

Patient safety

*The use of Shared Medicine Card at Danish hospital pharmacies
when dispensing paid pharmaceuticals to outpatients*

*Outpatients' perspective on dispense of paid pharmaceuticals and
patterns in outpatients' adherence*



Master's Thesis in collaboration with Hospital pharmacy in the
North Denmark Region

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Master's Thesis Title

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The use of Shared Medicine Card at Danish Hospital Pharmacies when dispensing paid pharmaceuticals to outpatients

Outpatients' perspective on dispense of paid pharmaceuticals and patterns in outpatients' adherence

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Preface

This investigational study was performed in cooperation with the Hospital Pharmacy in North Denmark Region (HPN) and written by three 10th semester students from Aalborg University (AAU) studying Medicine with Industrial Specialization, Translational Medicine. The study was done in the period from September 1st 2016 to May 29th 2017 and focused on dispense of paid pharmaceuticals (PPs) from outpatients' perspective. Also, the study focused on how the Shared Medicine Card (SMC) is used at hospital pharmacies in Denmark and the possibility to incorporate SMC at HPN homecare department's workflow.

To investigate this, a questionnaire was sent to outpatients at endocrinological and neurological ambulatory at Aalborg University Hospital (AUH). Also, an interview guide was sent to hospital pharmacies in Denmark including HPN homecare department. The results were used to investigate if the use of SMC could be improved.

The study was based on the principles of working in a group and has been structured based on the Aalborg Problem Based Learning (PBL) model, where problem solving and discussion of the results are essential elements.

Readers Manual

This study is addressed to readers with an interest in health science and especially fields within PPs and SMC. For this reason, it is required that the reader has a basic knowledge in the field, including patient adherence, discarding of medication and legislation within SMC to fully appreciate the study. In addition, the study can be used as a base for further research within the field. This study ends in two articles dealing with outpatients' perspective on dispense of PPs and the use of SMC at hospital pharmacies, respectively.

The study has used AMA-American Medical Association, 10th edition system for references, which is listed in the bibliography in chronological order. The references can be stated either at the end of sentences, where it is the reference related to the specific sentence, or as a direct reference to a certain article in the middle of a sentence.

When referring to a figure or table it will be listed in brackets; (figure X), (table X) and when referring to an appendix, it will be placed in brackets as well; (appendix X.X). The questionnaire in appendix will be referred to as (QX; appendix X.X).

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At last we thank patients and employees from endocrinology and neurology ambulatory at AUH, and hospital pharmacies in the regions of Denmark for their time and dedication to contribute and participate in the study.

Abbreviation

AE: Adverse Event

ApoVision: Internal computer system used by hospital pharmacies in Denmark for registration of medication and patient information¹.

AUH: Aalborg University Hospital

BP: Biological pharmaceuticals

CDR: Central Denmark Region

DDR: Drug-Drug Reaction

EA: Endocrinological ambulatory

EHR: Electronic Health Record, patients' full health record²

FD: Funen in Denmark

GP: General practitioners

HCC: HomeCare Capital Region of Denmark

HPN: Hospital pharmacy in North Denmark Region

ME: Medication Error

MEM: Medicine module, a part of EHR where only medicine records are held³

NA: Neurological ambulatory

NDR: The North Denmark Region

PP: Paid Pharmaceuticals, pharmaceuticals that can be given to patients in continued treatment at home (out-patients)⁴

RSD: Region of Southern Denmark

RZD: Region Zealand in Denmark

SDM: Shared decision-making

SMC: Shared Medicine Card, gives citizens and healthcare staff access to information regarding the citizens' medicine and vaccinations⁵.

SWJ: South West Jutland in Denmark

TPN: Total Parenteral Nutrition

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Introduction

During an eight-year period, the cost for hospital medicine in Denmark has been doubled to approximately 8 billion Danish kroner⁶. An investigation that formed a Master's Thesis in 2016 showed that paid pharmaceuticals (PPs) given to outpatients cover approximately 34% of the total cost for hospital medicine in the North Denmark Region (NDR)⁷. PPs are pharmaceuticals that can be given to patients in continued treatment at home (outpatients)⁸. When the cost for PPs reaches such a notable expense, a particular attention or control is expected for dispensing PPs. Specific care or control can be achieved by implementing Shared Medicine Card (SMC) to all healthcare services. SMC is an IT-solution, where all current prescriptions to patients should be present. It is the responsibility of healthcare staff to make sure that SMC is brought up to date with the prescription. The ingenious with SMC is that both healthcare staff and the patient have access to SMC and thereby all the prescriptions to the patient. It is important to register in SMC to show that dispense of medicine has occurred, called an effectuation⁹. This is important especially with the PPs that are dispensed frequently or those that last a lifetime. Even though, the law states that every drug prescription must be reported to SMC¹⁰, it is unfortunately not the case¹¹. This states a serious problem as effectuations of PPs in SMC have a very important purpose, namely patient safety^{9,10}. Patient safety is possibly increased when SMC has created an overview of patient medication to the healthcare staff and thereby a likely decrease in drug-drug interaction (DDR) and avoiding unsuitable medication⁹. The effort that is put into improving patient safety should also be supported by patients themselves. However, in developed countries, only 50% of patients with long-term therapy take the medicine as recommended by healthcare staffs. Obviously, this non-adherent behavior affects the patient's health¹² and indirectly the healthcare cost. It is paramount to note that enhancement of adherence should come from both patient and healthcare staff¹³. A good starting point when aiming to improve patient safety is to assess patients' perspective and adherence to PPs and concurrently examine the use of SMC at hospital pharmacies that dispense PPs.

Study aim

Problems with missing prescriptions and effectuation in SMC is aimed to be improved in this study, hopefully resulting in increased patient safety. Also, outpatient adherence is investigated as a factor of patient safety. Hence, the aim of this study is;

To establish a guidance for the Hospital Pharmacy in North Denmark Region (HPN) Homecare department's registration of dispensed paid pharmaceuticals (PPs) to outpatients in Shared Medicine Card (SMC) and to explore the dispense of PPs from outpatients' perspective"

To fulfill the above-mentioned aim there has been designed two parallel studies, which both address improving patient safety but from two different ways; healthcare staff and patient themselves. A series of partial aims were put forward to investigate the use of SMC:

- How do hospital pharmacies in Denmark register dispensed PPs?
- How is the daily workflow at the HPN homecare department?
- How, where and do hospital pharmacies in Denmark register batch numbers on dispense biological pharmaceuticals (BPs)?
- How time consuming is SMC in the daily workflow, and where it can be implemented in the HPN homecare department's workflow?

Also, a series of themes were put forward to investigate patients' perspective:

- Communication between the patient and healthcare staff
- Dispensing of PPs to patients
- Patient adherence
- Discarding of drug residues

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Abstrakt

Brugen af Fælles Medicinkort på danske sygehusapoteker ved udleveringen af vederlagsfrie lægemidler til hjemmepatienter

Formål: Formålet med dette studie var at udvikle en vejledning til registrering (effektivering) af udleverede vederlagsfrie lægemidler (VLM) og biologiske lægemidler (BL) til patienter i det Fælles Medicinkort (FMK). Vejledningen skal bruges på Sygehusapoteket Region Nordjyllands (SRN) hjemmepatientafdeling. Samtidig har studiet til formål at udforske brugen af FMK på andre sygehusapoteker i Danmarks regioner.

Metode: For at kunne udvikle vejledningen til effektivering af VLM og BL i FMK, blev et interview med hjemmepatientafdelingen på SRN gennemført, hvor deres daglige arbejdsgang også blev observeret. For at fastlægge vejledningen til effektivering, blev der korresponderede med to farmaceuter, som er kendte brugere af FMK. For at undersøge brugen af FMK på sygehusapotekerne, blev der ydermere udført seks interviews med sygehusapoteker i Danmark. Alle interviews blev optaget og efterfølgende transskriberet og analyseret.

