine given to the patient.

#### Implementation Process

Many points regarding the implementation process were discussed as following:

- Many discussed the fact the IT systems are implemented suddenly which is frustrating for the doctors
- One doctor questioned the leadership on the project
- Several doctors did not feel included in the process and development of IT systems in general
- One doctor requested a feedback arrangement for comments, problems, and ideas to the systems
- One questioned why the implementation process was initiated prior to completion of a pilot study
- Some found it evident that not much exchange of experience happens in the public health sector
- One mentioned the diverse implementation where the hospitals are obligated but the GPs get paid to implement the system
- Some questioned what will happen when all sectors have implemented FMK, one doctor fears that it will result in an extra burden for the doctors in the hospital because the nursing homes might contact the doctors to clear potential errors
- Many of the doctors found the topic of this project relevant

#### IT Systems

A younger doctor stated that it seems that older doctors are more critical towards new IT systems. They find it overwhelming and time consuming.
Doctors expressed that they feel that they support the IT solutions and not the other way around. This point should have been tested during the pilot study [61]. It is important that those training the doctors are positive towards FMK because a negative attitude might influence the training.
Doctors stated that they feel that time is spent on more documentation and less time with the patients. The documentation process is extensive and involves several systems which can confuse the doctors.
One doctor questioned why there are several different EPJ systems in Denmark that are not able to communicate with each other. However, if only one system existed, a breakdown would have serious consequences.
One doctor asked for more innovative solutions for example equipment for measuring blood pressure which could automatically be sent to OPUS Medicine.

## 5.3 Medical Errors

The DPSD registers medical errors from the Danish Health Sector. Figure 5.5 shows the development in number of medical errors in the health sector as well as medical errors which happened at the hospitals [9] [11] [12] [13].

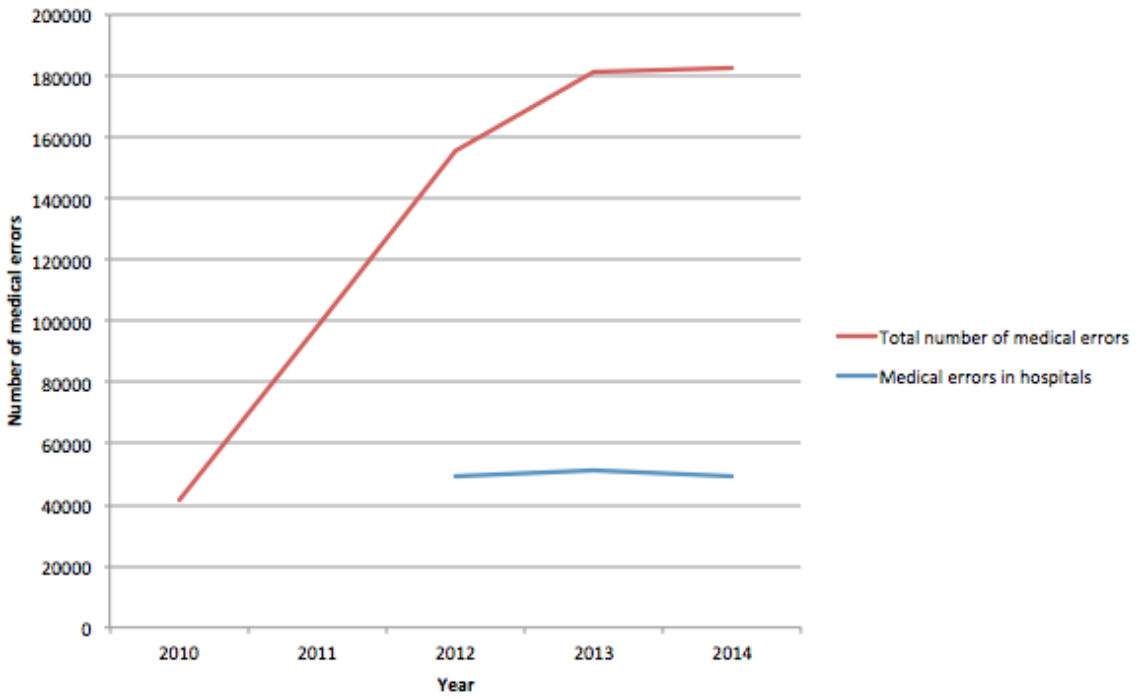


***Figure 5.5.*** Medical errors [9] [11] [12] [13] over time. The red line shows the development of reported medical errors to the DPSD whereas the blue line shows the reported medical errors which occurred in the hospitals

Initially, only the hospitals reported medical errors, however since in September 2010 the GPs, counties, and pharmacies have been obligated to report medical errors [11]. This causes the increased number of reported medical errors. In the annual reports of DPSD prior to 2012, the medical errors were not specified according to origin and the number of medical errors reported in the hospitals are therefore not available. The total number of medical errors reported in 2010 is an indication for medical errors in the hospitals since other health professionals only were obligated to report medical errors in the last four months of 2010.
Figure 5.5 shows that the number of reported medical errors increased until 2013 whereafter a plateau is reached. The increase in medical errors is due to many medical errors reported from the health professionals of the counties [11]. This does not prove that there are more medical errors but it is caused by more people being able and willing to report medical errors [11].
In figure 5.5, the number of medical errors reported in the hospitals show a stable level. However, when comparing medical errors reported in the hospitals from 2012-2014 to the total number of medical errors in 2010, it is evident that more medical errors are reported in the hospitals. This could be due to a change in the view on reporting of medical errors.

Medical errors can be divided based on the seriousness of the error which for the hospitals can be seen in figure 5.6.

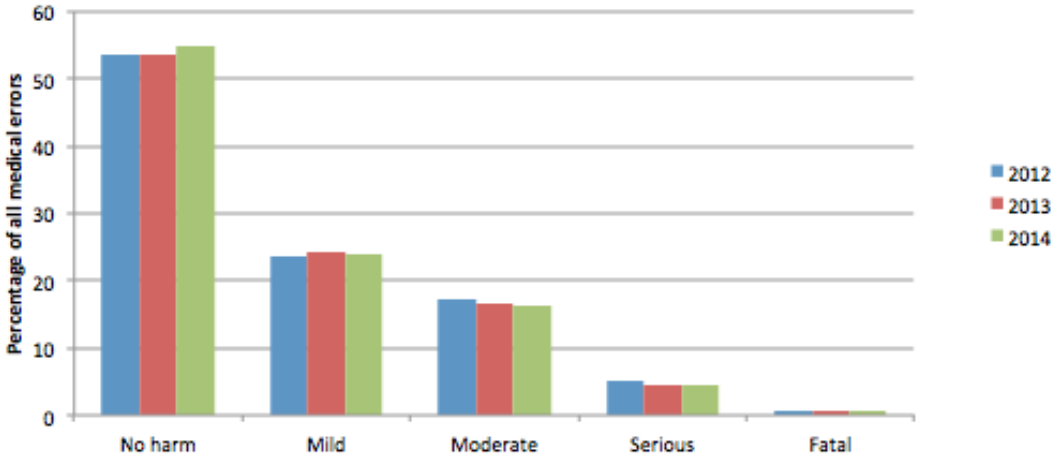


***Figure 5.6.*** Medical errors in hospital distributed based on seriousness

The medical errors are distributed similarly for 2012, 2013, and 2014. Slight decreases in moderate and serious medical errors can be seen.
Generally, figure 5.6 shows there is a tendency towards that more serious medical errors are fewer in numbers than less serious medical errors. It is positive to notice that more than 50 % of medical errors are of the type 'No harm'. Ideally, all medical errors should be of the type 'No harm'.

Medical errors can be divided into different types of errors whereas the medication errors is the most often type of error [11] [12] [13].
The medication errors compared to the total number of medical errors at the hospitals can be seen in figure 5.7.

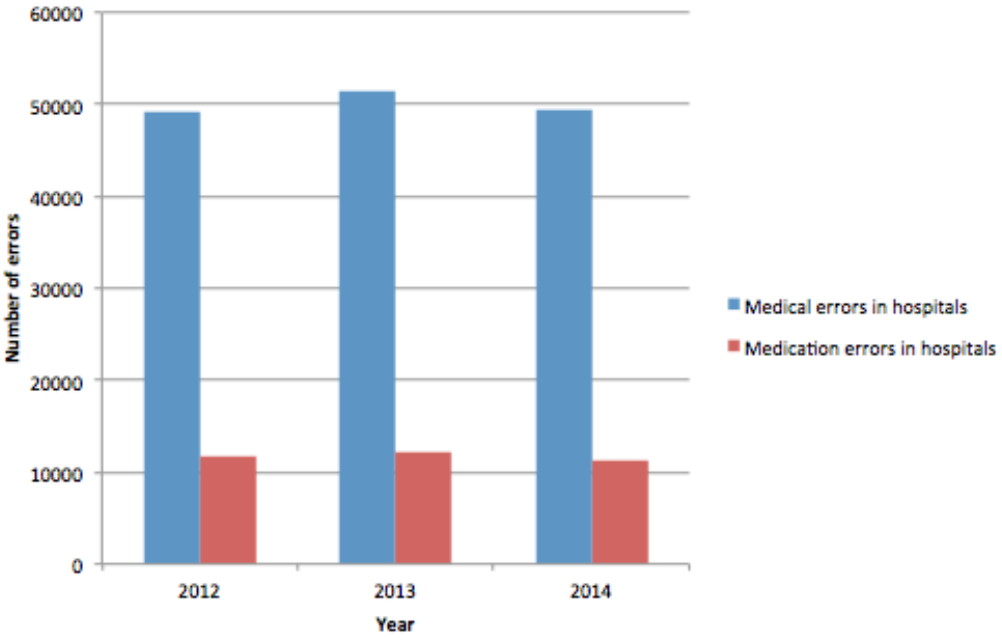


***Figure 5.7.*** Medication errors compared to the total number of medical errors in sll Danish hospital from 2012 to 2014

The figure shows little deviation between the years both for the total number of medical errors as well as the medication errors. Medication errors represent approximately 23 % of medical errors.

