The effect of pharmacist telephone counselling (PTC) on patients initiating cardiovascular medication

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02-02-2022

Abstract

Background Initiating new chronic cardiovascular medication can be difficult, especially with different healthcare providers and the appliance to a home setting. Therefore, pharmacist telephone counseling (PTC), where a new chronic user of cardiovascular medication receives a phone call within the first two weeks of the first prescription fill, can offer a great benefit for these patients at the start of their new therapy. In the Netherlands, no such service was available until now.

Objective To evaluate the effect of PTC on patient reported outcome measurements (PROMs) in patients with new chronic cardiovascular medication.

Methods A descriptive study was performed in 14 Dutch community pharmacies and one outpatient pharmacy in Almere, The Netherlands. In total, three patient groups participated in study: the PTC group (n=406), the non-PTC group (n=455) and the usual care group (n=189). In the PTC group, selected patients by the outpatient pharmacy received a PTC from the community pharmacist within 2 weeks after drug prescription. One day after the PTC two questionnaires about medication understanding and use Self-Efficacy (MUSE) and Satisfaction with information About Medicines Scale (SIMS) were conducted with the patients. The non-PTC group did not receive a pharmacist counseling and did not answered the SIMS and MUSE questionnaires. In the usual care group, patients received the questionnaires three months prior to the start of the intervention.

Results Out of the 406 patients who received a PTC, 71.2% reported one or more problems with their new cardiovascular medication during PTC. Moreover, the pharmacist provided 75.1% of the PTC patients with recommendations. Additionally, the results of the SIMS and MUSE both showed a higher score in the PTC group, respectively 11.68 vs 9.28 on a 15-point SIMS score and 85.8% vs 66.9% scored 'Good' on the MUSE questionnaire.

Conclusion The PTC showed a great number of problems patients still have after their first cardiovascular prescription. Next to this, the pharmacist was able to provide three-quarter of the patients with (unasked) recommendations about their medication. This led to higher scores in the questionnaires about satisfaction on received medication information and medication understanding and self-efficacy.

1.Introduction

Initiating a new medicine intended for chronic use is often challenging for patients. Especially continuing the daily intake of medication, adherence, is found to be difficult. Adherence consists out of 3 phases: initiation, implementation and discontinuation.[1] In the initiation phase the patient starts to take the first dose of the prescribed medication.[1] Thereafter the implementation phase follows: the patients' intake has to be according to the prescribed dosing regimen.[1,2] Eventually, if the patient stops taking medication, discontinuation occurs.[1] Implementation is longitudinal and therefore the most important factor for adherence of medication.[1]

Patients with cardiovascular disease and related comorbidities often have complex treatments which can include up to nine different medications in one dispension.[3] Above all, patients with cardiovascular diseases do not always see the need of medication because of the asymptomatic nature of the disease, no immediate noticeable effect when missing a dose and the long-term benefit from the medication.[1,4] As a result of perceptual and practical barriers such as worries and forgetfulness, patients have shown to discontinue medicine use early. [2,4,5,6,7] Previous research showed that 28% of the heart failure patients who started new daily statin use discontinued medication after only one dispension. [6,7,8]

Many patients receive their new therapy at the outpatient clinic or at hospital discharge. Whereafter treatment and refill of prescriptions continue in the primary care setting (community pharmacist and general practitioner). Though, the patient can also refill their prescription at the outpatient pharmacy. At the first refill the pharmacy staff members, primarily the pharmacy technician, will question the patient about their experience, use and provide other necessary information or counselling. However, the patient is not always asked about their problems with the intake regimen, worries and other experiences.[9,10] Consequently, the growing variety of healthcare specialists caring for one patient can lead to cumulating "knowledge-gaps" with the patient.[11] For example at hospital discharge where the patient is overwhelmed by all new information; follow-up data, changes in medication and discharge instructions, which are not always completely clear for the patient.[12,13] Or when a patient switches healthcare provider transferring from clinician to GP. Therefore, a good collaboration of different healthcare providers is essential for a safe continuity of care, patient safety and better patient satisfaction.[11,14,15,16] As demonstrated above, the usual care does not provide enough time and assistance to tackle all (future) questions and concerns.