Resultater: Foruden hjemmepatientafdelingen på SRN, udleverer fire andre sygehusapoteker også VLM til ambulante patienter. Ingen af disse bruger FMK, mens 2 ud af 3 sygehusapoteker, som udleverer BL til hjemmepatienter, registrerer batchnummer i den elektroniske patientjournal (EPJ). Arbejdsgangen hos SRNs hjemmepatientafdeling blev udarbejdet og brugt til at vurdere, hvor i deres arbejdsgang det ville være mest fordelagtigt at implementere brugen af effektiveringer af VLM i FMK.

Konklusion: Dette studie viste, at ingen af de adspurgte sygehusapoteker brugte FMK, mens størstedelen registrerer batchnummer på udleverede BL. Implementering af FMK ved hjemmepatientafdelingen på SRN påbegyndes i den nærmeste fremtid.

Hjemmepatienters perspektiv på udlevering af vederlagsfrie lægemidler samt mønstre i hjemmepatienters adhærens

Formål: Formålet med dette studie var at undersøge patientens perspektiv på udlevering af vederlagsfrie lægemidler (VLM) samt patienternes adhærens i forhold til deres VLM. Dette omfattede kommunikationen mellem patienterne og det sundhedsfaglige personale ved udlevering af VLM.

Metode: 150 forsøgspersoner, 110 fra neurologisk ambulatorium (NA) og 40 fra endokrinologisk ambulatorium (EA) på Aalborg Universitetshospital (AUH) blev randomiseret udvalgt til at deltage i en spørgeskemaundersøgelse. Spørgeskemaet bestod af fire temaer; 1) Kommunikation og information om den udleverede medicin, 2) Udlevering af medicin, 3) Patient adhærens og 4) Kassation af medicinrester. Spørgeskemaet blev designet således at det både kunne besvares via brev og online.

Resultater: 97 svar blev returneret, hvilket gav en svarrate på 68%. Analysen viste, at 88% af respondenterne enten var tilfredse eller stærkt tilfredse med de oplysninger, de modtog fra sundhedspersonalet. 89% af respondenterne mente, at de havde en god adhærens.

Konklusion: Dette studie viste, at patienttilfredsheden var høj i forbindelse med udleveringen af VLM, selvom nogle informationer blev udeladt i doktor-patient kommunikationen. Alligevel viste undersøgelsen at patient adhærens var god, og dette kan være en afspejling af patienternes tilfredshed.

The use of Shared Medicine Card at Danish Hospital Pharmacies when dispensing paid pharmaceuticals to outpatients

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Abstract: The purpose of this study was to establish a procedure for registration (effectuation) of dispensed paid pharmaceuticals (PPs) and biological pharmaceuticals (BPs) to outpatients in Shared Medicine Card (SMC). The procedure is meant to be implemented at The Hospital Pharmacy in North Denmark Region (HPN) homecare department. Likewise, the study aims to discover the use of SMC at hospital pharmacies in the regions of Denmark. **Methods:** To establish the current procedure for registration of dispensed PPs an interview with the HPN homecare department were performed and their daily workflow were observed. A correspondence with two pharmacists, experienced in SMC, took place to establish a guideline for making effectuations in SMC. Six additional interviews were performed with hospital pharmacies in Denmark. **Results:** In addition to the HPN homecare department, four other hospital pharmacies dispense PPs to outpatients, thus none of them use SMC and 2/3 hospital pharmacies, that dispense BPs, register batch numbers. The workflow at HPN was determined and used to assess implementation of the created guideline for making effectuations on dispensed PPs in SMC. **Conclusion:** None of the hospital pharmacies use SMC, but an implementation of SMC is soon to be in progress at HPN.

An increasing number of people around the world is in need of medications. In Denmark, the percentage of patients receiving prescription-based medicines and over-the-counter medicines has been increasing each year from 1994 to 2010 (from 52% to 68%)¹. With the increased number of people receiving medicine, the rate of adverse event (AE) is expected to increase, as well. In 2016, 189,467 AEs have been reported to the Danish patient security database², which is an increase of 8% since 2014^{3,4}. The most prevalent AE has been noted as medication errors (MEs), which accounts for 23% of the total AEs recorded in the secondary healthcare (hospitals) and up to 64% in the primary healthcare (pharmacy, general practitioners (GPs), homecare etc.)². The MEs include, amongst other, prescription errors and incorrectly substitution of drugs, which in some cases leads to AEs that might result in hospitalization².

Unnecessary hospitalizations as a result of AEs is likely to be an outcome of poor communication between hospitals and GPs in regards to what medication a patient is receiving⁵. When the patients' medication use rises, the likelihood of drug-drug interaction (DDR) would expectedly enhance. It is

therefore important to ensure a proper communication between healthcare staff and patients. Communication issues might be resolved by using common systems that can provide an overview of a patient medication data⁵.

Shared Medicine Card (SMC) was brought to the Danish primary and secondary healthcare in 2011, which is considered as a potential solution to prevent MEs caused by communication difficulties⁶. SMC interact with the regions intern medicine module (MEM). MEM is a part of the electronic health record (EHR) obtaining only medicine records of the patients. An important purpose of SMC is to improve patient safety by making it easier to oversee what medications patients have been using for the last two years. It can also be used for prescribing new medicines, making it beneficial for healthcare staff⁶. Furthermore, the patients are able to renew their active prescriptions via the SMC app⁷, making it less time consuming for both patients and healthcare staff.

There is, however, some limitations with the use of SMC, such as lack of functions to type in part number for medicines and batch numbers for biological pharmaceuticals (BPs). It is an obligation to

report the batch number when dispensing selected BPs in order to obtain possible side effects⁸.

Even though SMC has been implemented into the Danish healthcare system for about five years (since 2011), it still is not being used conclusively across the country⁹. The law states that every drug prescription from a healthcare staff must be registered in SMC¹⁰. However, this is not always the case and it is in particular lacking in regards to paid pharmaceuticals (PPs), which refers to types of pharmaceuticals that can be given cost-free to patients that are in continued treatment at home (outpatients)¹¹. Typically, patients who receive PPs, suffer from chronic diseases and are in need for long term medications, which are often with a high cost^{12,13}. The Hospital Pharmacy in North Denmark Region (HPN) is handling PPs every day. The pharmacy registers each delivery in an intern IT system called ApoVision, which is also used by other hospital pharmacies in Denmark. SMC, as a supplement to ApoVision, could be beneficial since it is a national IT system available for a wider range of healthcare staff. As mentioned earlier, it would provide possibilities to improve the overall patients' safety, as well as giving an overview of the medication that has been dispensed to the patient.

Therefore, the purpose of this study is, to develop a guideline for registration of dispensed PPs in SMC, which is called an effectuation. Furthermore, effectuations of BPs are also wanted, along with registration of batch number. The goal is to incorporate the guideline in the daily work at the HPN homecare department, which is in charge of dispensing PPs to some outpatients.

Methods

This was a descriptive case-study that used qualitative measurements to fulfil its goal. Participants of this study included 7 hospital pharmacies across the regions of Denmark. Two of the pharmacies participated in telephonic interviews and four answered the questions via e-mail. The last pharmacy was HPN, which participated in an in-person interview, as well as a guided tour at their homecare department (visit-interview).

Correspondence with hospital pharmacies

Hospital pharmacies were interviewed by telephone or e-mail to gain knowledge on pharmacy workflows with registration of PPs and BPs. The interviews were based on a series of premade questions (interview guide) to ensure a structured interview. The interview guide ensured that the content of information given by the regions was more thorough¹⁴. The interview guide was validated by both pharmacist, Ph.d. Hanne Plet and hospital pharmacist Gitte Søndergaard Nielsen from HPN.

Workflow at the HPN homecare department

A series of questions were formed for the homecare department at HPN to determine their current workflow. The questions were validated by pharmacist, Ph.d. Hanne Plet. The interview was performed with two pharmaconomists working in the homecare department, who gave a description of their daily workflow. As a supplement to the interview, a visit to the homecare department was arranged to get a practical view on the current workflow. Outlining the current workflow at the homecare department, made it possible to identify the most suitable way of implementing SMC.