To gain an insight into the type of medical errors occurring regarding the FMK and OPUS medicine systems, anonymous medical errors were examined. Examples of medical errors in relation to FMK reported at Vendsyssel Hospital are listed below:

1. Variance between information in OPUS medicine, FMK, paper medication list, or patient journal
2. Right dose (for example mg) cannot be entered in OPUS medicine for specific drugs
3. Problems occurring when patient is responsible for some of the drug administration
4. Updates of FMK or OPUS medicine which confuse the doctors
5. Typing errors
6. Duplicate prescribtions
7. Problems occuring when drugs are almost identical (for example similar name, ATC code, pronounciation, and/or location)
8. System errors
9. Medication status, medication update, and release of FMK not completed
10. Problems when patients are increased or reduced gradually in their use of drugs

Some of these medical errors are difficult to eliminate completely for example typing errors. However, some of these medical errors should or could be eliminated with the help of the FMK and OPUS systems for example items 1, 2, 6, and 10.

# 6 Discussion

It should be in all doctors' interest to improve patient safety in any way possible.

It is a known fact that it is challenging to implement new systems or work routines in the health care sector and often the specifications and the complex clinical reality do not match [69]. Even though IT systems are difficult to implement, the health care sector should use IT to improve the overall quality [7].

This project assisted in identifying challenges that exist with FMK and aimed to give guideline or suggestions to limit these problems.

## 6.1 Methodological Considerations

It is important to consider the ethical aspects when conducting interviews. As seen in the introduction part of this project, many points should be taken into consideration. All points have been considered when conducting interviews however it proved difficult to evaluate the students own roles objectively.

### 6.1.1 Pretest

There are many different approaches to pretest interviews. The pretest was conducted to ensure that the questions were interpreted as intended. The method used in this project was to ask all the interview questions and afterwards ask how they interpreted each question. Other types of pretest methods could have been chosen such as behaviour coding and debriefings however since it was interesting to learn their responses to the interview questions without disclosing the actual aim of the pretest, the applied method was the most suitable. Additionally, the students were not trained in performing interviews and therefore behaviour coding was not considered suitable for this project.

Due to the time limit of this project, only one week was available for conducting the pretest. It was aimed to recruit as many as possible however this proved to be a difficult task. A longer period for recruitment could have been considered in order to increase the number of participants. Other things that could have been considered were to contact the students several times and to use different approaches such as e-mails, Moodle which is the system used by Aalborg University to keep track of schedule and so on, and posters on boards in the hospital and campus. Social media was considered to be the best approach due to the fact that many young people frequently use this type of media [26] and it was therefore estimated that potential participants would be easier to reach using this method.

Even though it was desired to recruit as many participants as possible, it was only managed to recruit three students which could question the validity and strength of the pretest. After conducting the pretest interviews, it became clear that they all had different interpretations regarding one of the questions which was about how they would describe the training. The results of the pretest therefore gave rise to changing that specific question. However, other questions were changed or added based on ideas inspired by the introduction to FMK, responses from the

pretest, and ideas from supervisors. The new questions for the interviews with doctors were not pretested due to the time limit for this project. To strengthen the validity of the new questions, another pretest should have been conducted.

When conducting a pilot study, the participants should be part of the study population [58]. Since the pretest participants were not a part of the study population for the interviews and the location was in a private home, the study design differed from the interviews with doctors and therefore the pretest was not considered a pilot study but rather a pretest [1]. It should not have had an impact on the pretest that the participants were students and not finished with their medical education since the participants are educated in the hospital and should know about the system. The students do not have rights to make changes in FMK but through their training in the hospital, they have seen doctors use it frequently. Students could be included in the pretest because the aim was to investigate the interpretation of the questions.

The medical students receive most of their training at Aalborg University Hospital whereas the doctors for the interviews work at Vendsyssel Hospital, Hjørring. This however should not have had an impact on the pretest since the two hospitals use the same systems.

To motivate the medical students to participate in the pretest interviews, the location was considered. It had to be convenient for the participants and it was therefore important that it was held in Aalborg. The pretest interviews were conducted in the private home of a student however this should not have influenced the participants other than making them feel more comfortable. If the pretest interviews were conducted for example at Aalborg University, it might have affected the motivation for participating in a negative manner because of the distance. Since it was stated in the Recruitment Post that the pretest interviews were expected to take approximately 30 minutes, it could have had a negative impact on the recruitment success. The pretest interviews generally took approximately 10-15 minutes. The length of the pretest interviews were estimated on the basis of the number of questions and the fact that the students of this project suspected that it was better to give a higher estimation compared to if the interview took longer than estimated. If the time frame had been different, it could have been beneficial to conduct one pretest interview at first to estimate the length of the pretest interviews.

The pretest participants differed from the interview participants because the students of this project know the pretest participants privately from the Bachelor Program at Aalborg University. The pretest participants were expected to be motivated to participate and therefore take the pretest questions seriously. However, it was difficult to maintain the professional distance, especially prior to the interview. It was attempted to get the pretest interviews started as quickly as possible to avoid private conversation prior to the interview part.

It was decided that the interviewer and the transcriber were allowed to show interest and encourage the participants by only using body language. The fact that the interviewer and transcriber were not allowed to comment on the answers could have had a negative impact on the length of the answers. If the interviewer had been allowed to comment on the answers and ask further questions, it might have given deeper and more extensive answers however this would have resulted in variation of the interviews and would have changed the interview type.

Considering all limitations, the pretest helped gaining knowledge of the interpretation of the interview questions however the validity of the interview questions would have been higher if more medical students had participated and if a pretest had been conducted on the new interview

questions as well.

### 6.1.2 Interviews

Regarding the background information, some questions were taken out due to the fact that the survey should not be too extensive. Questions regarding age, country of education, and if foreign birth country how many years have the doctor lived in Denmark were taken out. It was expected that age and experience would be correlated however this fact was not investigated and it is therefore unknown whether age has an impact on the doctor's ability to adapt to new work routines but it would be expected that age and ability to adapt would be negatively correlated. Due to the fact that it was expected that most of the doctors were Danish, the latter two questions in the background information were taken out. If this project was to be conducted in a larger scale, these questions could be of relevance because of the barriers faced by foreigners. Other background questions which could have been interesting were: IT competences, job title, and how many hours are used for IT on a daily basis. Even though these questions would be of interest, it was more important that the survey was short in order to keep the motivation of the doctors high.

Some of the interview questions were changed after the pretest interviews. Due to the time limit, the questions were not tested again however to ensure that the interpretations of the questions were as intended, the questions ought to have been tested once again. Despite the fact that the questions were not tested once more, it would be evident when analyzing the responses if the questions were not interpreted as intended.
To test the doctors knowledge about the terms in FMK, the questions were set up in an unlogical manner. It was expected that doctors have better insights of the work routines rather than the definition of the terms. To test this, the questions had to be in a random order. The order of the questions was suggested by supervisor, Vivi Pedersen.

Recruitment for the interviews proved to be difficult and time consuming due to the fact that multiple parties had to be involved. The doctors were more willing to participate than expected however for most doctors it was difficult to schedule an exact time for the interviews. The most successful recruitment was for Clinic for Acute Medicine probably due to the fact that the students came to the clinic on pre-scheduled days and interviewed the doctors available. To increase the recruitment success, the following tactics could have been used: increase the time frame for interviews, contact the clinics more often, contact doctors directly, and take personal contact to the clinics for example by showing up on interview days or presenting the project at morning meetings in the clinics.

Compared to the pretest interviews, conducting the interviews with doctors differed in terms of location and previous knowledge to the interviewer and transcriber. The locations for interviews were at offices in the clinics, and the interviewer and transcriber came to the clinic to conduct the interviews whereas the pretest participants came to the location. This should not have impacted the responses to the questions but could have been a motivational factor hence it was intended to make the interviews as convenient for the doctors as possible. The interviews became more professional compared to the pretest interviews due to the fact that the interviewer and transcriber had no personal knowledge of the doctors participating in the interviews.
During some of the interviews, the interview was disrupted in different ways, and when background noise disturbed the interviews, the current question was repeated for the participant.

