Assessing the medication information process within different departments of the UMCG: Exploring healthcare professionals' roles and patients' perspectives

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Content

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Abstract

Background: Medication information is essential for correct use of newly prescribed medication. As several healthcare professionals are involved in the medication information process, their roles need to be clear and the information needs to be in line with the patient's expectations and needs.

Aims and objectives: To identify what the current medication information process is in different departments of the University Medical Center Groningen (UMCG) whereby looking at who is giving which information about newly started medication to the patient and at what moments this occurs and also to assess what the perspective is of the patients and healthcare professionals towards the provided medication information.

Design: A qualitative study with semi-structured interviews among both healthcare professionals and patients.

Methods: The study was conducted in the neurology, pediatric surgery of the Beatrix Child clinic, gastro-intestinal liver diseases and the outpatient pharmacy clinic departments of the UMCG between April and June 2023. A semi-structured qualitative interview was conducted with ten healthcare professionals, 19 patients and two caregivers of these departments. After discharge, a follow-up interview was conducted. Four discharge rounds were observed at the outpatient pharmacy. Main outcomes were the characteristics of the study population, type of information given according to the professionals and patients and specifically the information on side effects, who was explaining this information, the barriers in the medication information process as perceived by professional and patients, the experience of the medication information process, improvement proposals, observations at the outpatient pharmacy during discharge consultations and the moments of receiving the information about the medication. All interviews were recorded, transcribed and coded. All participants provided informant consent for participating in this study.

Results: Healthcare professionals look at what information about the new medication can be shared per patient. The prescribers tell the basic things about the medication, such as the reason for prescribing, the effect and the frequency of intake. Insignificant side effects are often not mentioned by the prescribers, they believe that this is a task of the pharmacy. Nurses often summarize what the prescriber has said in easier words. The pharmacy technicians provide detailed medication information. In addition, there are no clear working agreements regarding who provides the medication information and when this happens. Healthcare professionals want clear working agreements about the medication information process. Patients often do not know which medication has been newly prescribed. They experienced the admission as impressive and stressful. The majority of patients also indicated that they had not received any information about possible side effects. Patients want to receive this information also on paper during admission.

Conclusion: Medication information can be improved, especially regarding information on side effects. Healthcare professionals should coordinate the process and determine who provides which information.

Keywords: Medication information process, qualitative research, perspective of the patient, perspective of the healthcare professional, hospital & knowledge level patient.

1. Introduction

Adhering to the medication regimen is important to reach optimal efficacy of the medication (Yang etl al., 2021). Non-adherence may be a consequence of medication self-management problems of the patient. The definition of medication self-management is the cognitive and physical skills of a person to administer the medication as prescribed (Badawoud et al., 2020). Medication self-management problems may contribute to medication non-adherence. Non-adherence is defined as the extent to which patients are not using their medication as prescribed (Hugtenberg et al., 2013). Medication non-adherence can occur at different stages of the medication self-management cycle. Patients can decide to not pick up their medication at the pharmacy so they do not start with their medication regimen. They can also pick up their medication and not start with it. After starting, patients may use another frequency per day of the medication or use it at the wrong time points. Non-adherence can be intentional where the patient does not follow the recommendations on purpose or it can be unintentional like forgetting to take the medication. Vanwesemael et al. (2017) showed that medication self-management is important to have satisfied patients, better medication adherence and better self-care. When the patient can manage their medication by themselves, Sorensen et al. (2020) showed that less medication errors occurred. According to Rathod et al. (2023) worsening of the medication self-management of patients is an important health problem. The prevalence of this problem ranges approximately from 11% to 90% in the world.

For optimal medication self-management, appropriate medication information needs to be provided. In the study by Jimmy et al (2011), it became clear that several barriers are present for patients to use their medication as intended. These were miscommunication between the provider and the patient, poor knowledge about the medication, not understanding the essence of the medication, fear of possible side effects, complex medication regimens and costs. Saqib (2018) et al identified additional barriers for adequate medication information and self-management, namely insufficient knowledge of healthcare professional, low health literacy of the patient and no engagement of the patient in the medication regimen. In the study by Parra et al. (2019) it was proven that insufficient medication information led to a negative impact on medication adherence. Hohmann et al (2014), showed that improving the medication information process, in this case the paper which patients will get about their medication, led to improvements in medication adherence. According to Hai et al (2020), a good relationship between healthcare professional and patient is essential and sufficient information needs to be given to the patient so that they can decide for themselves. The key to a successful medication treatment is the fact that the patient has sufficient knowledge about the medication (Saqib et al. 2018).

Hospitalized patients are often prescribed new medication. It is the task of the healthcare professional to provide information to the patient about this newly started medication. Several aspects of the medication should be discussed such as the reason for prescribing, the effect of the medication, the frequency of intake, the use, the drug-drug interactions and the side effects. According to the Patiëntenfederatie Nederland (2023) various care providers are authorized to provide medication information, such as the doctor who prescribes the medication, the pharmacist, the pharmacy technician and the (specialised) nurse.

At the moment it is unclear who is providing which medication information to the hospitalized patient within the UMCG. In addition, it is unknown what the patient's perspective is regarding the medication information: how do they experience the present medication information and what do they expect of it?

Research question
The following research question was answered by conducting this study: *"What is the role of the individual healthcare professionals in the medication information process and what are the patients'*

perspectives regarding this process?" Specific attention was given to information on side effects, as this item was scored relatively low in previous patient questionnaires.

Subquestions
In order to have a well-answered research question, sub-questions have also been formulated:
1. Who is providing the medication information about the new medication, and at which timepoint(s) during hospital admission and discharge?
2. Which information is provided on medication? Does this include information on side effects?
3. Which barriers and facilitators do healthcare professionals experience when it comes to providing information about new medication to hospitalized patients?
4. What are the needs of healthcare professionals to improve the process of medication information of hospitalized patients?
5. Is the patient information about new medication by different healthcare professionals congruent during admission and discharge from the patient's perspective?
6. Do the patients report to receive information on side effects?
7. Which barriers and facilitators do patients experience in receiving medication information?
8. What could be improved in the medication information (process) from the patient's perspective?

2. Methods

2.1 Study design and setting
A qualitative study was performed using interviews with healthcare professionals and patients. The study was conducted from April to June 2023 within the University Medical Center Groningen (UMCG), in the departments of neurology, gastro-intestinal and liver diseases, pediatric surgery and the outpatient pharmacy.