Ways to further optimize the patient with the adequate information and guidance at the start of new chronic medication could be to send the information in animations through e-mail ('watchyourmeds'), and a telephone counseling.[10,17] Besides medication adherence these actions promote good use of medication when performed by the best suited health care professional. Therefore the pharmacist who is the medicine expert, easily accessible and skilled on pharmacology is able to support a good start and correct use of medication as well as improving medication adherence.[10,18] Further, a telephonic counseling contributes to a more private patient environment where the patient is more comfortable to speak and feels like their medication related questions are more explored.[10,19] Hence they will get more confidence about the therapy.[19] Next to this, the patient will not physically have to visit the pharmacy and the pharmacists can prepare and plan the moment of counselling.[10,19]

A concept of pharmacist telephone counseling (PTC), New Medicines Service (NMS), already exists for patients with new chronic medication in Denmark and England. [20,21] The patient is referred to the pharmacist for NMS by the GP, a pharmacist, a nurse or the patient itself.[21] In the Netherlands no such concept is implemented yet. Therefore, the aim of this study is to evaluate the effect of

Pharmacist telephone counseling (PTC) on patient reported outcome measurements (PROMs) in patients with new chronic cardiovascular medication.

2. Methods

Population

2.1 Design and setting

This was a prospective observational study in all 14 community pharmacies and the outpatient pharmacy of Zorggroep Almere (ZGA), the Netherlands. The outpatient pharmacy ('de Brug') is located in Flevoziekenhuis, the single general hospital of Almere. All 15 pharmacies used the same pharmacy information system, which gave easy access to updated medication. In the outpatient pharmacy the hospital information system was also open for consultation to clarify any discrepancies in the patients' medical record. Furthermore, ZGA consists of multiple health care institutions which include healthcare professionals such as pharmacists, specialists, general practitioners and care at home. Moreover, ZGA is controlled by a board of directors who make overall decisions and regulations for the disciplines/departments.

2.2. Ethics approval

The study protocol was approved by UPPER (Utrecht Pharmacy Practice Research network for Education and Research) Institutional Review Board (IRB), department of Pharmaceutical Sciences, Utrecht University. All participants included for analysis agreed to informed consent over the phone and their data were anonymised. The patients were free to refuse to answer to any questionnaire.

2.3. Study population

Adult patients (aged >18) living at home who filled their first prescription for cardiovascular medication prescribed by an in-hospital specialist at the outpatient pharmacy were eligible for the study (table 1). The patients were selected from the pharmacy information system based on their medication ATC-codes, which are summarized in the appendix table 1. The prescriptions originated from specialists from outpatient clinics as well as prescriptions from discharged patients and all first fills were collected at outpatient pharmacy 'De Brug'. The 'first fill' of medication is described as that the prescribed medication must not have been used in the past twelve months prior to the intervention.

Excluding criteria for this study existed of non-Dutch speakers. Also the use of "short usage" and "when necessary" medication (e.g. nitroglycerin spray) were excluded. Furthermore, the patients who didn't answer their phone or did not understand the questions, because of a language barrier, were not included in the analysis. The intervention was implemented in a pragmatic way where some of these exclusion criteria, such as 'no gynaecologists prescription' or 'usage of arixta', were added during the implementation of the intervention to serve only the intended patients.[22] In this way the intervention was enjoyable and achievable for the pharmacist to perform.

2.4 Intervention and usual care

Figure 1 describes the prescription-flow. Numbers 1, 2, 6, 7 show usual care, where the medical specialist writes a prescription (1) The patient fills this prescription at the outpatient pharmacy, where the patient receives information about the (intake of) medication (2). Thereafter, the GP writes a refill prescription (6) and the patient continues this medication at home (7). This group was only phoned for the MUSE and SIMS questionnaire, which will be discussed later, 3 months prior to the start of the intervention.