As a consequence of the first doctor answering the questions in a low voice, it was decided that the interviewer and transcriber should be allowed to motivate by using specific words. It proved difficult to get the participants to answer loud and clear and therefore it could have been beneficial to include these points in the information to the participants. Even if these points were mentioned in the information to participants, it might not have had an impact on the results hence the information stated that the participants should elaborate their answers which not all participants did. In order to receive more elaborated answers, the interview design could have been changed to an in-depth interview which would allow the interviewer to ask additional questions based on answers from the doctors. A disadvantage to in-depth interviews is the fact that all interviews would then be different from each other and certain topics might come up in one interview but not the others.

Even though, 13 doctors formed a small study population, it was expected that these would give indications as to the general view of doctors at Vendsyssel Hospital. This is due to the fact that doctors from different clinics and at different levels of experience were represented. It must be considered that the interviews reflected the doctors' opinion at the specific times of the interviews and might change if the interviews were conducted at different times.

For the interviews with doctors, one limitation was the recruitment of participants. For future studies, it should be considered how to recruit doctors for example by visits to the clinics to explain the purpose of the project.

One code was excluded after transcribing the pretest interviews. The code was used when the participant laughed and it was decided that it would not be useful for the analysis.
All remaining codes proved necessary in the transcription and analyses of interviews.

One limitation was the quality of the recordings. It could have been considered to use video recordings in order to be able to analyse on body language if the students had been trained and lip read whenever the participants would speak too low for the transcriber to hear.

### 6.1.3 Medical Errors

One might question whether or not the period of medical errors was sufficient, and it could have been beneficial to have an extended period. Contrary, it was wished to get a current overview of the medical errors reported in relation to FMK. The older the medical errors, the less current they might be. Data more recent than December 2014 were not available and could therefore not be analyzed.

## 6.2 Results Considerations

### 6.2.1 Status of Implementation of FMK

Similar to implementation of many former IT systems, the implementation of FMK has been prolonged and the budget exceeded compared to the original plan [20] [34] [61].

The national data were difficult to obtain and data for May and June were not available. The percentages of these months are therefore uncertain however little deviation in the months between April and December indicates that the level seems stable during this period.

Figure 5.1 clearly shows that the North Denmark Region had a higher percentage of performed

medication updates compared to the national level in 2014. Since the regions in Denmark are at different implementation levels, it could have been interesting to compared the regions to each other. The North Denmark Region has been further in the implementation process which was concluded by the National Audit Office of Denmark in 2013 [61] and supports the findings of this project.
For hospitals in the North Denmark Region, there is a slight increase in performed medication updates throughout the period. The tendency for the region intertwines with the tendency for the performed medication updates in Vendsyssel Hospital. For both tendencies, it is evident that something has occurred during the summer months: June, July, August, and September. This could be caused by:

- Updates to the system
- Work of quality personnel and risk managers
- Busy/slow periods
- Training sessions
- Campaigns regionally
- Campaigns nationally
- Public awareness for example news, journals and so on
- Statements from the Hospital Administration

Regarding updates to system, two updates have been implemented in hospitals in the North Denmark Region during 2014. The first on June $18^{th}$ and the second update was September $17^{th}$. This could be an explanation to the positive effects shown in figure 5.1 immediately after these dates especially for Vendsyssel Hospital.
At Vendsyssel Hospital, Hjørring, the quality personnel of Clinic for Internal Medicine focused on medication updates during summer and autumn locally in the clinic which also might have influenced the numbers. The work of quality personnel is expected to have a high impact hence it will increase the focus on medication updates locally.
Regarding slow or busy periods, it has been investigated that in Clinic for Acute Medicine the busy time of day is between 10 a.m. and 4 p.m. [14]. It has not been investigated if there are any periods during a year which are more busy or slow. The busy or slow periods could have an impact to the work environment causing the personnel to be less or more willing to adapt to changes as well as impacting their stress level.
It would be interesting to investigate why the percentages dropped since it indicates that less doctors used the system, consistently.
It would be expected that campaigns, increased public awareness, and statements from the Hospital Administration would have a positive effect on the use of FMK. However, this point has not been investigated.

When evaluating the use of FMK, it is measured differently for the different sectors. In the hospitals, the use of FMK is measured by the percentage of performed medication updates for all discharged patients whereas for the GPs it is measured whether or not the GPs have made change in FMK once in four weeks [61]. This makes it difficult to compare the use of FMK across sectors. For the hospitals, this measurement does not reveal the quality of the medication updates whereas for the GPs, the measurement is insufficient due to the fact that it does not reveal the actual use of FMK. Contrary, the GPs who do not use FMK at any point during four weeks, must be considered to not use the system at all. However, finding a more accurate way of measuring the use of FMK by the GPs is difficult [61].

Generally, all doctors should take responsibility for their own use of FMK. Furthermore, leadership from hospital administrations and the Danish region should be evident in order for the implementation of FMK to succeed.

### 6.2.2 Interviews

#### Background Information

The intention was to recruit doctors with different levels of experience and with different years of employment in the North Denmark Region. Considering the number of participants, the recruitment proved successful at this point.

The background question regarding country of birth proved to be unnecessary since all doctors were born in Denmark. If conducting interviews on a larger scale, this question might be relevant due to the fact that it could for example be more difficult for foreigners to understand the terms. Even though no foreigners participated in the interviews, the question might be relevant for the doctor population at Vendsyssel Hospital, Hjørring, if the study population consists of a high ratio of foreign doctors.

When asked which percentages of time spent on medication status, medication revision, and medication update, one doctor gave two answers. Both answers were included in the analysis however it can be discussed whether or not the answers should have been included. It quickly became evident that most doctors had difficulties answering the specific question. To improve this, it could be considered to change the options from percentages to hours of work. In addition, the doctor could be given the opportunity to write their own answer if the question had been an open-ended question.
Since all doctors answered that they use less than 30 % of their workload to perform medication status, medication revision, and medication update, it could be considered if the intervals were specialized enough. If the intervals had been five percent, the responses could have been been more defined. However, the doctors found it difficult even to answer with the ten percent intervals which indicate that it is not easy for them to estimate.
The distribution of percentage of workload used for the tasks might not reveal the true distribution, since the results are based on answers of doctors and their assessment might not be accurate. It is not possible to make an estimation of how much time the doctors should spend on tasks in FMK due to the different type of work in the clinics. However, it might be possible to investigate if estimations could be calculated for the specific clinics.

Due to the confidentiality agreement, the small study population, and the fact that the doctors should not be recognizable, it has not been possible to use the background information as much as intended.

#### Interview Questions

**Training**
Regarding training in OPUS Medicine and FMK, the doctors have received different amounts of training. Those receiving more than 5 hours of training were more experienced doctors, some of which were superusers.
Most of the doctors had received less than an hour training in FMK specifically. To improve the training session, it could be considered how to organize the training. One consideration could be to divide the training for specific groups of doctors for example more and less experienced

doctors or divide the doctors based on IT skills. However, it could be difficult to divide the doctors based on IT skills unless the doctors themselves could decide which category applies to them.

When implementing new IT systems, it is important to train the personnel close to the date of implementation in order for the participants to perceive the training as applicable and to remember it when starting to use the system [38]. A report by Johannsen et al. showed that doctors generally wished for case-based training in FMK and follow-up training to clarify potential questions [38] which is in line with the findings of this project. It is crucial to announce the importance of the changes in a timely manner in order for the employees to be motivated and ready to adapt to changes [20] and considering the answers from the doctors, the management has not been successful on these points. As Bonnerup et al. describe this can cause uncertainty and unwillingness of the employees to change [20].
It is difficult to estimate an exact amount of training needed for the doctors in FMK. This is due to their different level of experience, IT skills, and motivation to adapt to the new work routines.

Except for the superusers themselves, none of the other doctors expressed knowledge of superusers. The most common answer to whom they could go to for help was colleagues. To improve the use of FMK, it could be beneficial to use the competences of the superusers locally in the clinics.

One doctor stated that IT personnel should conduct the training of doctors. In that way, the IT personnel could gain an insight to the daily use of FMK and explain the possibilities in the system. However, if IT personnel were in charge of the training, it might influence the quality of the training since the IT personnel have little or no knowledge of the work routines of doctors.
No matter how user-friendly an IT system is, it is still crucial for the users to be trained [7].
Based on this project, it is suggested that basic training is available for the doctors and it could be beneficial to make the doctors obligated to participate in certain sessions of training. The training should consist of group-based training with cases to illustrate the realistic work in FMK. Besides the obligated training, booklets, videos of the system or additional follow-up training sessions could be offered for those interested. It could be beneficial for the doctors in their daily work to have knowledge of the superusers and be able to consult them when facing a problem. This could result in the need of more superusers and therefore more doctors should be educated as superusers.

**Terms and Tasks**
The terms were listed in an unlogical manner to test if the doctors were familiar with the terms. Doctors ought to know the terms independently however the order of the questions might have confused some.

Generally, the doctors are uncertain about the terms. Only two doctors knew when and why all the tasks should be performed. This could be explained by the low number of hours of training in FMK specifically. Supporting the findings of this project, another study showed that there has been uncertainty about the terms [41].
Since one doctor explained that nobody ever told why to perform the task, this could be a point in the training sessions in order to improve the use of the system.