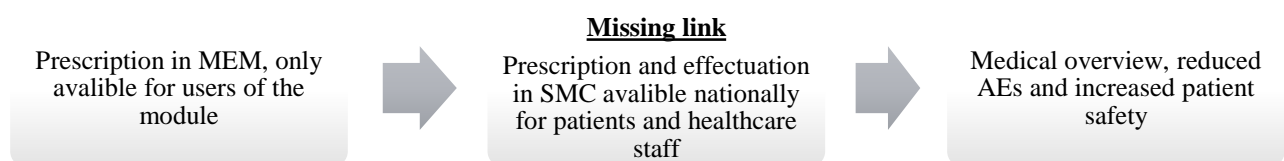


Figure 1. Flowchart of registration of pharmaceuticals. Flowchart illustrating the course of actions for prescribing and registering pharmaceuticals in medicine module (MEM), with demonstration of the missing link, Shared Medicine Card (SMC). The medical overview reduces adverse events (AEs) and increases patient safety.

Working procedure in SMC

A workflow in SMC was developed based on correspondence with two pharmacists, experienced in SMC. The correspondence consisted of both tutored lessons in SMC and editing of the guideline. The purpose of the guideline is to successfully implement SMC at the HPN homecare department, and thereby overcoming the missing link between sectors (figure 1). The guideline describes how to make an effectuation in SMC, including how to handle a series of different scenarios that might occur (table 1). The guideline is adjusted to the HPN homecare department.

SMC and MEM are consistent

1. Same drug is transferred from MEM to SMC

SMC and MEM are inconsistent

2. MEM contains a drug or a change in existing drug not transferred to SMC
3. A drug is neither transferred to MEM and therefore not SMC

Table 1 Scenarios when wanting to make effectuations in Shared Medicine Card (SMC). Two different starting point occur when using SMC to make effectuation, depending on the consistency between SMC and medicine module (MEM).

Time estimate

As a supplement to the working procedure in SMC, a calculation of the approximate additional time was also made. The time estimate is based on data regarding; number of daily patients at the HPN homecare department, as well as the average time used to make an effectuation in SMC.

Data management

The results are presented in descriptive tables and a figure (flowchart).

Results

Interview with the regions

Interviews conducted with hospital pharmacies in Central Denmark Region (CDR), Funen in Denmark (FD), South West Jutland in Denmark (SWJ) and HomeCare Capital Region of Denmark (HCC), showed that they dispense PPs to the outpatients who live far from the hospital ward, outpatients who receive large amount of medicine (e.g. dialysis, total parenteral nutrition (TPN)), and outpatients whose hospital ward wishes to obtain assistance from hospital pharmacies. Registration of PPs and BPs are presented in Table 2. As it is seen clearly, none of the hospital pharmacies register or effectuate in SMC due to technical problems and lack of access for the pharmaconomists who dispense PPs to outpatients.

<i>Hospital pharmacies</i>	<i>Register PPs dispensed directly to patients</i>	<i>Effectuation of dispensed PPs in SMC</i>	<i>Batch number registration of dispensed BPs</i>
CDR	Yes, in ApoVision	No	Yes in EHR**
SWJ	Yes, in ApoVision	No	Yes in EHR**
FD	Yes, in ApoVision	No	No, do not dispense BPs to patients
HCC*	Yes, in ApoVision	No	No, do not dispense BPs to patients
NDR	Yes, in ApoVision	No	No

Table 2 Overview of the registration of paid pharmaceuticals (PPs) and biological pharmaceuticals (BPs) at hospital pharmacies that dispense to outpatients. Hospital pharmacies at Central Denmark Region (CDR), South West Jutland in Denmark (SWJ), Funen in Denmark (FD), HomeCare Capital Region of Denmark (HCC) and North Denmark Region (NDR) dispense and registers PPs in ApoVision. The other hospital pharmacies (Region of Southern Denmark (RSD) and Region Zealand in Denmark (RZD)) only deliver PPs and BPs to hospitals, and not to outpatients. Thereby, these hospital pharmacies are not responsible for effectuation in Shared Medicine Card (SMC) or batch number registration of BPs. *HCC is a logistic department of the hospital pharmacy in Capital Region of Denmark; **Electronic health record (EHR).

Workflow at HPN homecare department

HPN homecare is responsible for dispensing PPs to outpatients with sclerosis, short bowel syndrome, endocrine diseases, immune deficiencies and dialysis patients. They infrequently deliver medicine to the pediatric ward. Every homecare patient is found in ApoVision where previous and future dispense of PPs can be seen. To optimize the transport of the medicine, outpatients are divided into groups in ApoVision according to their home addresses. The workflow at HPN homecare department can be found in figure 2.

Working procedure in SMC

A guideline on effectuation in SMC has been constructed based on the three scenarios mentioned in the method section (table 1). The guideline contains screenshots and descriptions of how to handle the situations (appendix 2.5). If any of the “inconsistent” scenarios occur, the pharmacist should always contact the doctor or nurse who is responsible for the prescription.

When SMC and MEM are consistent, an effectuation of a specific drug can be made. A new copy of an existing effectuation of a specific drug is possible, making it easier and faster when handling an already existing drug to an outpatient.

Time estimate

A time estimate was made to assess the additional time resources per day. Table 3 shows the time required for every step towards an effectuation in SMC. The pharmacists handle the medicine of 20 to 100 patients per day each. The additional time was estimated for 20, 30, 40, 50, 60, 70, 80, 90 and 100 patients, respectively (table 4). The number of effectuations varies from patient to patient; but, the estimate in additional time was assessed when making 5 new effectuations, 5 copies of existing effectuations and switch from one patient to another. In table 4, the final estimates for additional time per day, can be found.

<i>Process</i>	<i>Exact time</i>
1. Opening Clinical Suite	34 sec
2. Enter userID and password	16 sec
3. Choose patient, drug, business and SMC	1 min
4. New effectuation	10 sec*
5. New copy of existing effectuation	2 sec*
6. Switch from one patient to another	20 sec

Table 3. Measured time required to complete each step in Shared Medicine Card when making an effectuation. The time estimate depends on the computer and internet connection. *per drug.

1. Homecare receives a prescription by mail, fax or attends a discharge convention. A homecare pharmacist, doctor, nurse, patient and a relative are present at the discharge convention.



2. New prescriptions or changes are added in ApoVision.



3. On a daily basis, ApoVision makes a requisition form for patients who are on the route of delivery the following day.



4. Homecare staff find and scan medicine to each patient presented on the daily requisition form. Scanning of the medicine secures that the patient gets the right medicine, amount, dosage, etc. In addition, it presents if the medicine is not consistent with the information entered in the ApoVision.



5. The scanned medicines are labelled with: name of the patient, date of dispensing, “Sygehusapoteket Region Nordjylland” and dosage, which will be written as “efter aftale”* or “efter anvisning”**.



6. The medicines are packed and ready for delivery at the patients’ addresses in the next day.

Figure 2 Workflow at Hospital Pharmacy in North Denmark Region’s (HPN) homecare department. The full workflow is present in appendix 2.5. * as agreed with the doctor; ** as instructed

On less busy days, the pharmacist can work ahead of schedule and start next day's work, making the distribution of work and number of patients to expedite more equal. Based on that knowledge, it has been estimated that the average number of patients per day is 60 patients. The average of 60 patients and the start-up of SMC give an estimated total of one hour and 22 additional minutes per day. The start-up of SMC (step 1, 2 and 3, table 3) only takes about 2 minutes additionally per day since the actual log-in can last for 8 hours.

<i>Number of patients</i>	<i>Estimated time</i>
20	27 min
30	40 min
40	53 min
50	1h 6min
60	1h 20 min
70	1h 33min
80	1h 47 min
90	2h
100	2h 13 min

Table 4. The estimated additional time required per day when a pharmacist dispense paid pharmaceuticals to 20-100 patients.

The calculations are based on the results found in table 3.

Discussion

This study was designed to identify workflows in SMC at the hospital pharmacies across the regions of Denmark, which result in the creation of a working procedure for the HPN homecare department. After conducting interviews with the participating regions, it was found that none of the regions use SMC to make effectuations on dispensed PPs. It was also found that 5/8 hospital pharmacies dispense PPs or BPs to outpatients. Additionally, a workflow on how to effectuate in SMC was successfully created, waiting to be implemented at HPN homecare department. In the following, different aspects of methodology and findings of this study will be discussed in further details.