Numbers 3, 4 and 5 display the intervention, where the outpatient pharmacy sends out 'watchyourmeds' (3) and selects patients for the PTC on ATC-code and prescriber (4). Two weeks

after the first dispensing the community pharmacist conducts the PTC on eligible patients (5.1) followed by a phone call from the pharmacy technician to conduct the MUSE and SIMS questionnaire one day later (5.2). The PTC (intervention) group follows numbers 1 to 7. The patients who were eligible for PTC but did not receive it (number 5) for various reasons (figure 2) were named the 'non-PTC group'. Leaving us with three groups: PTC patients, non-PTC patients and a usual care group.

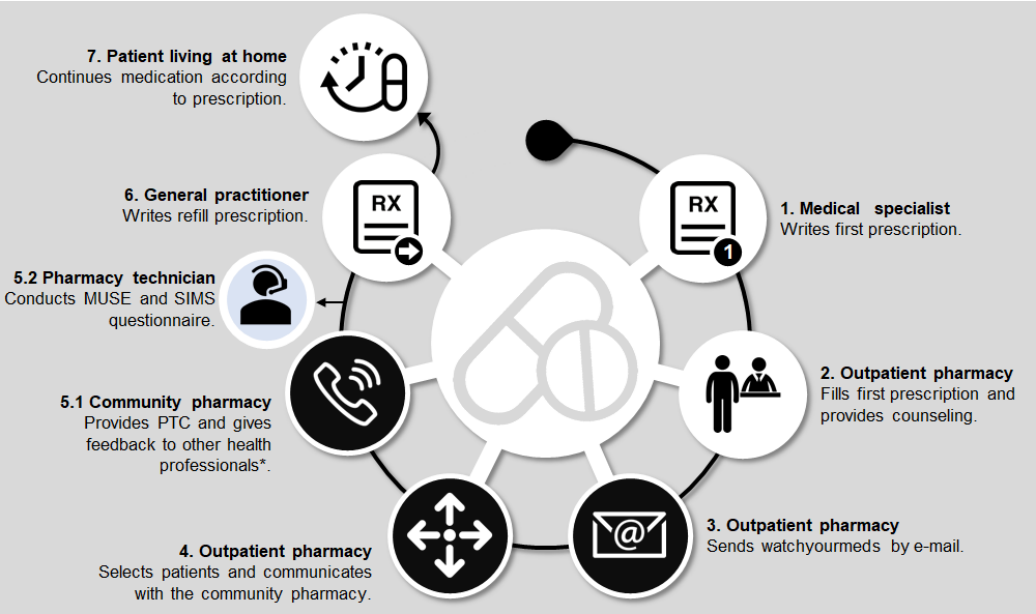

Figure 1: prescription-flow with the intervention and PROMs. *general practitioner, district nursing, medical specialist.

2.5 Data collection

2.5.1 Data from pharmacy information system and data from the telephone counselling by the pharmacist

The patient characteristics were collected from the pharmacy information system 2-4 weeks after the PTC (step 5 in figure 1) and organized in a MS excel sheet fitted for SPSS. During the phone call, the pharmacist noted problems and proposed actions/recommendations. Possible topics to discuss were composed beforehand by pharmacists as a checklist (appendix 4). These topics differed from problems with the intake of medication, to worries about medication or not being able to understand all given information. These questions could lead to interventions and/or contact with the specialist. All these outcomes were recorded in a set MS forms file and linked to the anonymized patient numbers in the SPSS sheet.

2.5.2 Data from the SIMS and MUSE questionnaire

One day after the PTC in step 5.1 a pharmacist technician performed a phone call conducting the SIMS and MUSE questionnaires. [23,24] This information was collected in the SPSS file as well.