The way that the use of FMK is evaluated at this point is whether or not the doctors clicked on

the button but not the quality of the tasks performed. Low quality in the tasks performed does not increase patient safety. Some doctors mentioned that they spend a lot of time documenting their work and question the usability of all the documentation they perform. If the purpose of the task, the demand to perform medication update, and the clinical reality do not match, the performance of medication update will be for the demand for documentation rather than to ensure quality [69].
It is important that doctors are aware of the tasks and why to perform them in order to motivate them. Furthermore, it should be evident from the training sessions what the tasks are and the purpose of them.
Another reason for doctors not to embrace FMK could be that doctors are known to feel overworked and undersupported [64].

**FMK**
Since all doctors knew the purpose of FMK, it is evident that the implementation of terms and tasks has not been successful.
FMK was supposed to help the doctors in different ways, and some of these were mentioned by the doctors as the good things regarding FMK for example that the patients do not have to remember their own drug consumption and that FMK has improved communication between doctors of different sectors. FMK should limit the number of drugs of which the GP is unaware of. However, the doctors explained many challenges regarding FMK, some of which could be reduced by changes in the system and in the terms.

All doctors agreed that when FMK is updated, it will increase the patient safety. Some of the doctors criticized the lack of use of FMK by GPs however only few doctors looked critically at their own use of the system. An evaluation pointed out that doctors are more focused on criticizing doctors working in other sectors [38]. Some doctors stated that all doctors have a responsibility to implement and use the system as intended. Only if FMK is used consistently and by all, patient safety will be increased [66].

The doctors need to take responsibility of the medication of the patients they treat. This responsibility has not changed after implementation of FMK [66]. Some doctors feel that the implementation of FMK and the tasks give them a larger responsibility for prescriptions made by other doctors. This point was stated by some doctors saying that they do not perform certain tasks because of the increased level of responsibility. Nevertheless, the responsibility has not changed and all doctors have to perform all tasks even for medication outside their field of expertise [49].
GPs and doctors in the outpatient department have full responsibility for own prescriptions and the drug-drug interactions between own and other prescribed drugs as well as the responsibility to detect obvious faults [66]. However, doctors at the hospitals have full responsibility for all prescriptions when a patient is admitted to hospital [66]. If no one takes responsibility of a patient's medication, no doctor will have an overview of the total drug consumption.
Responsibilities of doctors have not changed however the doctors have the interpretation that FMK increases the responsibility for them. Maybe doctors feel that the responsibility has increased due to the fact that the system reveals who have performed the tasks or maybe because they feel that the task, medication revision, increases their responsibility for prescription prescribed by other doctors.

Some doctors questioned why both FMK and OPUS Medicine exists. This statement is among the findings of another evaluation made by Johannsen et al. [38]. Having multiple systems can

cause duplicate work processes [70] which takes time from the patients themselves.

Christensen et al. investigated barriers for the use of FMK [24]. The findings of Christensen et al. were in line with the findings of this project being that lack of motivation, technical problems, time consumption, and lack of training being the major barriers.

**Implementation Process**
The general attitude towards the implementation of FMK was that it was not successful. Many doctors did not feel included in the process both in terms of wishes for training and ideas for improvement. This is supported by the findings of Johannsen et al. [38].

When developing new IT systems, it is important to use experiences from former IT projects in order to limit the challenges for example by making a risk assessment which can identify possible risks, their likelihood of happening, and the consequences hereof [20]. Generally, it can be discussed whether or not experiences with implementation of former, similar IT systems have been considered in the process of implementing FMK.

Preliminary work is essential when developing IT systems hence it should provide a clear picture of the needs and wishes for the system [34]. This has not been successful when developing FMK for example a pilot study of the system was initiated however implementation of the system was begun prior to completion of the pilot study [61]. When developing new IT systems, a pilot study of the system ought to be conducted [20].

In a study by Christensen et al., it was suggested to follow the theory by Kotter about implementing change. According to Kotter, a successful implementation requires that the purpose of the change makes sense for the employees [24].
It could seem that it was thought that FMK itself would motivate the doctors, however this is a common mistake [18]. A project concluded when the users experience the value of the technology, the use of it increases [33].

**IT Systems**
The interviews revealed that doctors felt that they support the IT systems and not the IT system supporting the work of doctors. This could be a major explanation for the doctors not to be motivated to adapt to the new work routines in the IT systems.
It could be beneficial for the work of doctors if there was only one EPJ system containing information about all people living in Denmark. However, this model would contain some risks for example if the system brakes down or if the company providing the system goes bankrupt. The first risk always exists though as the current systems work regionally, the risk is also regionally. The second risk could be overcome by the government creating the system, however there have been negative experiences with such systems in Denmark [20].

In the literature, criteria for designing IT systems for the health care sector are stated [50]. These criteria focus on preventing errors, easy interception of errors, and limit consequences of errors [50]. During the interviews, the doctors stated that they find FMK to be user-friendly and thereby the usability of the system must prevent errors. However, some pointed out that the system is not flawless and therefore more could be done in order to limit errors and the consequences hereof. For example if FMK could detect drug-drug interactions and warn the doctor of these, then it could increase patient safety. Another example is that if FMK could give a warning that a patient is prescribed the same medication but with different trade names,

it would limit adverse effects and potential toxic events. Additionally, it could be beneficial if FMK could give a warning when a wrong dose is prescribed.

When designing and implementing new IT systems for the Danish health care, there are many considerations to be taken into account. Knowledge of the work routines, preliminary tests, implementation with the aid of knowledge taken from the pretest and wishes of the users, training of the users, check of compliance of the users, check of whether the system is living up to the expectations or need some improvements as well as management in general are all essential for the system to be successful. A dynamic system is beneficial compared to a rigid system because of its abilities to incorporate changes and updates to the system.

**Compliance of Patients**
Low compliance is an ongoing and complex problem for doctors [68]. A low compliance is problematic due to the fact that information in FMK does not correspond to the actual drug consumption as well as it provides a lower guarantee that the patient will use the prescribed medication. All in all, low compliance leads to lower patient safety. Especially, the elder patient group experience drug-drug interactions due to the fact that this group consume more drugs because of more illnesses [25]. Furthermore, this group often has lower compliance [30].

A study by Monte et al. investigated the accuracy between the medication list and the patients' own version of medication consumption. The study showed that these were only accurate in approximately 22 % of the cases with no dependency to the number of medications [46]. However, in a Danish study it was found that compliance was lower for patients taking multiple drugs [23]. The fact that medication lists are not always accurate gives the health care professionals the impression that the electronic medication lists are somewhat unreliable [70] which is supported the findings of this project.

In order for FMK to be successful, the doctors have to consistently use the system and furthermore have to consider the compliance of the patient on the basis of an anamnesis [67]. The system can limit medication errors however the doctor should not rely on the system solely when determining the drug consumption of a patient [47].

### 6.2.3 Medical Errors

Even though the number of reported medical errors overall has increased, the number of medical errors reported in the hospital remained on a steady level in the period from 2012-2014. The overall increase in medical errors could be caused by the fact that the view on medical errors has changed from the person making the error to how to prevent the error [28]. Furthermore, more health professionals are obligated to report medical errors which could explain the increased number of medical errors.
When evaluating the number of medical errors reported, it is important to remember that not all medical errors are reported [11]. Another reason for the increase in medical errors could be because the doctors are more busy hence it is known that more medical errors occur during busy periods [71].

There is a small increase in medical errors of the category 'No harm'. This could indicate that there is more focus on limiting the more serious medical errors. However, it must be considered that medical errors are categorized when reported and that the seriousness might change over time [13].

Implementation of FMK was begun at the hospitals in 2011-2012 [61] and the implementation process has been problematic which could explain the slight increase in medical as well as medication errors seen in figure 5.7 for 2013. Since FMK was designed with the purpose of improving patient safety, medical and medication errors should decrease over time.

Evaluating the impact of FMK on patient safety is a complex task. Some of the reported medical errors ought to be eliminated by the use of FMK and OPUS Medicine however some medical errors will always occur especially the human errors.

Medical errors can never be eliminated to the fact that errors will always occur however they should be limited as much as possible. The implementation of FMK should reduce the number of medical errors and thereby increase safety for patients. In order to limit the medical errors, the doctors need to acknowledge and learn from the mistakes to limit the repetition of them. To achieve this, doctors need to be willing to adapt to change and accept that the learning process is continuous [60].

To make a complete evaluation of FMK, medical errors, the use of FMK in all sectors, the interpretation of the tasks by doctors, and the complication rate for patients should be investigated. This project focused on FMK at Vendsyssel Hospital, Hjørring, and the focus is therefore from the hospital doctors' point of view. A complete evaluation of FMK on patient safety cannot be conducted until all sectors have implemented FMK because only then FMK as a system can be evaluated.

Only after a complete implementation of FMK, it can be concluded if it is beneficial to only have one system. The advantages of having a single system are the facts that it will limit the mistakes happening when transferring data between systems as well as the system will contain the same features for all doctors. However, if there are errors in the system, it will affect all doctors and data can be lost.