Methodological considerations

The methodology for this study implemented two different types of qualitative interviews. It was found most advantageous to conduct semi-structured interviews, with the use of a pre-created interview guide for the interviews. This method allowed the interviewer to determine an agenda, thus still making it possible both for the interviewer and the interviewees to explore fields outside the interview guide¹⁵. For the interview with the hospital pharmacies in the regions of Denmark, it was decided to perform telephonic interviews, as it was quicker and a more convenient procedure with lower costs, than visiting all regions¹⁴. Also, it was more effective than a mailed questionnaire, due to the possibility of asking follow-up questions during the interview. Some hospital pharmacies were not able to participate in a telephonic interview and instead replied on the interview guide by e-mail. If the response were not seen as sufficient, follow-up questions were forwarded.

For the HPN homecare department it was found beneficial to conduct a visit-interview, since this made it possible to also explore their daily workflow. Overall the chosen methods were considered to be appropriate for each purpose.

Methodological limitations

When using telephonic interviews, some unavoidable limitations occur. Even though the time of communication is synchronous, the place is asynchronous causing some problematics. One of the disadvantages is the lack of social cues, as facial expressions and body language. Thus, some social cues remain, such as voice and intonation. It is also notable to address, that by using telephonic interviews, it is very difficult for the interviewer to view the situation of the interviewee, and thereby less likely to create a good interview ambiance¹⁶.

Some of the hospital pharmacies did not wish to participate in a telephonic interview but answered by e-mail. Lost information are more likely in written answers but as the hospital pharmacies that answered via e-mail did not dispense PPs nor BPs to outpatients, further information was not needed.

Limitations in SMC

Only doctors and dentists have access to perform all tasks in SMC. However, nurses, pharmacists and additional healthcare staff have the opportunity to function as “doctors’ helper” in SMC. Thereby they have access to work on behalf of the doctor in all tasks except from updating medications in SMC. Subsequently, doctors have to authorize the tasks executed by helpers⁶. To lighten the work of the doctors at the ambulatories, some of the tasks in SMC could beneficially be delegated to the nurses without subsequent authorization from doctor. Unnecessary time use could be avoided by authorizing the nurses to update the patients’ medicine card on SMC. Also, a great amount of changes in patients’ medicine are not being updated in SMC, causing problems when prescribing medicine¹⁷, and possibly risking DDRs. This problem is also represented at GPs across the nation, where the update rate is very low, causing extra work for doctors at the hospital ambulatories¹⁸.

Another limitation is the missing fields for typing in part number of medicines and batch numbers of BPs. HPN homecare department work on part number level, and therefore wishes to continue this workflow in future procedure. Since batch numbers on 20 selected BPs are obligatory to report when dispensed⁸, a field for typing in batch number would be optimal. Even though, 2/3 hospital pharmacies that dispense BPs registers batch number in EHR, it is still preferred to use SMC as a national tool between sectors. Functional limitations, like these, are fixable by adding the fields into the software, which is only possible for the developers of SMC to do.

According to the declaration of prescriptions, prescriptions are valid for 2 years¹⁹, and SMC play by this law⁶. Considering the daily workflow at HPN homecare department, they might have a problem with this policy of saving prescriptions for 2 years at the most, since the outpatients related to the department usually need PPs and BPs for several years, or even a lifetime. It is likely to result in extra work, when doctors have to prescribe the medicine again every other year to ensure that they are active in SMC.

Advantage of SMC

The use of SMC has great advantages both locally and nationally for multiple reasons. When healthcare staff have access to a drug database like SMC, it makes it easier to overview the patient's medical prescriptions. This benefits, both the patient oneself and the healthcare staff. Patients will be able to see an overview of their medication including dosage and the ability of renewing active prescriptions⁷. Doctors will be able to consider current medication use when prescribing new medicine, ensuring fewer DDR's and AE's resulting in a possible increase in patient safety. It also provides the opportunity of saving time for the doctors who are prescribing new medicine, when doctors do not have to spend unnecessary amounts of time exploring what medication the patient is already receiving. When making effectuations in SMC, it is possible for healthcare staff to view what medication has already been dispensed to the patient, and by that, avoiding double handling of pharmaceuticals. This could very well be used to reduce the likeliness of drug abuse.

Locally at HPN they have expressed a desire to use SMC for their own advantage as well. Besides being able to get an overview of the patient's medicine, they will be able to see if the patient is currently admitted to the hospital, and is therefore in no need of medication from HPN homecare department. Previously, there has been cases of wasted PPs when HPN homecare department was not informed about patient hospitalizations, and therefore did not cancel the planned drug delivery. SMC has the potential of solving this type of problem which results in less drug residues and thereby reduced health care cost.

Requirements prior to implementation of SMC

The results showed that HPN homecare department did not use SMC as a tool for registration of PPs and BPs, therefore a guideline for making effectuations in SMC was created by using the knowledge obtained in this study. Implementing the use of SMC at the HPN homecare departments’ daily workflow would be ideal since they dispense and deliver medicine to many outpatients. The main

function that the homecare department will be using in SMC, is the creation of effectuations for the dispensed medicine. Effectuations in SMC are a key link in contributing to raising the overall patient safety and has the opportunity of lighten the work for prescribing medicine in the future⁶.

In order for this new procedure to work optimally, it is important that healthcare staff of both the primary and secondary sector use SMC correctly and consequently. Otherwise, it is going to be difficult for the HPN homecare department. It is a known problem that not all healthcare staff transfer the prescribed medicine to SMC²⁰, possibly due to a lack of time²¹, or limited knowledge and training in using SMC. When a prescription is missing from SMC, the homecare department has to contact the responsible doctor or nurse, adding unnecessary time to both their daily workflow. It is therefore very important that a corporation is made with the ambulatories responsible for the outpatients associated to HPN, to ensure that all prescribed medicine is listed in SMC.

Implementation of SMC

Implementation of SMC at the HPN homecare department is going to take several months. The startup phase is especially going to be time consuming for both ambulatories and the pharmaconomists at HPN homecare department. The pharmaconomists have to learn a new software, which is always a matter of adjustment. The guideline made for SMC (appendix 2.5) is designed to minimize the extra time as much as possible, by making it very simple and straightforward. Even though the guideline simplifies the workflow, the department still have to find 52-88 minutes extra every day per pharmaconomist for using SMC. For the new workflow to function it may be essential with extra equipment at the department.

The effectuation will preferably take place after scanning medication for each one of the outpatients (between step 4 and 5, figure 2). When in time need, it may be possible that the work in SMC have to wait to the next day, thus it is problematic as the idea of double controlling the dispensed PPs falls flat.

SMC at national level

Nationally, SMC has not reached the expected level yet. It is especially the secondary sector that is lacking in their use of SMC, where 78% of hospitals in Denmark (2016) use SMC, while only 18-56% of the ambulatories in the five regions of Denmark use SMC²⁰. Among the GPs, SMC is in high use (98-100%) which correspond well with the national goal of using SMC for 95% of all patients²⁰, thus their SMC update rate is fairly low causing extra work for the doctors at the ambulatories¹⁸.

According to a report done by The National Audit Office of Denmark in 2014, there was quite a big difference in using SMC between the five regions²². The biggest user of SMC was revealed to be Region of Southern Denmark (RSD) where 80% of the region's healthcare were using SMC. On the opposite site of the scale was CDR with a usage percentage of only 31, making it the region that uses SMC the least. The North Denmark Region (NDR) is very similar to the two remaining regions with an average percentage use of SMC at 69%. All of the regions represented an increase in the percentages since 2013²², making it plausible that the numbers have increased even more by 2017, and maybe even reached the goal of 95%²⁰. Along with an increasing use of SMC in the regions, the patients' safety assumingly would increase as well, highlighting the importance of fully implementation of SMC nationally.