2.2 Study population
The study population consisted of both the health care professionals who provide information about newly started medication and the patients admitted to the study departments. For the healthcare professional interviews (specialized) nurses, physician assistants, doctors (from the study departments) and pharmacy technicians (from the outpatient pharmacy) were included. A healthcare professional was excluded when they cannot answer the question in Dutch or English.

Inclusion criteria of patient were age 18-65 years, and new medication started during admission. Patients who, in the opinion of the nurse, were not able to participate in the interview were excluded. This may concern patients with, for example a severe intellectual disability and dementia.

2.3 Study procedures
First, all departments were informed about the study and the interviews by e-mail or during a meeting. The researcher, a third-year bachelor's pharmacy student at the University of Groningen, handed out flyers containing information about the interview to the hospitalized patients. The information in the flyer is written at the B1 language level. The questions which were asked to the patient were also on B1 level. The title of the flyer is "6 question to you" (in Dutch "6 vragen aan u") and it was distributed to patients in Dutch and English. The flyer also contained a QR code leading to a translation app, which the patient can apply to translate the flyer into another language. At this visit to the patient, the consent form was also provided (appendix 7.11). After consent, the patient was interviewed. During the first interview, the patient was informed that he or she would be called by telephone approximately three days after discharge to conduct the follow-up interview. In the follow-up interview the patient was asked again whether new medication was started. When no medication was started, the patient was asked whether he or she received additional information

during discharge about their medication which was already started during admission. This follow-up interview was done to investigate whether medication information was given during discharge and what their experience was with the discharge process. The responsible nurse was contacted daily to ask whether patients had been discharged already.

In the context of this research, extra interview data of the healthcare professionals is added which was conducted by two HBO nursing students. These interviews were done at the neurology and gastrointestinal liver disease departments. In total, eight nurses and three physicians were interviewed by these students. They were unable to include enough healthcare professionals. All the healthcare professionals who were interviewed were working for at least six months at the department. Healthcare professional were selected for the interviews in consultation with the department. Informed consent was obtained and subsequently, appointments were made via e-mail.

When the admitted patient went home, the discharge mediation was brought to the patient by the outpatient pharmacy and medication information is provided. The outpatient pharmacy receives the prescriptions from the doctor or the nurse specialist. Then one of the technicians calls the ward and asks when the patient will be discharged. Based on this, the discharge medication is dispensed. There are three rounds in which discharge medication is distributed per day, at 11:00 AM, at 2:00 PM and at 4:00 PM. The researcher observed a full day and an extra round of the discharge visits of the outpatient pharmacy.

Semi-structured interviews with the healthcare professionals and patients were performed. See appendix 7.2 for the topic list. The questions of both groups were open-ended. The interview with the patient took approximately ten minutes. The interviews with the healthcare professional took approximately thirty minutes.

2.4 Main outcomes
Main outcomes were the characteristics of the study population, type of information which was given according to the professionals and patients and specifically the information on side effects, who was explaining the medication information, the barriers in providing medication information and receiving that information, the experience with the medication information process of professionals and patients, improvement proposals, observations at the outpatient pharmacy during discharge consultations and the moments the patient received information about medication.

2.5 Data collection
All interviews were audio recorded using a telephone recording program (Tascam) after approval of the patient or healthcare professional. The following general characteristics of healthcare professionals were collected: age, sex and profession. For patients the following general characteristics were collected: age, sex and department. These general characteristics were collected in Excel (appendix 7.4 & 7.5).

2.6 Sample size
Interviews with ten different healthcare professionals were conducted. In total 19 patients were interviewed and at the pediatric surgery, two caregivers were included. In the results, the obtained data of the HBO students are included. During the observations at the outpatient pharmacy, 15 discharge consultations were observed with patients and caregivers.

2.7 Data analysis
The interviews were transcribed verbatim to F4 transkript version 7.0.6 (aXiomatic GmbH, Marburg, Germany). The answers were then coded according to the question asked via Atlas.ti version 5.3.2

(Scientific Software Development GmbH, Madrid, Spain). The main topics have a general code which were then subdivided into subcodes (appendix 7.6). Descriptive statistics was used to analyse the general characteristics of the included healthcare professionals and patients.

2.8 Ethical considerations
All patients and healthcare professionals provided informed consent for participating in the interviews. The interviews were anonymously analyzed by coding the patient or healthcare professional.

3. Results

3.1 Characteristics of the study population
For this study, the healthcare professionals, patients and caregivers were interviewed. Table 1 shows the general characteristics of the study population.

Table 1: The characteristics like age, sex, profession and follow-up of the healthcare professionals, patients and caregivers at the outpatient pharmacy, neurology department, pediatric surgery department and gastro-intestinal and liver disease department.

	Healthcare professionals (n=10)	Patients (n=19)	Caregivers (n=2)
Mean age ± Standard Deviation	35,6 (10,6)	55,3 (17,05)	25,5 (0,5)
Sex, male (n,%)	2 (20%)	12 (63%)	1 (50%)
Department (n,%)			
- **Neurology**	3 (30%)	9 (47%)	
- **Pediatric surgery**	4 (40%)		2 (100%)
- **Gastrointestinal liver disease**	-	10 (53%)	
- **Outpatient pharmacy**	3 (30%)		
Profession (n, %)		-	-
- **Resident**	1 (10%)		
- **Nurse specialist**	2 (20%)		
- **Physician assistant**	1 (10%)		
- **Nurse**	3 (30%)		
- **Pharmacy technician**	3 (30%)		
Follow-up interviews (n,%)	-	6 (32%)	1 (50%)

3.2 Healthcare professionals

3.2.1 Type of medication information given by different professionals
During the day, medication is prescribed to the patient by the doctor, nurse specialist and the physician assistant. They all indicated that when they prescribe it, they also inform the patient. They then tell which medication the patient is receiving and the reason. This is linked to the patient's clinical picture. They also tell how often the patient receives the medication. When the prescribed medication has unpleasant side effects, the patient will be informed about this by the prescriber. However, due to the time pressure, naming and explaining the side effects is unconsciously forgotten. When the patient goes home, the prescriber briefly explains the medication. The nurses of

the pediatric surgery department mentioned that only the most important information is told to the caregiver and that they add in simpler language which medication has been prescribed. The nurses are also training the caregivers in administering the medication to the child. The pharmacy technicians are closely involved in providing information about the new medication to the patient.

"Well, what I mainly tell is why we give the medication and how often the patient have to take them" (Resident, #5)."