# 7 Conclusions

**Hypotheses 1: Even though the implementation of FMK was delayed, the implementation has now been completed successfully**
On the basis of the results regarding status of implementation, the percentages for performed medication updates for the North Denmark Region have not yet reached the goal of 100 % which is the nationally set goal for FMK. However, the percentages for the region and Vendsyssel Hospital have been higher than the Danish average. The implementation has not yet been completed successfully and therefore hypothesis 1 is rejected.

**Hypotheses 2: All doctors find FMK useful and the implementation of FMK successful**
Based on the results from the interviews with doctors at Vendsyssel Hospital, Hjørring, it is evident that doctors find the idea of FMK useful however in the current use, they do not trust the information within FMK and therefore they do not use it as intended. Regarding the implementation of FMK, doctors find the process not to have run smoothly. Hypothesis 2 is therefore rejected.

**Hypotheses 3: The current use of FMK improves patient safety in terms of a decline in medical errors in hospitals, medical errors occurring in hospitals being less serious, and lower number of medication errors in hospitals**
The total number of medical errors have not declined since implementation of FMK. It is suspected that this is caused by the focus and changed attitude towards medical errors. The results regarding seriousness of medical errors in hospitals show a slight increase in medical errors of the category 'No harm' which could indicate that medical errors are less serious. Analysis of number of medication errors shows a steady state however this may change when FMK is fully implemented in all health sectors. Hypothesis 3 is therefore rejected.

# 8 Perspectives

## 8.1 Limitations and Rooms for Improvement of this Project

Generally, it could have been beneficial to conduct a second pretest to ensure the interpretations of the interview questions were correct. For the pretest, it had been more valid if more students had participated. For both the pretest and the interviews with doctors, it could have been beneficial to improve the recruitment strategies and have a prolonged time frame. For the pretest, a limiting factor was the time frame whereas for the interviews with doctors, two limiting factors were that the students of this project did not have direct contact to most of the doctors prior to interviews and the fact that doctors had difficulties foreseeing their work tasks prior to a specific day.
A prolonged time frame would potentially had allowed more doctors to participate in the interviews which would increase the validity of the project. If conducting this project on a larger sample of doctors, it could be possible to investigate the association between background information and the responses to the interview questions for example to investigate gender difference.
Since the doctors gave an estimation as to how much time is spent on performing FMK tasks, it could be interesting to investigate the actual time spent on these for example by performing observational studies or using the data logged within the system.
To investigate the view on the implementation process and FMK in general, interviews with quality personnel and the Hospital Administration could provide interesting insights to this aspect.

## 8.2 Improvements for Implementation at Vendsyssel Hospital, Hjørring

Most doctors requested more training sessions with a higher focus on why to perform the FMK tasks compared to the current focus on how to perform the tasks. It could be beneficial to have both IT personnel and superusers involved in the training sessions since these in combination could represent how to do the tasks and why to do them. Furthermore, it is suggested that training should be mandatory to ensure that all doctors have the basic knowledge of the tasks. Additionally, it could be considered to divide doctors based on for example IT skills or experience during training sessions to ensure that all doctors find the training session relevant.
Based on the interviews with doctors, it was evident that many were insecure about one or more terms. This uncertainty may impact the quality of performed tasks negatively. It could be beneficial to develop written material for doctors to carry around.
It seems that it is difficult to get information to the relevant employees, and it could be beneficial to investigate which information route is most successful. When information fails to reach the relevant employees, the desired effect will lack. This can result in important information being lost and implementation of new work routines being delayed.
By September 2014, all doctors were obligated to report all medical changes for patients in FMK [61]. However, in the current use not all doctors perform the FMK tasks even though they are obligated. To motivate the doctors to perform the tasks, it could be suggested to give them extra training to gain knowledge of why to perform the tasks, inform the doctors of their

responsibilities, and have discussions in the clinic about the use of FMK from a patient point of view.
To investigate the quality of the performed medication updates, a random sample of performed medication updates could be suggested. This could provided information about the quality rather than the percentages of clicked buttons. Furthermore, it would be suggested to provide the quality personnel with access to FMK in order for them to be able to investigate the general quality of FMK tasks performed which could be a type of internal quality control system. When the quality in the performed FMK tasks is low, the more medical error might occur.

## 8.3 Improvements for FMK

In addition to training of doctors and motivation of doctors, the system itself could be improved. It could be beneficial to create an IT solution where the definition of the term appears when the doctor is about to click on the button. In general, it could be beneficial to implement a feature for comments from the users in regards to the system. This way the developers would gain an insight to features missing and system errors directly from the doctors. This would give an idea about new solutions and updates needed for the system and would therefore make it easier for the IT developers.
It is crucial when implementing IT solutions, that the management on the project is stable and with the right qualifications. It can be discussed whether or not the management on FMK was sufficient.
Involvement of employees is of importance when motivating them to adapt to new work routines and when developing new IT solutions in order to ensure that the solution fits the needs.
It could be beneficial to analyze the development of drug-drug interactions to investigate if there has been a decrease in these after the implementation of FMK. However, it is crucial to use the analysis to limit drug-drug interactions for example by implementing a feature in FMK which is able to warn doctors about potential drug-drug interactions.

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# Appendix

# Pretest Questions A

## A.1 Pretest Interview Questions

1. Hvor mange timers planlagt undervisning har du fået i brugen af FMK?
2. Hvordan vil du beskrive den planlagte undervisning?
3. Er der nogle, du kan spørge om hjælp, hvis du har problemer med at bruge FMK?
4. Hvor mange timers planlagt undervisning har du fået i brugen af OPUS-medicin?
5. Hvordan vil du beskrive den planlagte undervisning?
6. Er der nogle, du kan spørge om hjælp, hvis du har problemer med at bruge OPUS-medicin?
   I OPUS-medicin/FMK er der 3 begreber: medicinstatus, medicingennemgang, og medicinafstemning:
7. Hvad er formålet med medicinstatus?
8. Hvornår udføres medicinstatus?
9. Hvad er formålet med medicingennemgang?
10. Hvornår udføres medicingennemgang?
11. For hvilke patientgrupper er det mest udfordrende at lave medicingennemgang?
12. Hvad er formålet med medicinafstemning?
13. Hvornår udfører du medicinafstemning?
14. Hvordan synes du afstemning af medicin fra OPUS til FMK fungere?
15. Kan du komme i tanke om nogle funktioner der kunne være gavnlige at integrere i OPUS/FMK, og hvis ja hvilke?
16. På hvilken måde vil du beskrive FMK i forhold til brugervenlighed?
17. På hvilken måde påvirker FMK patientsikkerheden?
18. Hvad er dit overordnede indtryk af FMK?
19. Har du forslag til forbedringer til FMK, og hvis ja hvilke?
20. Hvad er din oplevelse af processen af implementeringen af FMK?

## A.2 Validation Questions

Nu vil jeg spørge dig til opfattelsen af spørgsmålene.

1. Hvad forstod du ved spørgsmålet "Hvor mange timers planlagt undervisning har du fået i brugen af FMK?"
2. Hvad forstod du ved spørgsmålet "Hvordan vil du beskrive den planlagte undervisning?"
3. Hvad forstod du ved spørgsmålet "Er der nogle, du kan spørge om hjælp, hvis du har problemer med at bruge FMK?"
4. Hvad forstod du ved spørgsmålet "Hvor mange timers planlagt undervisning har du fået i brugen af OPUS-medicin?"
5. Hvad forstod du ved spørgsmålet "Hvordan vil du beskrive den planlagte undervisning?"
6. Hvad forstod du ved spørgsmålet "Er der nogle, du kan spørge om hjælp, hvis du har problemer med at bruge OPUS-medicin?"
7. Hvad forstod du ved spørgsmålet "Hvad er formålet med medicinstatus?"
8. Hvad forstod du ved spørgsmålet "Hvornår udføres medicinstatus?"
9. Hvad forstod du ved spørgsmålet "Hvad er formålet med medicingennemgang?"
10. Hvad forstod du ved spørgsmålet "Hvornår udføres medicingennemgang?"

11. Hvad forstod du ved spørgsmålet "For hvilke patientgrupper er det mest udfordrende at lave medicingennemgang?"
12. Hvad forstod du ved spørgsmålet "Hvad er formålet med medicinafstemning?"
13. Hvad forstod du ved spørgsmålet "Hvornår udfører du medicinafstemning?"
14. Hvad forstod du ved spørgsmålet "Hvordan synes du afstemning af medicin fra OPUS til FMK fungere?"
15. Hvad forstod du ved spørgsmålet "Kan du komme i tanke om nogle funktioner der kunne være gavnlige at integrere i OPUS/FMK, og hvis ja hvilke?"
16. Hvad forstod du ved spørgsmålet "På hvilken måde vil du beskrive FMK i forhold til brugervenlighed?"
17. Hvad forstod du ved spørgsmålet "På hvilken måde påvirker FMK patientsikkerheden?"
18. Hvad forstod du ved spørgsmålet "Hvad er dit overordnede indtryk af FMK?"
19. Hvad forstod du ved spørgsmålet "Har du forslag til forbedringer til FMK, og hvis ja hvilke?"
20. Hvad forstod du ved spørgsmålet "Hvad er din oplevelse af processen af implementeringen af FMK?"