In conclusion, none of the hospital pharmacies use SMC, but through interviews some of them express interest in start using SMC in their daily work. At HPN homecare department, the SMC guideline created in this study is about to be implemented in their daily workflow. This would once again be a benefit for the patient safety. After implementation of SMC at HPN homecare department the next step would be to make the other hospital pharmacies in Denmark use SMC, as well as, effectuation of dispensed PPs and BPs to outpatients.

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Conflict of interest

None declared.

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Outpatients' perspective on dispense of paid pharmaceuticals and patterns in outpatient adherence

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Abstract: Purpose of this study was to investigate the patient's perspective on dispense of paid pharmaceuticals (PPs) and their adherence towards PPs. This included communication between outpatients and healthcare staff regarding PPs. Likewise, the patient's adherence from their own point of view was analyzed. **Methods:** 150 participants, 110 from the Neurological Ambulatory (NA) and 40 from the Endocrinological Ambulatory (EA) at Aalborg University Hospital Denmark (AUH) were randomly selected to answer a questionnaire. Four themes were enlightened by the questionnaire; 1) communication and information about the dispensed medication, 2) dispensing medication, 3) patient adherence and 4) discarding of drug residues. **Results:** The questionnaire was returned with a response rate of 65%. The analysis of the responses, showed that a total of 88% said that they were either satisfied or strongly satisfied with the information they received from the healthcare staff and 89% of the respondents believed to have a good adherence. **Conclusion:** Some themes of information were missing in the doctor-patient communication. Nevertheless, the self-reported patient adherence was found to be good, as well as patient satisfaction when getting dispensed PPs.

The costs for hospital medicines in Denmark is remarkably increasing and it has been found that for a period of 8 years (2007-2015) the costs have increased from 4.3 billion Danish kroner (578,446,803.07 euros) to 7.9 billion Danish kroner (1,062,727,847.51 euros)^{1,2}. Hospital medicines include both medicines used during treatment at hospitals and medicines used by outpatients¹. The latter category is called paid pharmaceuticals (PPs) which refers to types of pharmaceuticals that can be given cost-free to patients who are in continued treatment at home (outpatients)³.

Preliminary data from a Master's Thesis in 2016 showed that PPs are a significant part of the total cost (approximately 34%) of hospital medicine given to outpatients in the North Denmark Region (NDR)⁴. Considering such a notable expense, it is desirable that patients experience optimal outcome of the treatment. However, it has been shown in other developed countries than Denmark, that only 50% of patients who are supposed to continue a long-term therapy are adhered to what is recommended by healthcare staff⁵. It is highly important to identify main reasons underlying non-adherent

behavior and how this can be minimized or resolved. Adherence is a shared responsibility between patients and healthcare staff. An optimal way to share this responsibility is to detect the poor adherence and handle it in a nonjudgmental way⁶. This is important due to the fact that lack of adherence not only reduce treatment benefits for patients, but also poses an economic burden to the healthcare system. The economic burden comes as a result of necessity for re-admission of patients to hospitals⁶ or waste of a large amount of medicine and resources⁵. There are several strategies for improving medicine adherence and one of those is by directly involving the patients in their course of treatment. International studies have shown a tendency of improvement in treatment when patients are considered an important part of the decision makings in treatment⁷⁻⁹. A national study by The Danish Knowledge Center for User Involvement in Health Care has also shown that both patients and healthcare staff are key players in shared decision-making (SDM) and optimal treatment outcome; however, there is currently a lack of experience with SDM in Denmark¹⁰. In order to start the process, assessing the course of treatment by patients

would yield valuable results that can possibly help with further progress and implementation of the next steps in this field. Hence, this study was designed to provide evidence on patterns of outpatients' adherence when receiving PPs.

Methods

Study design

This study was a descriptive cross-sectional study, where data were collected from two groups of outpatients from Aalborg University Hospital (AUH) in NDR. Results of the study were collected through a quantitative method in the form of a questionnaire. This study was funded by Aalborg University (AAU).

Permissions

Since this was a survey-based study applying questionnaires, and the study participants were not exposed to any physical or psychological interventions, it was not necessary to apply for ethical permission from the North Denmark Region Committee on Health Research Ethics.

Questionnaire

The questionnaire was designed in a way that accommodates relevant questions about outpatients' experiences, behaviors and feelings about PPs. Four themes were considered for the survey questions which were; 1) communication and information on the dispensed medication, 2) dispensing medication, 3) patient adherence and 4) discarding of drug residues. Each theme was supported by sub-questions.

The questionnaire consisted of both open and closed questions, as well as the opportunity to select multiple response categories in several questions.

Validation

The content of the four themes and related sub-questions were validated by company supervisor Hanne Plet, pharmacist, PhD, Hospital Pharmacy of North Denmark Region (HPN).

The validation process was designed to ensure that all themes were enlightened sufficiently by the questions.

A cognitive validation was also performed, to ensure correct phrasing and comprehension of each question. The cognitive validation was performed by eight people in the age of 18-75 years. Questions and comments were discussed along the way and recorded for later use in the final version of the questionnaire.

Participants

In total, 150 participants, 40 from Endocrinological Ambulatory (EA) (20 women and 20 men) and 110 from Neurological Ambulatory (NA) (55 women and 55 men), were randomly selected and invited to participate in the study. In order to calculate how many outpatients were to participate, a response analysis (figure 1) was made to get a representative sample of the patient group. It was expected that the response rate would be 50% as previous analyzes have shown an average response rate of 58%¹¹.

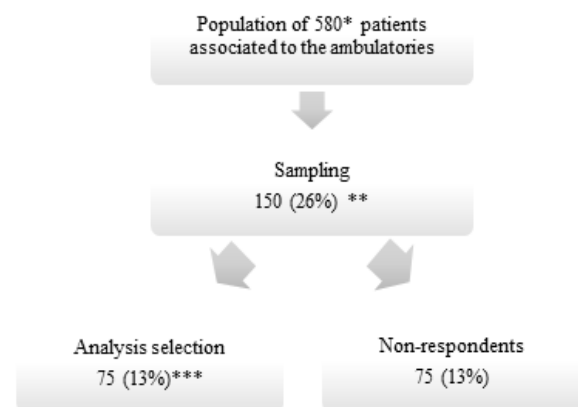


Figure 1. Response analysis.

All percentages are rounded. * The population represents outpatients from Neurological Ambulatory (NA) and Endocrinological Ambulatory (EA) at Aalborg University Hospital (AUH). Hospital Pharmacy of North Denmark Region (HPN) dispense to 500 NA outpatients a month, and 80 EA outpatients a month; ** From this, a sample of 150 outpatients was selected (110 from NA and 40 from EA), which is approximately 26% of all outpatients; *** A 50% response rate was expected, which represents 13% of the total population.

The questionnaires and a cover letter (appendix 1.1) were sent in a paper format to the outpatients' private address, with the opportunity to return the questionnaires by mail, which were delivered at AAU. This method was chosen because the response rate has shown to be higher when questionnaires are sent in paper format¹²; however, it was designed in a way that it was possible to answer through an online program called SurveyXact. A 30-day period was set for receiving responses.

Data management

All responses were collected and entered into a data matrix consisting of a table with ID numbers of respondents and code number for the answers. Prior to analysis, a quality assurance was done by double checking the answers; 30% randomized respondents from each ambulatory (21/70 from NA and 8/27 from EA). IBM SPSS Statistics 24 has been used for descriptive analysis, and the data are reported as percentages, range and frequencies.

Results

Out of 150 distributed questionnaires, 97 responses were returned resulting in a response rate of 65%, representing 17% of the total population of outpatients at NA and EA. Table 1 illustrates an overview of the respondents based on the ambulatory, age and gender of participants. Among responses, 18 outpatients answered using the online questionnaire, while 79 answered by ordinary mail.

	NA	EA	Total
Age range	%(n=70)	%(n=27)	%(n=97)
20-39	26 (18)	19 (5)	24 (23)
40-59	63 (44)	44 (12)	58 (56)
60-80	11 (8)	37 (10)	18 (18)
Total	100 (70)	100 (27)	100 (97)

Table 2. Age distribution in years at Neurological Ambulatory (NA) and Endocrinological Ambulatorie (EA) and also the age total of these.