3.2.2 Does the provided medication information include side effects?

When medications have important side effects which are common and can bother patients, they are told by the prescriber. When prescribing anticoagulants, one of the nurse specialists mentioned that the side effects are often not told, because they assume that the patient already knows that you can bleed and bruise more easily. Almost all healthcare professionals are critical about mentioning side effects to the patient, if the patient is too sick or has problems understanding information, side effects are not told or less emphasized. They are afraid that it can create unnecessary anxiety among patients and caregivers. The resident indicated that it is difficult to explain to a patient that side effects do not always have to occur. If a patient knows what side effects the medication can have, compliance to the medication can get into trouble according to the resident. Often when children are given vitamins they have red dots in the stool, this is often told to the caregivers by the nurses, because otherwise they may think it is blood. Side effects are considered as troublesome by the pharmacy technicians. They find it hard to make the distinction whether or not the side effects mentioned by the patient are medication related. If a patient goes home for palliative care, most of the times the side effects are not discussed by the technicians. Pharmacy technicians note that patients are often very impressed by the admission. Because of the fact that the information folder mentions the side effects, less emphasis is placed on them during the conversation by the technician.

"I also often say to people 'you have been here for a week now, if you experience side effects from that medication, you should already feel them', and then I ask 'is that the case, do you suffer from certain side effects', if nothing else comes out then I say well then, I do not expect you to get side effects at home either, then I will not go through all the side effects of all those new medicines. So, I usually do that in that way and then with, the information folder, if you still think of well hey something bothers me, then it is very nice to read back here, because they cannot remember everything anyway, so I choose indeed often for the most important things." (Pharmacy technician #3)

3.2.3 Who is telling side effects?

All the prescribers mentioned that it is the responsibility of the prescriber to inform the patient that he or she should use the medication despite the side effects. They think that pharmacy technicians know more about the side effects than they do, so that the responsibility for identifying side effects lies largely with the pharmacy. Nurses indicated that they only tell the most important side effects which the patient or caregiver can observe. Suppose the patient finds the side effects very annoying, then it is the prescriber's job to look for an alternative according to the pharmacy technicians. The technicians stated that the information about how the medication should be used, the reason, dosage and whether there is a reduction schedule, is the responsibility of the technician to explain.

"But I think sometimes the pharmacy technicians know that even better than I do. They work with it on a daily basis, they know much better what interactions there are, which side effects are often seen and how you can prevent these, they are even more specialized in this than me, while I do need to know a bit about the basics, but I have to look it up again too". (Nurse specialist #4)

3.2.4 Barriers to providing medication information

Almost all healthcare professionals are taking the knowledge level of the patient into account when providing medication information. Cognitive and language problems play a major role. When there are problems in understanding the information, the prescribers for example only mention that the

medication serves to prevent a new cerebral infarction and the dosage is explained. There is no point in telling more according to the prescribers. However, in patients or caregivers who can understand a little more, everything is told, including possible side effects by the prescriber. Nurses take also into account when caregivers are illiterate, deaf, blind or cannot speak Dutch or the English language. Pharmacy technicians and prescribers mentioned that it depends on how important the information on side effects or any restriction is. When the patient goes to a nursing home, the pharmacy technicians will not give any information about the medication. If patients have never taken medication before and they suddenly have to start taking it in the hospital, they or the caregivers are often curious or the caregivers about what they are going to take and what the effect is according to the pharmacy technicians. Then more information is given by the healthcare professionals. Pharmacy technicians observe that when patients already have a whole list of medication, less information is given to them.

"Look if I have patients, a patient with aphasia who does not understand at all what we explain to him, then I will not do that either. That makes no sense, a waste of my time and that also causes a lot of frustration with someone, they are trying to tell me something, but I do not understand that and uhm it also depends on what we prescribe I must say." (Nurse specialist #4).

3.2.5 Experience with the medication information process
All healthcare professionals mention that there is no clear guideline for the medication information process. It still remains vague what is expected of whom in this process. In general, the prescriber estimates what information is needed by the patient and in which way. It is actually assumed from the nurse specialists of the neurology department that additional information is provided by the nurse, but the prescriber receives no feedback on this. Nurses indicated that the training of caregivers with administering the medication starts too late. The pharmacy technicians find it difficult to estimate whether the patient understands the information which is told. In addition, technicians often feel that the patient is not open to receive information. The priority of the technician is then on the use, dosage and why it is prescribed. Technicians find it inconvenient if a patient or caregiver is not present in the room and that they then have to provide the information by telephone at a later time. It sometimes takes a long time before the caregivers are called back.

"Yes, ideally, whoever should do it, first of all clarity who does what. That is point one, whether it is with the prescriber or the pharmacy, that does not even matter that much to me. But that we are clear about who does what, and that there is also time and space for that." (Nurse specialist #4)

3.2.6 Improvement proposals from healthcare professionals
The healthcare professionals state that it is difficult to structurally change the current process regarding the information about newly started medication, because the information provided to the patient is tailor-made. On the other hand, it is also mentioned by the resident of the neurology department that more information about the side effects could be given. Also, consulting the apotheek.nl website for additional information could be more frequently advised. The resident mentioned that the prescribers can have a better preparation about the medication before the patient visit. The main obstacle for each professional to provide good and clear information to the patient is the lack of time. All prescribers indicate that it is almost impossible to send the discharge prescription to the outpatient pharmacy 24 hours in advance.

The nurses also like to follow extra training to give medication information. Especially the nurses of pediatric department indicated that written information about medication is important and they recommend to have a checklist in the hospital system about the topics which are already told to the patient about the medication. This needs to be accessible to every healthcare professional. Other healthcare professionals liked this idea as well. According to the prescribers, it would be nice if they could indicate in this checklist also when a patient needs extra explanation from the pharmacy. The nurse specialist of the neurology department prefers the idea that the pharmacy technician then

gives the explanation to the patient in a separate room when the patient is being discharged. Contrary to the pediatric ward, the nurses and nurse specialist prefer that the pharmacy technician gives explanation during the admission already. The pharmacy technicians do not like it when prescriptions are sent last minute for discharge. All healthcare professionals object to the thick information leaflets, especially the pharmacy technicians. The pharmacy technicians indicate that they would like to receive extra training in handling side effects.

"I do not know what they are supposed to say in the department. And what they already know, but if that could be more coordinated that might be nice. And just that everyone does what he has to do. That everyone knows about this I have to say and that I have to say. And do not assume anyone (patient) already knows". (Pharmacy technician #3)

3.2.7 Outpatient pharmacy: discharge process

When the pharmacy technician entered the room, the name of the patient is asked and they immediately started with explaining information. It regularly occurred that the patient was not present. The medication was then given to the nurse and they would deliver it to the patient and give the explanation. However, in the majority of observations, the patient was already waiting.