# Pretest Background Questions B

Baggrundsinformationer

Forsøgsdeltager nr:

Køn

- ☐ Mand
- ☐ Kvinde

Alder

- ☐ 20-30 år
- ☐ 30-40 år
- ☐ 40-50 år
- ☐ 50-60 år
- ☐ Over 60 år

Klinik

- ☐ Akut
- ☐ Medicin
- ☐ Kvinde Barn, Pædiatri
- ☐ Kvinde Barn, Gyn. obst.
- ☐ Kirurgi
- ☐ Anæstesi

Læge erfaring

- ☐ Kandidatstuderende
- ☐ KBU
- ☐ 0-5 år
- ☐ 5-10 år
- ☐ 10-20 år
- ☐ 20-30 år
- ☐ 30-40 år
- ☐ Mere end 40 år

I hvilket land blev du født?

- ☐ Danmark
- ☐ Nordiske lande: Norge/Sverige/Island/Færøerne/Grønland
- ☐ Andet europæisk land
- ☐ Land udenfor Europa

Hvis udenlandsk, hvor længe har du boet i Danmark?

- ☐ 0-10år
- ☐ Mere end 10 år

Hvor har du uddannet dig til læge?

- ☐ Kun Danmark
- ☐ Kun udlandet
- ☐ Både Danmark og udlandet

Hvor stor en del af din arbejdstid, tror du, at du bruger på medicin status, medicin gennemgang og medicin afstemning?

- ☐ 0-10%
- ☐ 10-20%
- ☐ 20-30%
- ☐ 30-40%
- ☐ 40-50%
- ☐ 50-60%
- ☐ 60-70%
- ☐ 70-80%
- ☐ 80-90%
- ☐ 90-100%

# Pretest Instructions to Participants

C

Formålet med det her interview er at lave en brugerundersøgelse af FMK, derfor er det vigtigt at du uddyber dine svar. Interviewet vil tage cirka 30-45 minutter og vil blive optaget. Vi optager for at have præcis data til analysen og optagelserne vil blive slettet efter vi har transskriberet dem. Besvarelserne vil blive holdt anonyme. Vi håber du vil holde vores spørgsmål hemmelige så andre deltagere ikke på forhånd kender dem. Har du nogen spørgsmål?
Hvis du vil være venlig at udfylde disse spørgsmål så starter interviewet bagefter.

# Pretest Recruitment Post D

**Katrine Dehn**
10 February at 14:45 · Edited

SØGER MEDICIN KANDIDAT STUDERENDE
Sanne og jeg er MedIS studerende i gang med at skrive speciale om Fælles Medicinkort (FMK) i samarbejde med Sygehus Vendsyssel. Vi søger medicinstuderende på kandidaten til et interview omkring brugen af FMK. Det er derfor vigtigt, at deltagerne har stiftet bekendtskab med FMK i klinikken. Interviews bliver afholdt enten i Aalborg Centrum eller på Forskningens Hus i næste uge og varer ca. 30-45 minutter. Besvarelsen er anonym.
Vi ved at I har travlt, så interviewet kan sagtens afholdes uden for 8-16.
Har du lyst til at deltage så skriv en privat besked eller send en mail til;
sande09@student.aau.dk

Synes godt om · Comment · Del

# Pretest Reminder Post E

**Katrine Dehn**
12 February at 12:13

VI MANGLER BARE ET PAR STYKKER MERE
Sanne og jeg mangler et par stykker mere til vores interview. Vi skriver speciale om FMK i samarbejde med Sygehus Vendsyssel og søger medicinstuderende på kandidaten til et interview omkring brugen af FMK. Det er derfor vigtigt, at deltagerne har stiftet bekendtskab med FMK og dets funktioner i klinikken, f.eks. ved at se over skulderen på læger der taster ind i systemet og derfra kender til programmet og dets funktioner. Interviews bliver afholdt enten i Aalborg Centrum eller på Forskningens Hus i næste uge og varer ca. 30-45 minutter. Besvarelsen er anonym. Vi ved at I har travlt, så interviewet kan sagtens afholdes uden for 8-16. Har du lyst til at deltage så skriv en privat besked eller send en mail til; sande09@student.aau.dk

Synes godt om · Comment · Del

# Information for the Hospital Administration F

**Speciale i Translationel Medicin på Sygehus Vendsyssel, ifm. uddannelsen Medicin med Industriel Specialisering, Aalborg Universitet**

**Præsentation af os**
Vi hedder Sanne Andersen og Katrine Dehn og er primo februar 2015 påbegyndt vores kandidatspeciale i samarbejde med Sygehus Vendsyssel. Vi har Riskmanager, Vivi Pedersen, som primær kontaktperson, og Kvalitetsleder Bente Jensen, Klinik Medicin som sekundær kontaktperson.

**Formål med projektet**
Projektets formål er at kortlægge opfattelsen af FMK (hermed menes også selve implementeringsprocessen) blandt lægerne på sygehuset og at undersøge FMKs påvirkning på patientsikkerheden. Dette vil vi gøre ved at lave en brugerundersøgelse af FMK blandt lægerne for at danne os et overblik over deres holdning til undervisningen, brugervenlighed og implementeringen af FMK. Desuden vil vi spørge til de tre begreber: medicinstatus, medicingennemgang og medicinafstemning. Data og analyser fra DPSD på rapporterede utilsigtede hændelser omkring FMK/OPUS (anonymiserede) vil indgå i vores projekt.

**Hvad kan Sygehus Vendsyssel bruge projektet til?**
Sygehus Vendsyssel i Hjørring kan bruge projektet til at få indsigt i hvorvidt undervisning og supervision er tilstrækkelig og få specifikke detaljer på hvad der evt. mangler i undervisningen. Desuden vil det kortlægges hvordan de tre begreber (medicinstatus, medicingennemgang og medicinafstemning) fortolkes af lægerne og om der stadig mangler implementering af medicineringsretningslinjer og IT anvendelsesdokumenter. Derudover vil oplevelsen af brugervenligheden og implementeringen af systemet undersøges, hvorefter resultaterne kan bruges til målrettede indsatser og evt. nye projekter på Sygehus Vendsyssel.

**Tidsplan**
Deadline for projektet er 28. maj 2015.
Foruden indsamling af baggrundsviden om FMK (Rigsrevisionen, Region Nordjyllands hjemmeside, forskellige tidsskrifter mm.) og implementeringen af FMK, har vi udarbejdet interviewguide, som vi i uge 8 har testet på medicin studerende fra kandidaten på Aalborg Universitet. På trods af at medicin studerende ikke har rettigheder til at ændre i FMK, oplever de på deres klinikophold på Aalborg Universitetshospital brugen af FMK fra lægerne.
Desuden har vi fået undervisning i undervisningsmodulet (FMK/OPUS) af Andrea Welzel, FMK-projektleder, for at have en større forståelse af brugen af FMK og de udfordringer der er med systemet. Vi vil sideløbende med interviews gennemgå utilsigtede hændelser, som er rapporteret i forbindelse med FMK.

**Forespørgsel**
Vi har behov for at interviewe læger på Sygehus Vendsyssel til projektet i marts og april måned, og derfor henvender vi os til jer i Sygehusledelsen får at spørge om tilladelse og få opbakning til at kunne starte udpegning, information til og indkald af lægerne til 30 min. interviews.

**Antal deltagere**
Efter drøftelser med Vivi Pedersen, Risk Manager, og Bente Jensen, Kvalitetsleder i Klinik Medicin, er vi nået frem til, at vi gerne vil interviewe 15 læger totalt set. Disse 15 læger kunne med fordel være fordelt på: Klinik Medicin (5), Klinik Akut (2), Klinik Kvinde Barn, Pædiatri (2), Klinik Kvinde Barn, Gyn + Obs (2), Klinik Kirurgi (2), og Klinik Anæstesi (2).

**Interviewet**
Varighed per læge er ca. 30 minutter.
Alle interviews vil blive anonymiseret. Interviews vil blive lydoptaget for at kunne transskribere dem efterfølgende. Når interviewet er transskriberet, vil lydoptagelsen blive slettet. Klinikker vil ikke blive nævnt specifikt, men hvis vi vil adressere forskelle og ligheder vil det blive generelt, sådan at ingen kan identificeres f.eks. erfarne og mindre erfarne læger.
Vi er meget fleksible i forhold til dage og tidspunkter.

**Foreløbig Interviewguide (stadig under udarbejdelse):**
Hvor mange timers planlagt undervisning har du fået i brugen af OPUS og/eller FMK?
Hvor mange timers planlagt undervisning har du fået specifikt i brugen af FMK?
Hvordan bedømmer du undervisningen?
Har du ideer til forbedringer af undervisningen?
Er der nogle i klinikken i hverdagen, du kan søge hjælp hos, hvis du har problemer i OPUS og FMK?