The main total respondents were in an age group of 40-59 years (58%). All percentages are rounded.

The main part of the respondents was found to be 40-59 years old (table 2). The overall age range varies from 20-80 years old across the ambulatories.

	NA	EA	Total
	%(n=110)	%(n=40)	%(n=150)
*Respondents	64 (70)	68 (27)	65 (97)
	%(n=97)	%(n=97)	%(n=97)
**Respondent distribution	72 (70)	28 (27)	100 (97)
	%(n=70)	%(n=27)	%(n=97)
Age median (range)	47 (20-71)	51 (23-80)	49 (20-80)
Male	50 (35)	41 (11)	47 (46)
Female	50 (35)	59 (16)	53 (51)

Table 1. Overview of respondents from Neurological Ambulatory (NA) and Endocrinological Ambulatory (EA).

Response rate, age and sex are represented. All percentages are rounded. * the response rate from each individually ambulatory and in total. ** Individually distribution of the respondents from NA and EA are present from the total number of respondents.

Since the questionnaire consisted of several parts, feedback obtained for each part is presented below.

Communication and information

Feedback on the first part of the questionnaire illustrates an insight on how outpatients' experience the received information regarding their medicine (Q1.2; appendix 1.1), as well as the quality of the information (Q1.3; appendix 1.1).

Table 3 summarizes different themes of information the outpatients received and the methods to receive the information. As it is indicated, most of the outpatients were informed about how to administer the drug (92%), while the least informed theme was the price, followed by discarding of drug residues. The rest of the themes is found in table 3 along with answers to what information the outpatients' would have liked to receive. It was also found that, the main part of the respondents received their information by a doctor or a nurse, which mostly was satisfied with.

	Provided information method			Desired information method			
	NA % (n)	EA % (n)	Total % (n)	NA % (n)	EA % (n)	Total % (n)	
Pamphlet	36 (25)	4 (1)	27 (26)	Pamphlet	9 (6)	4 (1)	7 (7)
Personal description	14 (10)	11 (3)	13 (13)	Personal description	4 (3)	19 (5)	8 (8)
By doctor	59 (41)	85 (23)	66 (64)	Minmedicn.dk	3 (2)	11 (3)	5 (5)
By nurse	77 (54)	30 (8)	64 (62)	Orally	7 (5)	19 (5)	10 (10)
Minmedicin.dk	0 (0)	0 (0)	0 (0)	Sessions	20 (14)	11 (3)	18 (17)
Other	6 (4)	4 (1)	5 (5)	Video	3 (2)	0 (0)	2 (2)
Non-respondents	0 (0)	0 (0)	0 (0)	Chat	6 (4)	0 (0)	4 (4)
				Other	44 (31)	52 (14)	46 (45)*
				Non-respondents	21 (15)	11 (3)	19 (18)

	Received information			Desired information			
	NA % (n)	EA % (n)	Total % (n)	NA % (n)	EA % (n)	Total % (n)	
Administration	91 (64)	93 (25)	92 (89)	Administration	3 (2)	4 (1)	3 (3)
Storage	60 (42)	41 (11)	55 (53)	Storage	7 (5)	4 (1)	6 (6)
Discarding	26 (18)	15 (4)	23 (22)	Discarding	6 (4)	11 (3)	7(7)
Side effects	77 (54)	48 (13)	69 (67)	Side effects	24 (17)	33 (9)	27 (26)
Price	10 (7)	11 (3)	10 (10)	Price	1 (1)	0 (0)	1 (1)
Effect	64 (45)	67 (18)	65 (63)	Effect	21 (15)	19 (5)	21 (20)
Other	4 (3)	4 (1)	4 (4)	Other	29 (20)	22 (6)	27 (26)**
Non-respondents	0 (0)	0 (0)	0 (0)	Non-respondents	27 (19)	33 (9)	29 (28)

Table 3. Overview of which and how the information was given to the outpatients at Neurological Ambulatory (NA) and Endocrinological Ambulatory (EA) and how they desired it.

The results are presented from the ambulatories individually and in total, as rounded percentages. The outpatients could choose more than one option for all four questions present in this table. *41/45 wrote that they were satisfied with the information method; ** 23/26 wrote that they were satisfied with the given information.

For quality of the information (Q1.3; appendix 1.1), data analysis presented in table 4 shows a total of 88% were either satisfied or strongly satisfied with the information that they received about their medication.

When looking at what information the outpatients received, it was suitable to see how the combination of information was given (table 5), since 3% of all participants received information about all six themes in the questionnaire.

Dispensing of medicine

In relation to delivery methods for PPs, 89% of the outpatients answered that they receive their medicine directly from HPN. When looking at the degree of satisfaction, 100% of the outpatients were either satisfied or strongly satisfied with the delivery method (table 4), and did not wish to change the applied method.

Combination of answers	NA % (n=70)	EA % (n=27)	Total % (n=97)
a+b+c+d+e+f	1 (1)	7 (2)	3 (3)
a+b+c+d+e	14 (10)	4 (1)	11 (11)
a+b+c+d	19 (13)	4 (1)	14 (14)
a+b+c	13 (9)	19 (5)	14 (14)
a+b+d	10 (7)	7 (2)	9 (9)
a+c	6 (4)	19 (5)	9 (9)

Table 5. The most common combinations of information given to outpatients at Neurological Ambulatory (NA) and Endocrinological Ambulatory (EA) regarding their medication.

The results are presented from the ambulatories individually and in total. All percentages are rounded. Combination of answers based on question 1.1; “What information did you receive about your medication?” Combinations consists of; a: Administration of drug; b: Side effects of drug; c: Effect of drugs; d: Storage of drug; e: Discarding of drug residues; f: Price of drug.

	Strongly dissatisfied % (n)	Dissatisfied % (n)	Neutral % (n)	Satisfied % (n)	Strongly satisfied % (n)
Q1.3*	0 (0)	1 (1)	11 (11)	48 (46)	40 (39)
Q2.2**	0 (0)	0 (0)	0 (0)	25 (24)	75 (73)
	Non-adherent % (n)	Poor % (n)	Neutral % (n)	Moderate % (n)	Good % (n)
Q3.1***	0 (0)	0 (0)	1 (1)	16 (16)	83 (80)

Table 4. Degree of satisfaction with information and delivery, and the patient adherence (n=97).

The results are present as the total respondents. There were no non-respondents. All percentages are rounded. *Q1.3 Degree of satisfaction with information; **Q2.2 Degree of satisfaction with delivery; ***Q3.1 Degree of adherence.

Patient adherence

As seen in table 4, most of the outpatients believed to have a good adherence (Q3.1; appendix 1.1). When the outpatients were asked about the level of doubt regarding how to take their medicine, 95% were not in doubt and knew how to take their medicine (Q3.2; appendix 1.1). When in doubt, 85% contacted either the doctor, nurse or HPN (Q3.3; appendix 1.1).

Discarding of drug residues

Forty percent of respondents had drug residues (table 6B). Regardless of having any drug residues, only 33 % of the outpatients knew what to do with the residues as seen in figure 3 (Q4.3; appendix 1.1). When they were asked about what they did with drug residues, 22 % indicated that they return

it at private pharmacies (Q4.1; appendix 1.1) as shown in figure 3.

The frequency of delivery was found to be widely different between the two ambulatories. 97% of outpatients from NA receive their medication monthly or more frequent, while 96% of the outpatients from EA receive their medication every other month or less, further details can be found in table 6A.

A.	NA % (n=70)	EA % (n=27)	Total % (n=97)
Weekly or every other week	1 (1)	0 (0)	1 (1)
Every 3th week	3 (2)	0 (0)	2 (2)
Monthly	93 (65)	0 (0)	67 (65)
Every 2 nd to 3th month	3 (2)	56 (15)	18 (17)
Every 4 th to 5 th month	0 (0)	22 (6)	6 (6)
Semiannually	0 (0)	7 (2)	2 (2)
Less than semiannually	0 (0)	11 (3)	3 (3)
B.	NA % (n=70)	EA % (n=27)	Total % (n=97)
Drug residues	34 (24)	56 (15)	40 (39)

Table 6. Frequency of medicine delivery and drug residues at Neurological Ambulatory (NA) and Endocrinological Ambulatory (EA), as well as the total respondents.