The original MUSE questionnaire consists of eight questions, associated with taking medicines and learning about prescription instructions with a maximum of 32 points.[23,25,26] In this study, seven instead of eight questions were used, converted in a maximum score of 28 points.[23] Scores three or four points per question were considered 'good' and lower scores 'poor', which led to a cut-off point of ≥21pt in this study.[26]

The SIMS-questionnaire provided insight in the patients' contentment about their received information of the new medication, where a higher score indicates a higher level of contentment.[24] This questionnaire was analysed for all 17 questions and split up in the first nine questions about the action of the medicine and the final eight questions about the possible problems with the medication.[24] This study started with 15 questions and added the two missing questions as the study was progressing.

To ensure all data from different excel files got linked to the right patient code a random check and numeric analysis were performed by a research assistant and pharmacist researcher to make sure the data was merged correctly.

2.5.3 Data about the refill at the community pharmacy

The refill data and the time between first prescription and refill data was extracted from the pharmacy information system. Mostly this will be under 30 days as the maximum first dispensing is one month.[10] In case the patient did not refill their medication, a possible reason for discontinuation was searched for in the electronic patient file, the answers of the PTC or in the electronic hospital system. When none of the above sources showed a reason for the discontinuation, the reason was marked with 'unknown'.

2.6 Data analysis

Baseline characteristics were presented stratified per group. Continuous variables were described with mean and standard deviation (SD) if normally distributed. Dichotomous and categorical variables were expressed with frequencies (n) and percentages. To assess differences in patient characteristics, Chi-square tests were used to calculate the two tailed P-value of categorical patient characteristics. To determine differences in continuous variables like age, a one way ANOVA was used. To compare the SIMS and MUSE questionnaire outcomes of the PTC group on with the usual care group the effect of the PTC on patients' perception towards medication and information received in medication, an unpaired t-test was used. A P-value of <0.05 was considered significant. SPSS version 27.0 was used for the analysis.

3. Results

3.1 Participants

A total of 1050 patients were selected on cardiovascular inclusion criteria in this study. Baseline characteristics of the study population are shown in table 1. Of these 1050 patients, 189 received usual care and 861 were eligible for the intervention (figure 2). Eventually, 392 checklists got collected. The mean age was 60.7 ± 15.47 and 49.8% was male.