I OPUS-medicin og FMK er der 3 begreber: medicinstatus, medicin-gennnemgang, medicin-afstemning:

Hvornår udfører du medicinafstemning?
Hvad er formålet med medicin afstemning?

Hvornår udfører du medicinstatus?
Hvad er formålet med medicin status?

Hvornår udfører du medicingennemgang?
Hvad er formålet med medicin gennemgang?
For hvilke patientgrupper er det mest udfordrende at lave medicin gennemgang?

Hvordan synes du afstemning af medicin fra OPUS til FMK fungerer?

Kan du komme i tanke om nogle funktioner der kunne være gavnlige at integrere i OPUS og FMK, og hvis ja hvilke?

På hvilken måde vil du beskrive FMK i forhold til brugervenlighed?

På hvilken måde påvirker FMK patientsikkerheden?

Hvad er dit overordnede indtryk af FMK?
Hvad er din oplevelse af processen af implementeringen af FMK?

# Background Information Interview G

Forsøgsdeltager:

Køn
- ☐ Mand
- ☐ Kvinde

Klinik
- ☐ Akut
- ☐ Medicin
- ☐ Kvinde Barn, Pædiatri
- ☐ Kvinde Barn, Gyn. obst.
- ☐ Kirurgi

Læge erfaring
- ☐ Kandidatstuderende
- ☐ KBU
- ☐ 0-5 år
- ☐ 5-10 år
- ☐ 10-20 år
- ☐ 20-30 år
- ☐ 30-40 år
- ☐ Mere end 40 år

Hvor længe har du været ansat i Region Nordjylland?
- ☐ 0-3 år
- ☐ 3-5 år
- ☐ 5-10 år
- ☐ 10-20 år
- ☐ 20-30 år
- ☐ 30-40 år
- ☐ Mere end 40 år

I hvilket land blev du født?
- ☐ Danmark
- ☐ Nordiske lande: Norge/Sverige/Island/Færøerne/Grønland
- ☐ Andet europæisk land
- ☐ Land udenfor Europa

Hvor stor en del af din arbejdstid, tror du, at du bruger på medicinstatus, medicingennemgang og medicinafstemning?

- ☐ 0-10%
- ☐ 10-20%
- ☐ 20-30%
- ☐ 30-40%
- ☐ 40-50%
- ☐ 50-60%
- ☐ 60-70%
- ☐ 70-80%
- ☐ 80-90%
- ☐ 90-100%

# Interview Questions H

**Undervisning:**
Hvor mange timers planlagt undervisning har du fået i brugen af OPUS og/eller FMK?
Hvor mange timers planlagt undervisning har du fået specifikt i brugen af FMK?
Hvordan bedømmer du undervisningen?
Har du ideer til forbedringer af undervisningen?

Er der nogle i klinikken i hverdagen, du kan søge hjælp hos, hvis du har problemer i OPUS og FMK?
Hvad har du selv gjort for at sætte dig ind i brugen af FMK?

**Begreber:**
I OPUS-medicin og FMK er der 3 begreber: medicinstatus, medicingennemgang, medicinafstemning:

Hvornår udfører du medicinafstemning?
Hvad er formålet med medicinafstemning?

Hvornår udfører du medicinstatus?
Hvad er formålet med medicinstatus?

Hvornår udfører du medicingennemgang?
Hvad er formålet med medicingennemgang?
For hvilke patientgrupper er det mest udfordrende at lave medicingennemgang?

Hvis de aldrig har lavet medicingennemgang:
For hvilke patientgrupper tror du det er mest udfordrende at lave medicingennemgang?

**Systemet:**
Hvordan synes du afstemning af medicin fra OPUS til FMK fungerer?

Hvad er formålet med FMK?
Hvilke tre gode ting er der ved FMK?
Hvilke tre ting ved FMK kan forbedres?

På hvilken måde vil du beskrive FMK i forhold til brugervenlighed?

**Patientsikkerhed:**
På hvilken måde påvirker FMK patientsikkerheden?

**Overordnet oplevelse af FMK:**
Hvad er dit overordnede indtryk af FMK?
Hvad er din oplevelse af processen af implementeringen af FMK?

# Invitation for Clinic for Woman- and Child Diseases I

**Speciale i Translationel Medicin på Sygehus Vendsyssel, uddannelsen Medicin med Industriel Specialisering (MEDIS) Aalborg Universitet**

**Invitation til Klinik Kvinde Barn**
Vi har som led i vores specialeprojekt på Sygehus Vendsyssel fået Sygehusledelsens/cheflæge Per Sabro's godkendelse til at interviewe lægeligt personale om FMK og implementering af FMK.

**Præsentation af os**
Vi hedder Sanne Andersen og Katrine Dehn og er primo februar 2015 påbegyndt vores kandidatspeciale i samarbejde med Sygehus Vendsyssel. Vi har Riskmanager, Vivi Pedersen, som primær kontaktperson, og Kvalitetsleder Bente Jensen, Klinik Medicin som sekundær kontaktperson.

**Formål med interviewene**
Interviewenes formål er at kortlægge opfattelsen af FMK (hermed menes også selve implementeringsprocessen) blandt lægerne på sygehuset. Interviewet vil derfor være en brugerundersøgelse af FMK blandt lægerne for at danne os et overblik over deres holdning til undervisningen, brugervenlighed og implementeringen af FMK.

**Interviewet**
**Interviewet er individuelt med varighed per læge på ca. 30 minutter.**
For at gøre det mindst tidskrævende for lægerne, kommer vi gerne til jer i Klinikken på selve interviewdagen og vil derfor gerne kunne benytte et kontor eller mødelokale hos jer.
Alle interviews bliver anonymiseret. Interviews vil blive lydoptaget for at kunne transskribere dem efterfølgende. Når interviewet er transskriberet, vil lydoptagelsen blive slettet. Klinikken vil ikke blive nævnt specifikt i projektet, men hvis vi adresserer forskelle og ligheder bliver det generelt, sådan at ingen kan identificeres f.eks. erfarne og mindre erfarne læger.

**Deltagere**
Efter drøftelser med Vivi Pedersen, Riskmanager, og Bente Jensen, Kvalitetsleder i Klinik Medicin, er vi nået frem til, at vi har behov for at interviewe: **2 læger fra det pædiatriske speciale og 2 læger fra det gynækologiske/obstetriske speciale**. Hvis muligt, ønskes der spredning mellem erfarne og mindre erfarne læger. På Sygehusniveau interviewes 15 læger i alt.

**Tidspunkt for interview**
Interviewene vil for jeres klinik blive afholdt i **Uge 15 i tidsrummet 8:30-16:00**. Se vedlagte ugeskema. I og/eller den enkelte udpegede læge bestemmer selv tidspunktet (tirsdag, torsdag eller fredag) i uge 15.

**Tilbagemelding**
Tilbagemelding på de læger I i Klinikken udpeger til interviews skal ske til Riskmanager Vivi Pedersen (vip@rn.dk) med navn, dag og tidspunkt, senest uge 14.

**Ugeskema for uge 15**

| Uge 15 | Mandag | Tirsdag | Onsdag | Torsdag | Fredag |
|---|---|---|---|---|---|
| Tidsrum muligt for afholdelse af interview | | 8:30-16:00 | | 8:30-16:00 | 8:30-16:00 |

**Projektet fremad**
Vi skal aflevere specialet 28. maj og har en aftale om at komme til staff-meeting i efteråret og fremlægge resultater fra vores specialeprojekt på Sygehus Vendsyssel.

**Mange tak for jeres hjælp.**

Med venlig hilsen
Sanne Andersen og Katrine Dehn

# Invitation for Clinic for Acute Medicine J

**Speciale i Translationel Medicin på Sygehus Vendsyssel, uddannelsen Medicin med Industriel Specialisering (MEDIS) Aalborg Universitet**

**Invitation til Klinik Akut**
Vi har som led i vores specialeprojekt på Sygehus Vendsyssel fået Sygehusledelsens/cheflæge Per Sabro's godkendelse til at interviewe lægeligt personale om FMK og implementering af FMK.

**Præsentation af os**
Vi hedder Sanne Andersen og Katrine Dehn og er primo februar 2015 påbegyndt vores kandidatspeciale i samarbejde med Sygehus Vendsyssel. Vi har Riskmanager, Vivi Pedersen, som primær kontaktperson, og Kvalitetsleder Bente Jensen, Klinik Medicin som sekundær kontaktperson.

**Formål med interviewene**
Interviewenes formål er at kortlægge opfattelsen af FMK (hermed menes også selve implementeringsprocessen) blandt lægerne på sygehuset. Interviewet vil derfor være en brugerundersøgelse af FMK blandt lægerne for at danne os et overblik over deres holdning til undervisningen, brugervenlighed og implementeringen af FMK.

**Interviewet**
**Interviewet er individuelt med varighed per læge på ca. 30 minutter.**
For at gøre det mindst tidskrævende for lægerne, kommer vi gerne til jer i Klinikken på selve interviewdagen og vil derfor gerne kunne benytte et kontor eller mødelokale hos jer.
Alle interviews bliver anonymiseret. Interviews vil blive lydoptaget for at kunne transskribere dem efterfølgende. Når interviewet er transskriberet, vil lydoptagelsen blive slettet. Klinikken vil ikke blive nævnt specifikt i projektet, men hvis vi adresserer forskelle og ligheder bliver det generelt, sådan at ingen kan identificeres f.eks. erfarne og mindre erfarne læger.