All percentages are rounded. A. The frequency of medicine delivery regardless of delivery method; B. Differences in amount of drug residues across the ambulatories, obtained from question 4.1 What do you do with medicine residues? and Q4.2 Why do you have drug residues?.

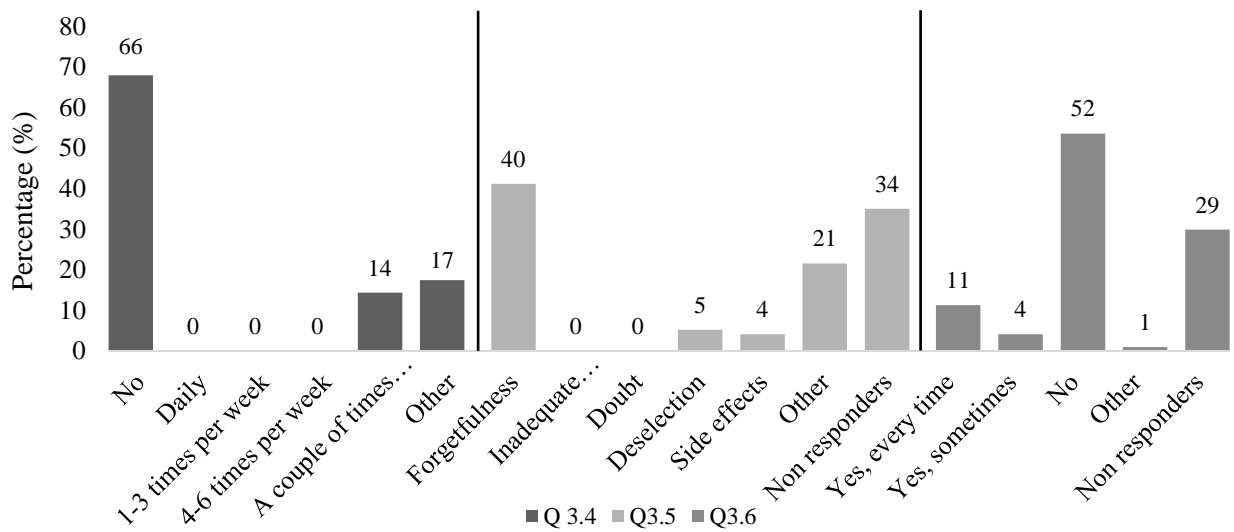


Figure 1. Questions regarding patient adherence.

Rounded percentage distribution of respondents across three questions; Q3.4 Do you ever not take your medication?; Q3.5 Why do you not take your medication?; Q3.6 Do you inform the healthcare staff if you do not take your medication?. The bars represent the percentages of respondents, while the numbers above is the number of respondents. For Q3.4 the entire part of the “other” respondents, answers that they forget their medication less than a couple of times per month.

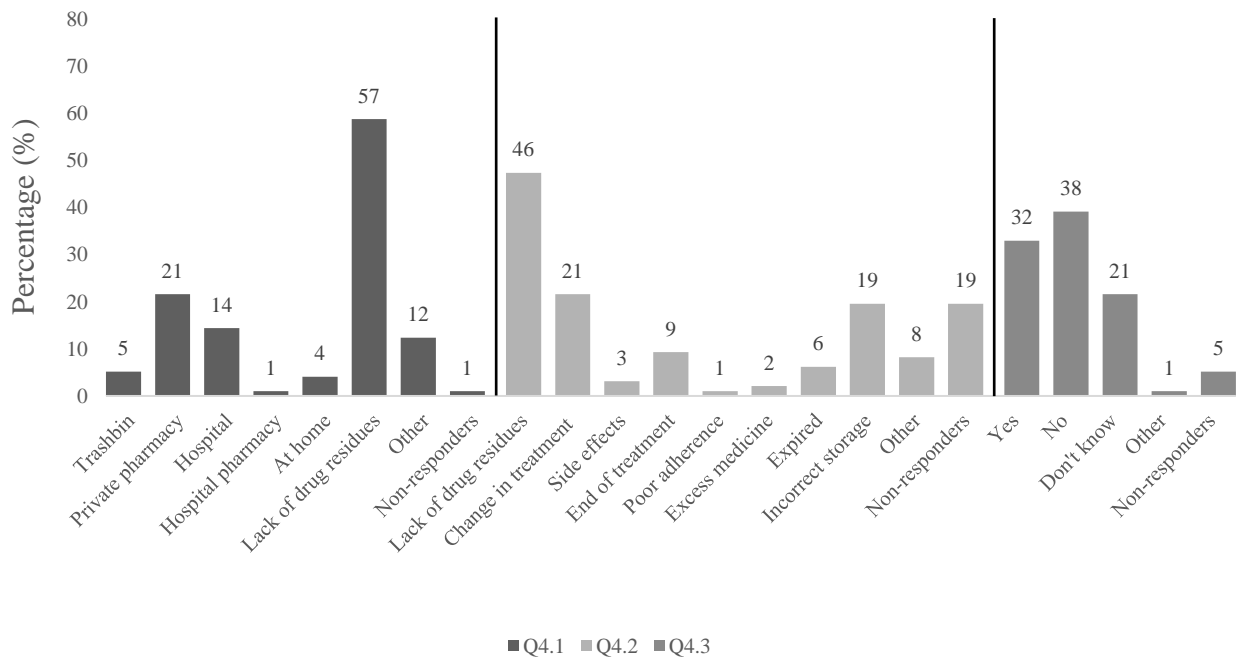


Figure 3. Questions regarding discarding of drug residues.

Rounded percentages distribution of respondents across three questions; Q4.1 What do you do with medicine residues?; Q4.2 Why do you have drug residues?; Q4.3 Have you received information regarding what to do with medicine residues? The bars represent the percentages while the numbers above is the number of respondents.

Discussion

This study was designed to identify outpatients' perspective on dispense of PPs, as well as tendencies in patient adherence. The analysis showed that outpatients from NA and EA was generally satisfied with information about their medicine, often provided by a doctor or a nurse. Also, they indicated that dispense of their medicine were satisfactory, even though the frequency of dispense was different between NA and EA. The respondents believed to have a moderate or good adherence, also none responded that they have ever been in doubt about intake of the medicine. 68% of the respondents did not have drug residues, but if they did it was often because of change in treatment.

Methodological considerations

The response rate of 65% presented a satisfactory rate in this study. The high response rate might have been due to the fact that a proper cover letter and clear design of the questionnaire were considered, which included Likert scales and also both open and closed questions. A higher response rate is proven when mailing the questionnaire in comparison with e-mailing^{12,13}, which were also the result in this study. By using a questionnaire, a larger population were reached, which were important to fulfil the aim of this study. Thus, a structured interview was considered, as this reduces the possibility of important information getting lost^{12,13}. However, this was prevented by an "other"-category in the end of all relevant questions. An uncontrollable weakness when using a questionnaire could be that the respondents' answers may be influenced by wishful thinking, misunderstandings or that another persons could have filled out the questionnaire.

Representativeness

Even though respondents from EA in total percentage count for less (28%) than NA respondents (72%), they still represent an equal amount of respondents from each ambulatory individually (68% and 64%). Also men and women in total and from each ambulatory were evenly distributed. This indicates that the respondents from each ambulatory

are representative in the final analysis. Although respondents from NA and EA had different experiences, they were overall satisfied, which is supported by their good patient adherence. Consequently, a generalization towards all outpatients at other ambulatories, who gets dispensed PPs from HPN at AUH is anticipated to be similar to the two consulted ambulatories.

Observed limitations

Limitations of this study include uneven age distribution among the two ambulatories and uneven percentage of participants who received the questionnaire from each ambulatory. Even though age distribution was a controllable factor when choosing participants, it was however, not controllable among the respondents. The percentage of participant could have been more equally distributed but due to economic reasons the number of participants from NA was not increased. With a low number of outpatients expedited a month from EA (80 outpatients) and an expected response rate of 50%, the number of participants from this ambulatory was not reduced, as this could result in lack of representation of respondents.