The important things like what the medication is, how it works, what the dosage is and for how long they need to take it was explained to all the patients. In most cases, the patient was only listening and did not participate in the conversation. In general, the side effects of the new medication were told briefly, the side effects of the medication which was already started were not discussed anymore. There was variation between pharmacy technician regarding the information provided. Table 8 in appendix 7.8 shows all observed discharge consultations

3.3 Perspective of the patient

3.3.1 Type of received medication information

Patients indicated they were unaware that they were receiving newly prescribed medication during admission. They indicated that they were very ill when they entered the hospital. Other patients only knew that it was an antibiotic and nothing else had been said about it. A few patients indicated that the prescriber or the nurse explained some things, but that they probably forgot it. Some patients were unable to tell during the follow-up interview who exactly had visited for the discharge consultation. All patients indicated that they have not received any additional information about the medication during discharge. In one of the neurological patients, almost nothing was said about the new medication during the admission or discharge.

"Well, I worked in healthcare years ago, I graduated as a nurse once, I did not do much with that, but I know what it is. Anyway, this lady who was just here, I think she sometimes mentioned that it is an anticoagulant, but they do not say more than that." (Patient interview #10)

3.3.2 Moment of receiving information

Most of the patients explained that they received explanation during admission about new medication in the ambulance and in the emergency room. Most of the neurology patients indicated that they remembered that someone came by to explain things about the medication, but that they no longer remember exactly what was said. In the gastro-intestinal liver department, the vast majority of patients can tell this very well. Almost none of the patients remembered the name of the medication. They could only tell what the medication is used for and the reason for prescribing. Most of the patients also knew the frequency of receiving the medication throughout the day. During the discharge consultation, in almost all patients nothing was said about the medication.

3.3.3 Receiving information on side effects

Only a few patients knew the potential side effects of the medication. These were mostly the patients in the gastrointestinal liver diseases department. One of the patients had a rash on the skin, the nurse was asked about this. The nurse then made clear that skin rashes are a side effect of the antibiotics the patient received. If patients themselves asked about the side effects, the nurse would tell them a few things. Patients also mentioned that at the emergency department, nothing was said about the side effects. In the patients who did receive information about the side effects during their admission, this was done briefly. A few patients actually knew that side effects are something difficult, because they pointed out that they often have other side effects than what the information leaflet stated. The majority of the patients emphasized that they want to be informed about the most common side effects they could experience but they did not like the information leaflets from the pharmacy which are not being read by a large number of the patients. They prefer to receive information about the side effects at the start of their medication regimen. During discharge, it is too hectic. What was also remarkable was that in one of the patients, new medication was started during admission of which the side effects were clearly explained. The patient was also able to mention these side effects. The same patient was then called back after discharge: the patient said that no information was given about the side effects at all. In almost none of the patients, the side effects of the medication were emphasized during discharge.

"Well not explicitly but at one point, one of the nurses saw that I had some spots on my skin and then she said 'Oh, that is a side effect of the antibiotic'. If she had not said I, then I would have thought at home like 'Oh what do I have!'." (Patient interview #9)

3.3.4 Barriers in the current process

Almost all patients mentioned that they were not satisfied with the amount of information they are currently receiving during admission and discharge. They would like to know the most common side effects. A few indicated that mentioning the side effects is not necessary, because everything is on the internet anyway. Some patients were also a bit confused by the fact that when they pick up medication at the pharmacy, they receive an information leaflet however no leaflet is given during their admission in the hospital. Some patients preferably do not want to know the side effects that are stated in the information leaflet of the medication, because they are afraid of it. According to one of the caregivers, it is important in the pediatric ward that sufficient attention is paid to side effects. The healthcare professionals should not assume that parents know it already, also with regard to pain relief medication.

"Well, every now and then I have very small things that are not really worth mentioning. But I do not know if that could be because of the medicines. And if it does, then it is good to know. Because those are things that I otherwise never have." (Patient interview #2).

3.3.5 Improvement proposals from patients

Patients have the preference for verbal medication information, because they can respond to it and interact with the information provider. In addition, they want to receive information but this should not be as long as the leaflets of the pharmacy. In general, patients found the discharge procedure well organized.

4. Discussion

The most important information like the use, reason of prescribing, the effect of the medication and the frequency are almost always told by the healthcare professionals. Whether or not explaining side effects is a difficult topic for all of the healthcare professionals. The pharmacy technicians are giving more information about side effects compared to other healthcare professionals. The priority of all healthcare professionals in terms of improving the medication information process is to make clear who is doing what at what time. Patient could not always remember the medication information provided, but in general perceived that they received the basic information on newly started medication. Information on side effect could be improved. They preferred to receive verbal medication information, in combination with information on paper.

4.1 Forgetting information

Forgetfulness of the patient about their medication is very common when looking at the conducted interviews. A lot of times when the medication was brought by the pharmacy technician, the patients were not aware of the new medication. The prescribers and the pharmacy technicians tell the most important information first, such as the effect and how often the medicine should be used. Which is in fact logical when looking at the literature. Patients only remember a small part from this explanation. Which is also proven in the study of Roy (2003) where patients forgot 80% of the information which was provided by the healthcare professional. Roter et al. (1989) demonstrated that only 50% of the patients remembered what was told by healthcare professionals about their medication. When patients were asked to explain again what their physician told them, 47% of the patients did not respond correctly (Schillinger, 2003). In another study by Jimmy and Jose (2011) it was observed that medical information given by the physician is forgotten in 40 to 80% of the patients right after the consultation. What they do remember, is for almost half not reliable. This is also proven in study by Hargis et al (2016), where it became clear that patients often misremember the specific details about the medication when the newly received knowledge interferes with the prior knowledge. Patients also mentioned that no additional information was given about their medication during the discharge process. In the study done by O'leary et al. (2010) it became clear that the healthcare professionals overestimated the patient's understanding during discharge. In a study done in the United States, 47 patients were questioned about their discharge. Less than 50% of the participants were actually able to recall medication information, such as name, purpose, diagnose and side effect (Makaryus et al., 2005). It was even observed that 72.1% of the patients could not recall the name of their medication. However, they could explain how the medication worked. Patients knew more about the working of their medication than about the side effects. The results of the study of Makaryus et al., (2005) are in line with the results found in the conducted interviews.

The healthcare professionals focused more on the use, effect and the frequency of the medication instead of the side effects. Which is not surprising when looking at the study of Castel et al. (2008) where it was seen that when information was deemed important, the patient remembered this information correctly. When healthcare professionals do not specify that side effects are important, patients will simply forget them.