**Deltagere**
Efter drøftelser med Vivi Pedersen, Riskmanager, og Bente Jensen, Kvalitetsleder i Klinik Medicin, er vi nået frem til, at vi har behov for at interviewe: **4 læger fra det akutmedicinsk speciale**. Hvis muligt, ønskes der spredning mellem erfarne og mindre erfarne læger. På Sygehusniveau interviewes 15 læger i alt.

**Tidspunkt for interview**
Interviewene vil for jeres klinik blive afholdt i **Uge 16 i tidsrummet 8:30-16:00**. Se vedlagte ugeskema. I og/eller den enkelte udpegede læge bestemmer selv tidspunktet (mandag, torsdag eller fredag) i uge 16.

**Tilbagemelding**
Tilbagemelding på de læger I i Klinikken udpeger til interviews skal ske til Riskmanager Vivi Pedersen (vip@rn.dk) med navn, dag og tidspunkt, senest uge 15.

**Ugeskema for uge 16**

| Uge 16 | Mandag | Tirsdag | Onsdag | Torsdag | Fredag |
|---|---|---|---|---|---|
| Tidsrum muligt for afholdelse af interview | 8:30-16:00 | | | 8:30-16:00 | 8:30-16:00 |

**Projektet fremad**
Vi skal aflevere specialet 28. maj og har en aftale om at komme til staff-meeting i efteråret og fremlægge resultater fra vores specialeprojekt på Sygehus Vendsyssel.

**Mange tak for jeres hjælp.**

Med venlig hilsen
Sanne Andersen og Katrine Dehn

# Invitation for Clinic for Surgery K

**Speciale i Translationel Medicin på Sygehus Vendsyssel, uddannelsen Medicin med Industriel Specialisering (MEDIS) Aalborg Universitet**

**Invitation til Klinik Kirurgi**
Vi har som led i vores specialeprojekt på Sygehus Vendsyssel fået Sygehusledelsens/cheflæge Per Sabro's godkendelse til at interviewe lægeligt personale om FMK og implementering af FMK.

**Præsentation af os**
Vi hedder Sanne Andersen og Katrine Dehn og er primo februar 2015 påbegyndt vores kandidatspeciale i samarbejde med Sygehus Vendsyssel. Vi har Riskmanager, Vivi Pedersen, som primær kontaktperson, og Kvalitetsleder Bente Jensen, Klinik Medicin som sekundær kontaktperson.

**Formål med interviewene**
Interviewenes formål er at kortlægge opfattelsen af FMK (hermed menes også selve implementeringsprocessen) blandt lægerne på sygehuset. Interviewet vil derfor være en brugerundersøgelse af FMK blandt lægerne for at danne os et overblik over deres holdning til undervisningen, brugervenlighed og implementeringen af FMK.

**Interviewet**
**Interviewet er individuelt med varighed per læge på ca. 30 minutter.**
For at gøre det mindst tidskrævende for lægerne, kommer vi gerne til jer i Klinikken på selve interviewdagen og vil derfor gerne kunne benytte et kontor eller mødelokale hos jer.
Alle interviews bliver anonymiseret. Interviews vil blive lydoptaget for at kunne transskribere dem efterfølgende. Når interviewet er transskriberet, vil lydoptagelsen blive slettet. Klinikken vil ikke blive nævnt specifikt i projektet, men hvis vi adresserer forskelle og ligheder bliver det generelt, sådan at ingen kan identificeres f.eks. erfarne og mindre erfarne læger.

**Deltagere**
Efter drøftelser med Vivi Pedersen, Riskmanager, og Bente Jensen, Kvalitetsleder i Klinik Medicin, er vi nået frem til, at vi har behov for at interviewe: **2 læger fra det kirurgiske speciale**. Hvis muligt, ønskes der spredning mellem erfarne og mindre erfarne læger. På Sygehusniveau interviewes 15 læger i alt.

**Tidspunkt for interview**
Interviewene vil for jeres klinik blive afholdt i **Uge 13 og 14 i tidsrummet 8:30-16:00**. Se vedlagte ugeskema. I og/eller den enkelte udpegede læge bestemmer selv tidspunktet (tirsdag, torsdag eller fredag) i uge 13 eller (tirsdag eller onsdag) i uge 14.

**Tilbagemelding**
Tilbagemelding på de læger I i Klinikken udpeger til interviews skal ske til Riskmanager Vivi Pedersen (vip@rn.dk) med navn, dag og tidspunkt, senest uge 13.

**Ugeskema for uge 13**

| Uge 13 | Mandag | Tirsdag | Onsdag | Torsdag | Fredag |
|---|---|---|---|---|---|
| Tidsrum muligt for afholdelse af interview | | 8:30-16:00 | | 8:30-16:00 | 8:30-16:00 |

**Ugeskema for uge 14**

| Uge 14 | Mandag | Tirsdag | Onsdag | Torsdag | Fredag |
|---|---|---|---|---|---|
| Tidsrum muligt for afholdelse af interview | | 8:30-16:00 | 8:30-16:00 | | |

**Projektet fremad**
Vi skal aflevere specialet 28. maj og har en aftale om at komme til staff-meeting i efteråret og fremlægge resultater fra vores specialeprojekt på Sygehus Vendsyssel.

**Mange tak for jeres hjælp.**

Med venlig hilsen
Sanne Andersen og Katrine Dehn

# Invitation for Clinic for Internal Medicine L

**Speciale i Translationel Medicin på Sygehus Vendsyssel, uddannelsen Medicin med Industriel Specialisering (MEDIS) Aalborg Universitet**

**Invitation til Klinik Medicin**
Vi har som led i vores specialeprojekt på Sygehus Vendsyssel fået Sygehusledelsens/cheflæge Per Sabro's godkendelse til at interviewe lægeligt personale om FMK og implementering af FMK.

**Præsentation af os**
Vi hedder Sanne Andersen og Katrine Dehn og er primo februar 2015 påbegyndt vores kandidatspeciale i samarbejde med Sygehus Vendsyssel. Vi har Riskmanager, Vivi Pedersen, som primær kontaktperson, og Kvalitetsleder Bente Jensen, Klinik Medicin som sekundær kontaktperson.

**Formål med interviewene**
Interviewenes formål er at kortlægge opfattelsen af FMK (hermed menes også selve implementeringsprocessen) blandt lægerne på sygehuset. Interviewet vil derfor være en brugerundersøgelse af FMK blandt lægerne for at danne os et overblik over deres holdning til undervisningen, brugervenlighed og implementeringen af FMK.

**Interviewet**
**Interviewet er individuelt med varighed per læge på ca. 30 minutter.**
For at gøre det mindst tidskrævende for lægerne, kommer vi gerne til jer i Klinikken på selve interviewdagen og vil derfor gerne kunne benytte et kontor eller mødelokale hos jer.
Alle interviews bliver anonymiseret. Interviews vil blive lydoptaget for at kunne transskribere dem efterfølgende. Når interviewet er transskriberet, vil lydoptagelsen blive slettet. Klinikken vil ikke blive nævnt specifikt i projektet, men hvis vi adresserer forskelle og ligheder bliver det generelt, sådan at ingen kan identificeres f.eks. erfarne og mindre erfarne læger.

**Deltagere**
Efter drøftelser med Vivi Pedersen, Riskmanager, og Bente Jensen, Kvalitetsleder i Klinik Medicin, er vi nået frem til, at vi har behov for at interviewe: **5 læger fra det medicinske speciale**. Hvis muligt, ønskes der spredning mellem erfarne og mindre erfarne læger. På Sygehusniveau interviewes 15 læger i alt.

**Tidspunkt for interview**
Interviewene vil for jeres klinik blive afholdt i **Uge 17 i tidsrummet 8:30-16:00**. Se vedlagte ugeskema. I og/eller den enkelte udpegede læge bestemmer selv tidspunktet (mandag, tirsdag, onsdag, torsdag eller fredag) i uge 17.

**Tilbagemelding**
Tilbagemelding på de læger I i Klinikken udpeger til interviews skal ske til Riskmanager Vivi Pedersen (vip@rn.dk) med navn, dag og tidspunkt, senest uge 16.

**Ugeskema for uge 17**

| Uge 17 | Mandag | Tirsdag | Onsdag | Torsdag | Fredag |
|---|---|---|---|---|---|
| Tidsrum muligt for afholdelse af interview | 8:30-16:00 | 8:30-16:00 | 8:30-16:00 | 8:30-16:00 | 8:30-16:00 |

**Projektet fremad**
Vi skal aflevere specialet 28. maj og har en aftale om at komme til staff-meeting i efteråret og fremlægge resultater fra vores specialeprojekt på Sygehus Vendsyssel.

**Mange tak for jeres hjælp.**

Med venlig hilsen
Sanne Andersen og Katrine Dehn