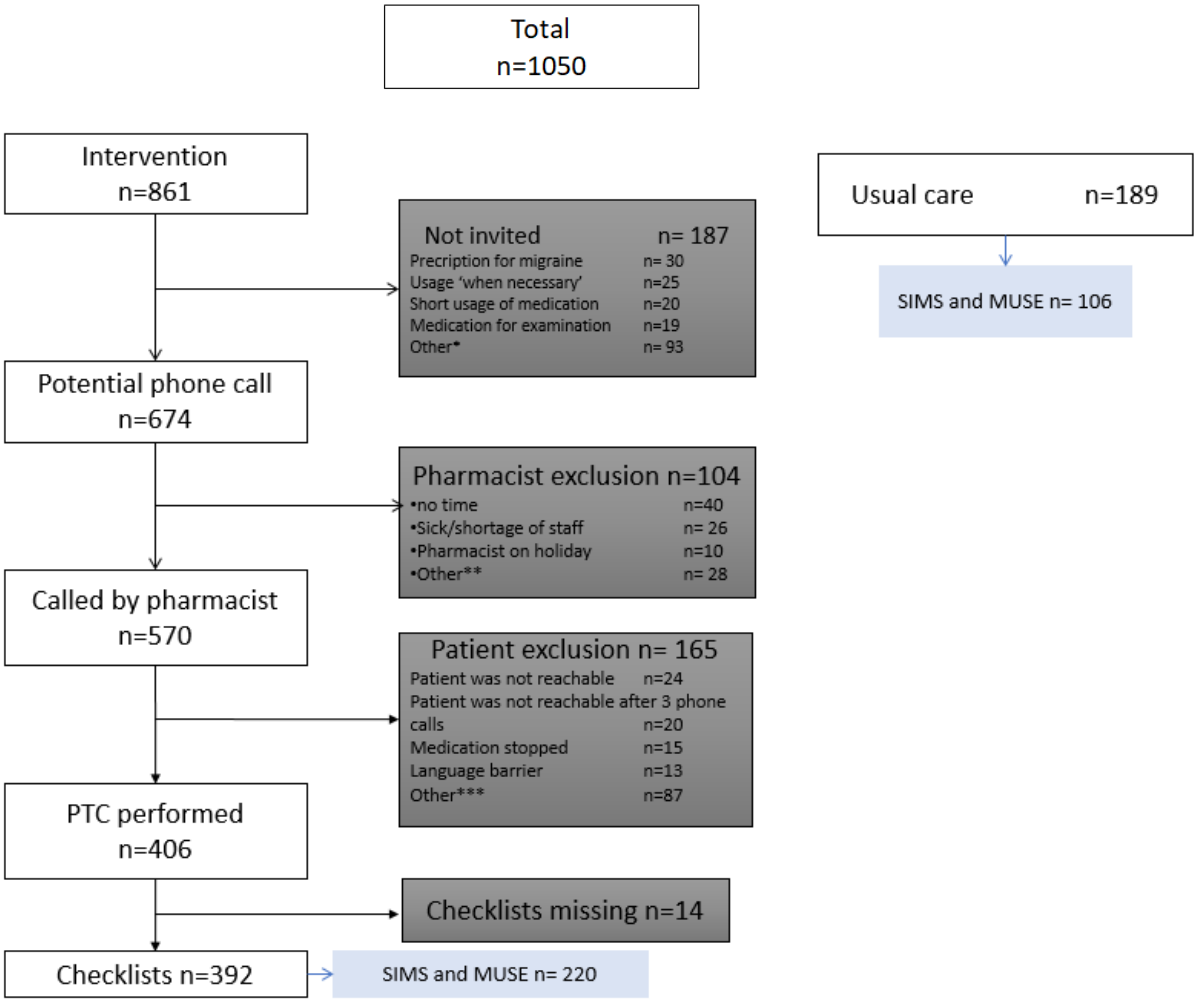

Figure 2: Patient-flow chart. *=non Almere resident, patient passed away, patient in care-home e.g. **= pharmacist found not necessary, patient has already received phone call e.g. ***= wrong phone number, patient has not started medication yet, unknown e.g.

Table 1: Patient characteristics

	PTC (n= 406)	no PTC (n=455)	usual care (n=189)	P-value
Sex				0.135
Female % (n)	46.8 (190)	53.6 (244)	50.3 (95)	
Age mean (SD)	62.52 (13.1)	59.3 (17.3)	60.0 (15.4)	0.008
Number of new cardiovascular medication received				<0.001
Mean (SD)	1.94 (1.34)	1.48 (0.93	1.71 (1.30)	
Comedication at First prescription, mean (SD)				0.0743
total	4.66 (3.82)	5.05 (4.17)	4.65 (3.85)	
Cardiovascular	1.90 (1.93)	1.98 (2.02)	1.73 (1.84)	
Gastro-enterology	0.90 (0.91)	0.89 (1.04)	0.93 (0.98)	
Airway	0.38 (0.83)	0.44 (0.96)	0.37 (0.80)	
Diabetes Mellitus 2	0.36 (0.85)	0.35 (0.82)	0.34 (0.83)	
Prescription from, % (n)				<0.001
Outpatient clinic	56.4 (229)	29.9 (136)	61.9 (117)	
Hospital discharge	43.6 (177)	70.1 (319)	38.1 (72)	
Prescribed by, % (n)				0.024
Cardiologist	49.5 (201)	36.0 (164)	37.6 (71)	
Internist*	14.5 (59)	18.5 (84)	23.3 (44)	
Neurologist	13.5 (55)	18.7 (85)	15.9 (30)	
Emergency aid	10.6 (43)	10.1 (46)	10.6 (20)	
Other**	11.9 (48)	16.7 (76)	12.6 (24)	
Patients from each community pharmacy, Mean (SD)				<0.001
	29 (21.2)	32.5 (16.2)	13.5 (8.8)	

*oncologist, nephrologist, cardiologist

**gynaecologist, rheumatologist, surgeon, pulmonologist, dermatologist, paediatrician, gastroenterologist, rehabilitation doctor, geriatric specialist, orthopaedic physician

3.2 Process measurements PTC

The mean duration of the counselling phone call was 6 minutes with a range of 1-21 minutes. The average time between the first prescription and the phone call was 13.3 (SD 2.34) days. Thereby, the pharmacist reached 76,1% of the patients with one phone call.