4.2 Verbal and written information

In the study done by Rameshkumar et al (2022), written information in the preferred language of the patient was compared to verbal information. This study shows that the patient's medication knowledge improves considerably when the information is given verbally as well as in writing. A large improvement in knowledge was also seen in patients who received written information compared to

the patients who received verbal information. In the study of Blinder et al. (2001) written information was tested with antibiotics, it became clear that written information was better remembered by the patient which has led to an improved medication adherence.

4.3 Tailored information

Several healthcare professionals mentioned that the conversation about medication is always tailored towards the patient. In the study by Wells (2012) the concept of "contextualized informed consent" was introduced. The healthcare professional considers the side effects which can occur, the patient's condition and the diagnosis and then makes a plan of the content of the explanation. While the concept of contextualized informed consent is already partially implemented by healthcare professionals in the UMCG and demonstrates positive aspects, there is still potential for further improvement.

From research by Silvestri et al. (2003) it is proven that when information on a detailed level is given about possible side effects of a medication, more side effects can occur than when the patient got tailored information on side effects. Mondaine et al. (2007) showed that patients who were informed about the sexual side effects of finasteride, indicated three times more sexual side effects than patients who were not aware of these side effects. In addition, the word choice of the healthcare professional during such consultation is of influence. Lang et al. (2005) observed that when patients heard the term "pain" in the explanation of the healthcare professional, they felt more pain than when patients hear the term "cool sensation".

4.4 Strengths and limitations of the study

Strength of the study is the inclusion of both healthcare professionals and patients, which provides insight into both their perspectives. In addition, the inclusion of several departments makes the results more generalizable. Despite the inclusion criterion of age 18 to 65 years, patients who were older than 65 years were included and the caregivers of the children as well. If these patients were excluded from the study, not enough patients would have participated. It would also have been better if there was more variation in age category. The researcher only observed the discharge consultations at the outpatient pharmacy. It would have been better if the medication information consultations at the different departments were also observed.

4.5 Implications for future research

Future studies should include multiple departments from different hospitals. Besides using interview, these studies should use direct observation of healthcare professionals providing medication information. Finally, future studies should look into the effect of improvements in the medication information process.

4.6 Implications for practice

During the discharge rounds, most of the patients only listened to the explanation without interacting with the pharmacy technician. It was overwhelming for the patient, because some patients were old and no relatives were present during this conversation. Sometimes at least four boxes were explained, whereby some medications had important information. The patients then suffered from cognitive overload. It was not checked whether the patient had understood all the information. The medication information awareness by the patient can be improved by implementing the Teach Back Method (TBM) by the technician. The information which is most important, needs to be explained at the start. Then the technician needs to ask the patient to tell in his or her own words what was just told. This question can be asked like this: "I am wondering if I explained the things clearly to you, can you explain to me how you would take the medication at home?"

To keep track of this medication information process, there must be a checklist called "MedVoorlicht" in the hospital system that deals with the newly started medication during admission and discharge. It should be accessible by every healthcare professional. In the appendix 7.9 figure 3 a concept version for this has been made. Finally, written medication information should not only be given at discharge but also during admission, and the amount of written information at discharge should be reduced. A concept of this flyer is included in the appendix 7.10 figure 4.

5. Conclusion

In conclusion, the residents, nurse specialists and pharmacy technicians emphasize during the medication information the reason for prescribing, the effect of the medication and the frequency of intake. Only the most important side effects are explained. The nurses add in simpler language the basic information about the medication. All the healthcare professionals want clear working agreements about the medication information process. Patients did not receive enough information and this was especially the case regarding side effects. They prefer to get the medication information also on paper.

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7. Appendix: additional information

7.1 Patient interview

Figure 1: Flyer which will be given to the hospitalized patients during their admission including a QR code which the patient can scan with their smartphone to translate the content to their preferred language (Dutch version).

Figure 2: Flyer which will be given to the hospitalized patients during their admission including a QR code which the patient can scan with their smartphone to translate the content to their preferred language (English version).

The questions which will be asked during the admission in the hospital (Dutch version), aan het bed:
- Wat is u verteld over de nieuwe medicatie die u in het ziekenhuis krijgt?
- Op welke momenten wordt hier met u over gesproken en wie was daarbij aanwezig?
- Wat is u verteld over de werking van de nieuwe medicijnen (weet u waarvoor het gegeven wordt?)
- Is u verteld welke klachten u ervan kunt krijgen of waar u op moet letten?
- Wat zou u willen weten over de klachten die u ervan kunt krijgen?
- Op welke manier zou u hier informatie over willen ontvangen:
• 	Mondelinge uitleg (wilt u dat dit u verteld wordt)
• 	Schriftelijk (wilt u het op papier)
• 	Wilt u zelf informatie op kunnen zoeken?

The questions which will be asked during the admission in the hospital (English version):
- What have you been told about the new medication you receive in the hospital?
- At what times is this discussed with you and who was present?
- What have you been told about how the new medicines work (do you know what they are for?)
- Have you been told what complaints you can get from it or what you should watch out for?
- What would you like to know about the complaints you can get from it?
- How would you like to receive information about this:
• Oral explanation (do you want to be told this)
• Written (do you want it on paper)
• Do you want to be able to look up information yourself?

The questions which will be asked after discharge from the hospital within three working days via telephone (Dutch version):
- De patiënt opbellen en toelichten wat de focus van de vragen is. Aan de patiënt wordt vermeld dat er tijdens de opname ook vragen zijn gesteld. Deze vragen gaan over nieuwe medicijnen die gestart zijn toen de patiënt naar huis ging.

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- Zijn er bij uw ontslag nieuwe medicijnen gestart? Zo niet, dan hoeven de volgende vragen niet gesteld te worden.
- Heeft iemand u (duidelijk) uitleg gegeven over de werking van de medicijnen en waar u last van kunt krijgen?
- Hoe heeft u informatie gekregen: mondeling of ook schriftelijk?
- Wie heeft deze uitleg aan u gegeven? Dit kunnen meerdere personen zijn.
- Wat is er verteld?
- Was dit duidelijk voor u?
- Waar zou u over geïnformeerd willen worden bij klachten en wat zou voor u het meest geschikte moment daarvoor zijn (een familielid erbij bijvoorbeeld)?

The questions which will be asked after discharge from the hospital within three working days via telephone (English version):
- Call the patient and explain the focus of the questions. The patient is informed that questions were also asked during the admission. These questions are about new medications that were started when the patient went home.
- Were any new medicines started when you were discharged? If not, the following questions do not need to be asked.
- Has someone given you a (clear) explanation about how the medicines work and what you may experience problems with?
- How did you receive information: orally or also on paper?
- Who gave this explanation to you? This can be several people.
- What was told?
- Was this clear to you?
- What would you like to be informed about in case of complaints and what would be the most suitable time for you (in the presence of a family member, for example)?