Throughout the questionnaire, some response categories as "Was satisfied", "Less than monthly" and "Do not fail to take medication" are missing. This supports the importance of the "other"-category present in the questionnaire, since a notable percentage of the respondents have answered the above-mentioned missing response categories in the "other"-category. As these particular questions also have a high number of non-respondents, it can only be assumed that the majority of the non-respondents were missing a proper response category.

Satisfaction with information effects adherence

The respondents showed a general satisfaction with the provided information about their medication. Reviews show that the provided information are positively associated with outpatients' satisfaction^{14,15}. Inadequate information could cause dissatisfaction among outpatients, which might influ-

ence their adherence and thereby future health status. Even though the respondents in this study were generally satisfied with information and dispense of PPs, a part of the respondents desired more information about side effects and effect of the drug. This is of course crucial information for the respondents' future well-being, as they have to be aware of and react to potential side effects. Also, it could be assumed that if the respondent knew the effect of the drug and its ability to improve health, an enhancement in patient adherence would happen quite automatically. This again shows that good adherence is not only patients' responsibility but also the responsibility of healthcare staff that provide the information. Furthermore, about 1/5 respondents wished for follow-up sessions with the doctor or nurse. In a national study from 2013¹⁶, non-adherent HIV-patients made use of coaching sessions. The intervention was seen as successful, if the patient attended in at least six sessions throughout 6-8 months. As a result, an improvement in adherence for the HIV-patients was proven¹⁶. This method could enhance outpatients' adherence but as the respondents in this study already had a good adherence, it would most likely be too expensive in both time and economics to use coaching session. However, the sessions could be arranged if an outpatient express that it is essential for oneself to fulfill adherence, or if non-adherent behavior is detected.

Patient involvement in treatment

Another possible solution to increase adherence could be by involving the patient in their own course of treatment. In Denmark, 77 million Danish kroner (10,353,358.79 euros) are devoted for this particular purpose in 2017¹. A review states that SDM between doctor and patient would provide the best care¹⁷. SDM might be a sufficient way to achieve the best possible involvement of patients. As previously mentioned, a national study by The Danish Knowledge Center for User Involvement in Health Care¹⁰ showed that SDM is a potential method to increase patient satisfaction and adherence¹⁰, and thereby apparently patient safety. It seems like it is of great interest among

healthcare staff in Denmark but it still needs further investigation¹⁰. For some patients, it might be safer to leave the decisions to the doctors and in these cases SDM should be avoided. Thus, a shared decision should always be made when allowing the doctor to make all decisions about the course of treatment.

Discard of drug residues

Besides effect and side effect of a drug, it is desirable that the respondents also know about drug storage and discarding of drug residues. Only about half of the respondents were told how to storage the medication, which could cause a problem with compromised medicine. Thereby, it becomes an economic burden to healthcare costs, which could have been avoided by sufficient information from healthcare staff. An effective method could be personal paper written descriptions.

Drug residues often exist when the respondent received a change in treatment. New medication should be trailed in a period of maximum 2 weeks before permanently dispensed¹⁸. It might be possible to overcome some of the problems by reducing the frequency of dispensed medicine, since 30% of the respondents get dispensed PPs every 2nd-3rd month or less. This solution is strengthened when investigating the two ambulatories separately where a possible correlation was found between frequency of dispensed medicine and lack of drug residues. Ninety-six percent of respondents from EA received dispensed PPs every 2nd-3rd month or less, while 97% from NA receive PPs monthly or more frequently. This observation could present a potential link between the amount of drug residues from each ambulatory, where EA has a percentage larger amount of drug residues than NA (56% vs. 34%). A more frequent dispense might minimize the drug residues. However, a report from Implement 2016, informed that a more frequent dispense from ambulatories would be too time consuming for both patient and healthcare staff¹⁸. Instead, a more frequent dispense could be HPN's responsibility, as outpatients have the opportunity to get medication delivered at their home address. As all of the personal information of the

recipients came from HPN, it was expected that all respondents generally get their dispensed PPs delivered from HPN. All respondents (100%) were satisfied with the dispenses of PPs, hence the above mentioned frequent dispense from HPN is sufficient.

Most of the respondents knew that drug residues should not be thrown in the bin or stored at home. If handed in at pharmacies and hospitals, an overview of drug residues could be an advantage to estimate economic waste. Afterwards, the problems that cause drug residues and economic waste can be addressed and partially avoided. It is understandable that drug residues cannot be fully eradicated, but some drug residues might be avoided concurrently with focus on more frequent dispense of PPs and knowledge about storage of the drugs.

Knowledge of price

A few of the respondents were informed of the price of the dispensed PPs. The benefit in providing information about price is that the outpatients might improve adherence due to a certain respect when receiving expensive medication. The disadvantage can be that the patient could develop a guilty conscience, which is unethical. That might either reduce or increase adherence to treatment¹⁸ which both affect patient health and Denmark healthcare cost in opposite directions. Instead, a possible solution could be a particular focus on price among the healthcare staff that dispense PPs, to make sure that they also understand the economic importance in providing the outpatients with the information needed to enhance adherence.

Patient adherence

All in all, only 14% of the respondents received information, regarding administration, effect, side effect, storage and discarding, which could be assumed to be the needed information to achieve a proper adherence. An international study from 2008 found that non-adherent outpatients are associated with higher health care cost compared with adherent outpatients¹⁹. However, the low amount of sufficiently informed respondents in this study

was not reflected when examining patient adherence, as 99% of the respondents was thought to have moderate or good adherence. The self-reported high patient adherence may be explained by the fact that the majority of respondents call healthcare staff if any questions about their medication should occur. Also, the majority of respondents were never in doubt on intake of their medicine, which is consistent with the majority who were told how to administer their medicine. Simply, they must feel well-informed about their medication. Still accidental non-adherence was observed in form of forgetfulness and furthermore, about 1/3 respondents failed to take their medicine a couple of times a month or less. Forgetfulness was also seen as the most common cause among outpatients with epilepsy, where 38% of the outpatients were seen as non-adherent²⁰.

For some outpatients too much information at the same time might be confusing, where coaching sessions with repeated information and personal descriptions may be a way to achieve proper adherence. Other outpatients only need the information ones to achieve the adherence. Some outpatients might wish to be involved when choosing the course of treatment, while others feel safer when leaving all decisions to the doctor. Patients might react different to the same type of provided information and information methods, which can end up with either good or poor adherence. All things considered, outpatients have to be individually assessed⁵ to achieve good doctor-patient communication and thereby a proper adherence to improve patients' health status.

In conclusion, findings from this study highlighted that the outpatient adherence was good, and that patient satisfaction was high when receiving dispensed PPs. Patient satisfaction is important, as this can reflect the scale of adherence. Satisfied patients can be seen, amongst other things, as a result of well-informed patients. A non-adherent behavior can cause decreased health for the patient and also increase in health care cost. Even though this study's findings showed a good doctor-patient communication and adherence, it could be preferred that healthcare staff provide outpatients with

further information about their medication. Different methods could be used depending on the patient's preferences, to avoid future problems with non-adherent behavior, as mentioned above.

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Conflict of interest

None declared.

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Recapitulation

This study managed to address some problematics in patient safety such as the lack of medicine registration and overview of patients' medication. However, this problem is to be overcome by implementing SMC and the instructions made in this study, at HPN homecare department. Patient safety was also addressed by examining outpatients' adherence and doctor-patient communication from patients' point of view. From patients' perspective, no problems were found as they were satisfied with doctor-patient communication and the delivery of PPs and also the self-reported adherence was moderate or good. Nevertheless, from this study's findings information about effects and side effects of medication were desired among ¼ of the respondents. This indicates that even though outpatients experience satisfying information, some improvements are still possible. This is furthermore confirmed, when investigating other studies, that propose greater patient involvement might lead to increased adherence. Greater patient involvement is also achieved when fully implementing SMC as patients also have access and thereby an overview of their own medication, including dosage. Both articles prepare the ground for further research in the fields of patient safety, as this study has shown some valuable points for discussion.