At first prescription fill 84 (20.7%) PTC patients received 'watchyourmeds', 25 (12.1%) patients did not remember anymore. Moreover, 53 (65.4%) patients watched 'watchyourmeds'. Main reasons for not watching 'watchyourmeds' were "not necessary", "I'd rather read", "no time".

3.3 Outcomes from the PTC

The ten most frequent problems pharmacists encountered as well as the ten most actions recommended during the phone counseling are shown in table 2 and 3. The full tables are visible in appendix 2 and 3.

Over 290 patients 549 problems were reported with a mean of 1.89 (SD 1.06) and a range of 1-9 problems per patient. Thus in 71.2% of the patients who got a PTC the pharmacist identified one or more problems. The most frequent problems were found in the categories 'side effects' and 'complexity of medication', with 'uncertainty about the method of repeating prescription' as the

largest problem. With a mean of 2.27 (SD 2.10), 953 recommendations were provided by the pharmacist over 306 patients in a range of 1-11. Therefore 75.4% of the PTC patients received one or more suggestions (with subsequent actions) from the pharmacist. Some of the recommendations were provided for different problems such as 'point out extra information sources to the patient' (2.9%), 'ask someone from your environment to support medication intake' (2.6%). Moreover, 16 (5.2%) patients who received recommendations from the pharmacist got them without reporting a problem.

In total 1.8 actions per problem were given by the pharmacist. For nine patients the pharmacist got in contact with the prescriber for an intervention or question.

Table 2: ten most found problems by pharmacist

Problems found by pharmacist n=549 problems		% of total problems
A. Medication intake	**N=28 (%)**	**5.1**
intake schedule unclear	16 (57.1)	2.9
B. Daily routine	**N=17 (%)**	**3.1**
Not being able to keep medication in stock at home	12 (70.6)	2.2
C. Complexicity with medication	**N=122 (%)**	**22.2**
Uncertainty about the method of repeating prescriptions	59 (48.3)	10.7
Many different medicines	24 (19.7)	4.4
Many different intake moments per day	18 (14.8)	3.3
Uncertainty about the duration of use (chronic/acute)	17 (13.9)	3.1
D. side effects	**N=193**	**35.2**
Headache, dizziness, tiredness, e.g.		
E. Necessity medication	**N=56 (%)**	**10.2**
Failing to see the need: notices no effect	32 (57.1)	5.8
Not motivated to follow treatment	11 (19.7)	2.0
F. Worries about medication	**N=49 (%)**	**8.9**
Fear of side effects	35 (71,4)	6.4
G. Knowledge barriers	**N=64 (%)**	**11.7**
Lack of knowledge about medication/ disease/ body	52 (81.3)	9.5

Table 3: ten most provided recommendations/actions by the pharmacist during PTC

Action/ recommendation N=356 patients		% of total recommendations n=953
C. Complexity of medication	**N=128 (%)**	**13.4**
Explain how the patient can request repeat medication	63 (49.2)	6.6
D. Side effects	**N=261 (%)**	**27.4**
Reassure patient with known side effects and explain the course of the side effect	128 (49.0)	13.4
Find out to what extent the experienced side effect pose a problem for the patient	100 (38.3)	10.5
If patient experienced a lot of discomfort (danger of stopping) consult with the doctor about possible alternatives	33 (12.7)	3.5
E. necessity of medication	**N=273 (%)**	**28.7**
Provide oral explanation of the purpose of the medicine (indication)	104 (38.1)	10.9
Emphasize the importance of regular use of the medicine for optimal effect	99 (36.3)	10.4
Emphasize that patient can't just stop, only when consulting a doctor	52 (19.0)	5.5
F. Worries about medication	**N=117 (%)**	**12.3**
Offer a listening ear for worries	53 (45.3)	5.6