7.2 Healthcare professional interview including the topic list

The researcher will introduce themselves first, they will mention that the interview will be recorded and how long the interview till take place.

Table 2: Topic list for the interview with the healthcare professional (Dutch version)

Onderwerpen	Sub-onderwerpen
Inleiding op het onderzoek en achtergrond van het onderzoek	- Doel van het onderzoek (zie script)
Persoonlijke gegevens	- Wat is uw achtergrond qua studie? - Hoe lang bent u al werkzaam in het UMCG? - In welke mate heeft u contact met de patiënt? - In welke mate bent u betrokken bij het verstrekken van informatie over medicatie aan patiënten?
Medicatie-informatie proces	Verloop proces: - Wie geeft medicatie informatie en wanneer wordt deze informatie gegeven? Vindt dit op meerdere momenten plaats? Nadrukkelijk uitvragen informatie bij nieuw te starten middelen tijdens opnemen bij ontslag - Wie is er allemaal bij dit proces betrokken? - Wie is er verantwoordelijk voor welk deel van het informatieproces? (Wie is de eigenaar?)

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	-welke afwegingen maakt u bij het geven van medicatie informatie (en ook bijwerkingen)? Garantie informatie: - Welke bronnen gebruikt u voor het geven van informatie? - Hoe garandeert u dat u op de hoogte bent van alle informatie rondom de medicatie?
Ervaringen van zorgprofessionals met huidige medicatie-informatie proces	- Wat is uw ervaring met het huidige proces? - Wat gaat goed in het huidige proces van medicatie informatie?
Knelpunten in het huidige proces	- Komt het wel eens voor dat er tegenstrijdige informatie wordt gegeven in het medicatie-informatie proces tussen verschillende zorgverleners? - Komt het wel eens voor dat er bij een patiënt bijwerkingen optreden waarvan u nog niks vanaf wist? Had de patiënt in zo'n geval beter voorgelicht kunnen worden?
Verbetervoorstellen zorgprofessionals	- Kan het proces m.b.t. medicatie-informatie naar uw idee verbeterd worden? Zo ja, hoe?
Behoeftes zorgprofessional	- Hoe ziet het ideale medicatie-informatie proces er voor u uit? - Hoe zou volgens u dit proces kunnen worden veranderd om dit te bereiken
Betrekking zorgverleners bij het verbeterproces	- Wat ligt er binnen uw mogelijkheden om deze ideale situatie te bereiken? - In hoeverre zou u betrokken willen worden in het veranderen van dit proces? (voorbeelden noemen) - Waar zou het proces als eerste moeten worden aangepast (prioriteiten)?
Afronding	- Eventuele vragen geïnterviewde.

Table 3: Topic list for the interview with the healthcare professionals (English version)

Main topic	Sub-topics
Introduction to the research and background of the research	- Aim of the research
Personal information	- What is your background in terms of studies? - How long have you been working at the UMCG? - How long have you been working/involved in the specific department? - To what extent do you have contact with the patient? - To what extent are you involved in providing information about medication to patients?
Medicatie-information process	Progress process:

	- Who provides medication information and when is this information provided? Does this happen at multiple times? Explicitly request information for new resources to be started during admission upon discharge - Who all is involved in this process? - Who is responsible for which part of the information process? (Who is the owner?) -what considerations do you make when providing medication information (and also side effects)? Reliability of provided information: - Which sources do you use to provide information? - How do you guarantee that you are aware of all information about the medication?
Experiences of healthcare professionals with current medication information process	- What is your experience with the current process? - What is going well in the current process of medication information?
Barriers in the current process	- Does it sometimes happen that conflicting information is provided in the medication information process between different healthcare providers? - Does it ever happen that a patient has side effects that you didn't know about? Could the patient have been better informed in such a case?
Improvement proposals for healthcare professionals	- Can the process regarding medication information be improved in your opinion? If so, how?
Needs of the healthcare professional	- What does the ideal medication information process look like for you? - How do you think this process could be changed to achieve this
Involvement of care providers in the improvement process	- What is within your possibilities to achieve this ideal situation? - To what extent would you like to be involved in changing this process? (cite examples) - Where should the process be adjusted first (priorities)?
Ending	Any remaining questions of the interviewee

7.3 Planning

Table 4: Timetable for conducting the Bachelor project including the interviews

Week 1 (17 April - 23 April)	Startup, reading different articles and investigating the reason for the study

Week 2 (24 April -30 April)	Designing the questions for the patient interview, making the flyer, beginning with writing the research protocol
Week 3 (1 May - 7 May)	Finishing the research protocol and reading articles from the literature.
Week 4 (8 May - 14 May)	Discussing the research protocol and having feedback. Starting to email/plan meetings with the departments. Also starting to write the thesis (introduction, methods etcetera). The outline for the thesis needs to be emailed to the supervisor.
Week 5 (15 May - 21 May)	Handing out the flyers to the different departments and starting to conduct the interviews with the patients. Also starting with the healthcare professional interviews. Writing the thesis.
Week 6 (22 May - 28 May)	Conducting the various interviews and also transcribing them at the same time. Writing the thesis and doing the data analysis.
Week 7 (29 May - 4 June)	Conducting the various interviews and also transcribing them at the same time. Writing the thesis and doing the data analysis.
Week 8 (5 June - 11 June)	Conducting the various interviews and also transcribing them at the same time. The last interviews will take place in this week. Writing the thesis and doing the data analysis.
Week 9 (12 June - 18 June)	Writing the thesis and doing data analysis.
Week 10 (19 June - 25 June)	Writing and finishing the thesis (deadline 26 June).

7.4 Participating healthcare professionals

Table 5: Participating healthcare professionals in the different departments of the UMCG

Interview #	Function	Age	Gender
1	Pharmacy technician	37	Female
2	Pharmacy technician	28	Female
3	Pharmacy technician	43	Female
4	Nurse specialist neurology department	54	Male
5	Resident neurology department	26	Male
6	Physician assistant neurology department	52	Female
7	Nurse pediatric department	27	Female
8	Nurse pediatric department	26	Female
9	Nurse pediatric department	24	Female

Interview #	Ward	Age	
10	Nurse specialist pediatric department	39	Female

7.5 Participating patients

Table 6: Observations which are made at the outclinic pharmacy of the UMCG during the discharge medications including the ward, age, time, observations and explanation of side effects.

Interview #	Ward	Age
1	Gastro-intestinal liver disease department	73
2	Gastro-intestinal liver disease department	54
3	Gastro-intestinal liver disease department	20
4	Gastro-intestinal liver disease department	66
5	Gastro-intestinal liver disease department	58
6	Gastro-intestinal liver disease department	56
7	Gastro-intestinal liver disease department	71
8	Neurology department	66
9	Neurology department	57
10	Neurology department	37
11	Neurology department	21
12	Neurology department	76
13	Exclusion because of limited communication	Exclusion because of limited communication
14	Gastro-intestinal liver disease department	72
15	Gastro-intestinal liver disease department	61
16	Neurology department	74
17	Pediatric surgery department of Beatrix Child Clinic	25
18	Neurology department	36
19	Neurology department	62
20	Neurology department	34
21	Neurology department	57

7.6 Coding healthcare professionals

Table 7: Coding system for the interviews with the healthcare professionals. The main codes are the main topics of the interview.

Main code	Codes
Personal information	- Background HCP - Patient contact - Age - Work experience
Medicatie-information process	- Moment of giving info

	- Moments of giving info on side effects (discharge) - Downside of side effects explanation - Informing relatives - Knowledge level patient - Language barrier - Patient information needs - Medication information process doctor - Medication information process nurse - Medication information process pharmacy - New medication to be started during admission - New medication to be stating during discharge - Resources doctor - Resources nurse - Resources pharmacy - up to date resources - Responsibility doctor - Responsibility nurse - Responsibility pharmacy - Side effects (doctor) - Side effects (nurse) - Side effects pharmacy
Experiences of healthcare professionals with current medication information process	- Experience medication information process (doctor) - Experience medication information process (nurse) - Experience medication information process (pharmacy)
Barriers in the current process	-Clear working agreements - Missing information (doctor) - Missing information (nurse) - Missing information (pharmacy) - Time pressure - Unknown side effects
Improvement proposals for healthcare professionals	- Changing current situation (docter) - changing current situation (pharmacy) - Solution side effects (doctor)
Needs of the healthcare professional	-Ideal process (docter) - Ideal process (nurse) - Ideal process (pharmacy)
Involvement of care providers in the improvement process	- Extra training (docter) - Extra training (nurse) - Clear working agreements

7.7 Coding patient interviews

Coding for patient interview during admission:
- Gender
- Age
- Information process
- Moments of giving info (patient)

- Which medication
- Reason getting medication
- Remembering first time medication is given
- Presence of relatives admission
- Dosage
- Side effects info admission
- Googling info
- Points of improvement
- Preference explanation
- Extra info side effects?

Coding for the follow-up interview of the patient after discharge
- Gender
- Age
- Discharge consultation
- New medication discharge (patient)
- Reason getting medication
- Which medication
- Dosage
- Moments of giving info (patient)
- Side effects info discharge
- Moments of giving info on side effects (discharge)
- Experience discharge
- Extra info about medication (discharge)
- Extra info side effects?
- Googling info
- Preference explanation
- Presence of relatives during discharge
- Points of improvement

7.8 Observations of the discharge consultations by the outpatient pharmacy

Table 8: Observations of the discharge consultations at the outpatient pharmacy including the department, age of the patient, time of discharge consultations, observations of the medication information and whether the side effects were explained.

Ward	Age of patient	Age of pharmacy technician	Round	Observations	Explanation side effects?
E4= lung diseases	55	39	11:00	The effect and the frequency were explained in details to the patient. The interaction between the patient and pharmacy technician was very good.	No
E3= long term care (vessels)	60	39	11:00	The question about the	Yes

				medication was well explained by the technician. The basic information about the medication were explained.	
C2= cardiology	63	39	11:00	Technician explained the effect of the medication; however, the patient did not understand why he was getting this.	Yes
C2= cardiology	-	39	11:00	Patient had already gone home because the taxi was already waiting at the main entrance.	
C2= cardiology	56	39	14:00	The effect of the medication and the frequency of intake was explained. A lot of medication was given and this was a bit confusing for the patient. The drug-drug interactions were also explained, however the patient seemed overwhelmed with the amount of medication and could not really join the conversation.	Yes
C1= heart monitoring	62	39	14:00	The effect of the medication and the frequency of intake are well explained. In addition, it is explained what the patient needs to do when they need a new refill	Yes

				for their medication.	
M1= children's department	-	39	14:00	The caregivers were not present when the medication was delivered. It was given to the nurse.	
L4= urology and gynecology	58	39	16:00	The reason for prescribing, the effect and the frequency of intake were told. The patient and the relative waited a long time for the medication. They thought that they would get more medication including fraxiparine, but this turned out not to be the case. A lot of medication was missing. The doctor had not sent a prescription for this. A kind of discussion ensued.	Yes
M4= children's department (Beatrix Kinder Ziekenhuis)	29	39	16:00	The effect is clearly explained to the caregiver. After the technician mentioned the side effects, the caregiver had still question, these were well explained by the technician.	Yes
C3= gastrointestinal liver diseases department	-	39	16:00	The patient would go to a nursing home, so the discharge medication was handed over to the nurse.	No
D2= Medical oncology	35	37	11:00	Patient does not speak Dutch and there was no	No

				interpreter present. The explanation was translated via a translation app which did not work well. Only the frequency of intake was told and the fact that the medication had to be paid for.	
D2= Medical oncology	64	37	11:00	The patient received a different strength than what the nurse gave during admission. The prescriber probably did not put this on the prescription properly. So confusion occurred during the explanation about the new medications.	Yes
D2= Medical oncology	73	37	11:00	Patient did not know why the medication was prescribed. Nothing was said about this. The effect of the medication was explained after the patient asked about this. The side effects were well explained.	Yes
Oncology (treatment chemotherapy)	65	37	11:00	The effect and the reason for prescribing were detailed explained. The patient seemed interested in this information. The patient got an alternative because the other one did not work	No

				well. The technician gave recommendations about this which were very helpful for the patient.	
Oncology (treatment chemotherapy)	-	37	11:00	The patient had already left before the medication arrived.	No

7.9 MedVoorlicht

Figure 3: Concept of the MedVoorlicht in the hospital system of the UMCG which can be filled out by all healthcare professionals.

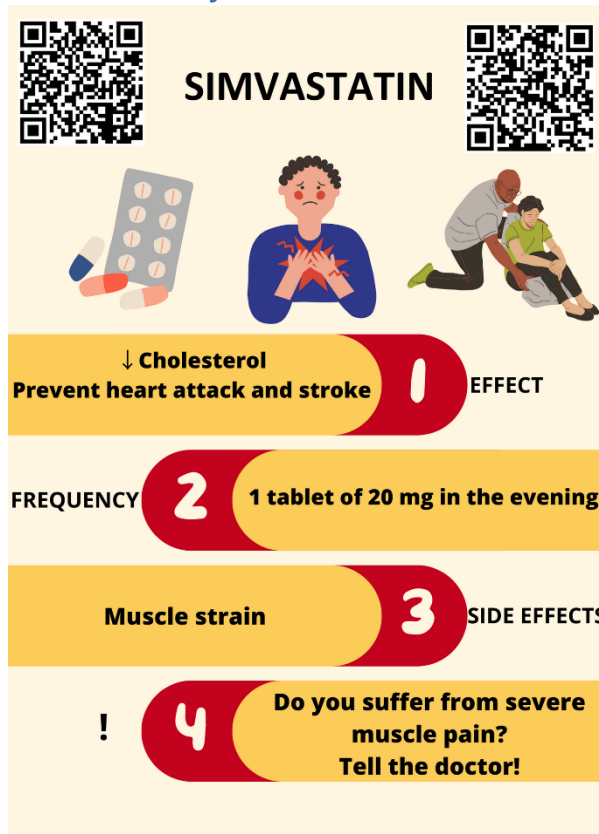## 7.10 Written information about the new medication

Figure 4: Concept of the flyer which will be given to the patient after starting the new medication, which is in this case simvastatin. It includes the effects, the frequency, the side effects and warnings. Also, two QR codes are included: one of them is for patient who are illiterate or want to translate the flyer to another language and the other code is a link to the website of kijsluiter.nl

7.11 Informed consent forms healthcare professionals and patients

Toestemmingsformulier (deelnemersexemplaar)
Medicatie voorlichting-project
Een onderzoek over het proces van medicatie informatie vanuit het perspectief van de zorgprofessional

Ik (ondergetekende) verklaar naar tevredenheid mondeling en digitaal geïnformeerd te zijn en geef hierbij geheel vrijwillig toestemming om de interviewdata ter beschikking te stellen voor het onderzoek. Ik ben in de gelegenheid gesteld om vragen over het onderzoek te stellen. Mijn vragen zijn naar tevredenheid beantwoord. Het staat mij vrij om deze toestemming op ieder door mij gewenst moment (schriftelijk) in te trekken zonder verdere opgaaf van redenen.
Intrekking van mijn toestemming heeft geen gevolgen voor de rechtmatigheid van de verwerking van mijn gegevens voorafgaand aan de intrekking (geen terugwerkende kracht).
Ik ben me bewust dat deelname aan de studie betekent dat verzamelde gegevens zullen worden bewaard gedurende 5 jaar na afloop van de studie. Alle gegevens zullen vertrouwelijk worden behandeld zoals vastgelegd in de geldende privacywetgeving.

Tekent u a.u.b. elk hokje apart na het lezen van de tekst, omcirkel wat van toepassing is.

1	Ik geef toestemming voor het verwerken van mijn gegevens in het kader van het onderzoek. Mijn verwerkte gegevens worden	JA / NEE Paraaf:

	na afloop van het medicatie voorlichting project 5 jaar vertrouwelijk bewaard in een dossier.	
2	Ik geef toestemming voor het delen van mijn onderzoeksgegevens met derden, zoals onderzoekers of overheidsinstellingen voor wetenschappelijk onderzoek. Het onderzoeksteam zorgt ervoor dat de onderzoeksgegevens niet tot mij herleidbaar zijn.	JA / NEE Paraaf:
3	Ik geef toestemming om in de toekomst benaderd te worden voor de volgende onderzoekronde of een daaraan gekoppeld project/onderzoek.	JA / NEE Paraaf:
4	Ik geef toestemming om in de toekomst benaderd te mogen worden voor het verstrekken van extra gegevens ten behoeve van het PEM-onderzoek.	JA / NEE Paraaf:

Achternaam, voorletter(s) en leeftijd:

Handtekening deelnemer: Datum: __ / __ / __

Handtekening onderzoeker: Datum: __ / __ /

Toestemmingsformulier (deelnemersexemplaar)
Medicatie voorlichting-project
Een onderzoek over het proces van medicatie informatie vanuit het perspectief van de patiënt

Ik (ondergetekende) verklaar naar tevredenheid mondeling en digitaal geïnformeerd te zijn en geef hierbij geheel vrijwillig toestemming om de interviewdata ter beschikking te stellen voor het onderzoek. Ik ben in de gelegenheid gesteld om vragen over het onderzoek te stellen. Mijn vragen zijn naar tevredenheid beantwoord. Het staat mij vrij om deze toestemming op ieder door mij gewenst moment (schriftelijk) in te trekken zonder verdere opgaaf van redenen.
Intrekking van mijn toestemming heeft geen gevolgen voor de rechtmatigheid van de verwerking van mijn gegevens voorafgaand aan de intrekking (geen terugwerkende kracht).
Ik ben me bewust dat deelname aan de studie betekent dat verzamelde gegevens zullen worden bewaard gedurende 5 jaar na afloop van de studie. Alle gegevens zullen vertrouwelijk worden behandeld zoals vastgelegd in de geldende privacywetgeving.

Tekent u a.u.b. elk hokje apart na het lezen van de tekst, omcirkel wat van toepassing is.

1	Ik geef toestemming voor het verwerken van mijn gegevens in het kader van het onderzoek. Mijn verwerkte gegevens worden na afloop van het medicatie voorlichting project 5 jaar vertrouwelijk bewaard in een dossier.	JA / NEE Paraaf:

2	Ik geef toestemming voor het delen van mijn onderzoeksgegevens met derden, zoals onderzoekers of overheidsinstellingen voor wetenschappelijk onderzoek. Het onderzoeksteam zorgt ervoor dat de onderzoeksgegevens niet tot mij herleidbaar zijn.	JA / NEE Paraaf:
3	Ik geef toestemming om in de toekomst benaderd te worden voor de volgende onderzoekronde of een daaraan gekoppeld project/onderzoek.	JA / NEE Paraaf:
4	Ik geef toestemming om in de toekomst benaderd te mogen worden voor het verstrekken van extra gegevens ten behoeve van het PEM-onderzoek.	JA / NEE Paraaf:

UMCG nummer en leeftijd:

Handtekening deelnemer: Datum: __ / __ / __

Handtekening onderzoeker: Datum: __ / __ / __