Explain orally about the risks and side effects of the medication and reassure the patient as much as possible	36 (30.8)	3.8
G. Knowledge barriers	**N=88 (%)**	**9.2**
Provide oral explanation about the effect, side effects and use of medication	49 (55.7)	5.1

3.4 patient related outcome measurements (PROMs)

3.4.1 SIMS and MUSE

The results of the MUSE and SIMS questionnaire are shown in table four and five. The mean total MUSE score for patient who received PCT was 24.02 (SD 3.68), which was significantly higher than 21.46 (SD 3.28) in the usual care group. Moreover, 85.8% of the PTC scored 'good' on overall MUSE, where in de usual care-group this was 66.9%. Thereby also the separate factors about medication intake and learning about medicines scored significantly higher in the PTC-group compared to the usual care-group, respectively 10.40 vs. 9.30 and 13.58 vs. 12.16. Which indicates a higher medication understanding and use self-efficacy in the PTC group.[23]

With the SIMS a maximum of 17 points was achievable and a higher score was associated with higher satisfaction with information about medicines. The total satisfaction rating over 15 questions was significantly higher in the PTC group with a score of 11.68 (SD 3.61) than in the usual care group with a score of 9.28 (SD 3.99). The overall satisfaction with medication education per question was calculated by dividing the total score by 15 or 17 as demonstrated in table 4 ('/15' and '/17').

Table 4: outcomes SIMS and MUSE questionnaire

MUSE	**PTC n=220**	**Usual care n= 106**	**P-value**
Total Mean (SD)	24.02 (3.68)	21.46 (3.28)	<0.001
'Good' (≥21pt) (%)	85.8	66.9	<0.001
Medication intake mean (SD)	10.40 (1.73)	9.30 (1.59)	<0.001
Learning about medication mean (SD)	13.58 (2.21)	12.16 (2.00)	<0.001

SIMS		**PTC n=220 mean (SD)**	**Usual care n=106 mean (SD)**	**P-value**
15 questions	Total	11.68 (3.61)	9.28 (3.99)	<0.001
	AU* (q1-7)	6.13 (1.46)	5.14 (1.82)	<0.001
	PPM** (q10-17)	5.55 (2.58)	4.14 (2.70)	<0.001
	/15	0.78 (0.24)	0.62 (0.27)	
		PTC n=81 mean (SD)		
17 questions	Total	13.89 (4.23)		
	AU* (q1-9)	7.77 (2.07)		
	PPM** (q10-17)	6.12 (2.51)		
	/17	0.82 (0.25)		

*action and usage subscale, ** potential problems of medication subscale

3.4.2 continuation of medication

Reasons for discontinuation of medication: Various stop reasons have been defined. In the PTC group 32.7% of the patients discontinued their medication after their first prescription. The five most mentioned reasons in the PTC group are: 'temporarily use'(48.5%), 'unknown' reason (9.9%) 'no more indication for medication' (8.9%), 'stopped by specialist because of a side effect'(5.9%) and 'one time use for examination' (5.0%). In the non-PTC group 176 (38.9%) patients stopped prescribed

medication of which 19 (10.8%) with an ‘unknown’ reason. For usual care this was 50 (26.5%) and 2 (4.0%).

Switch reasons: The most named reasons to switch medication is having side effects. In 61.9% of the PTC patients and 40.5% overall. In 9.5% the pharmacotherapy was not effective in the PTC group.

Prescription refill: 62.8% of the PTC patients refilled their prescription of which 86.7% at their community pharmacy. 56.0% of the patients who did not receive PTC refilled their medication of which 76.9% at their community pharmacy. In the usual care group 78.3% of the patients refilled their medication. With a p-value of <0.001 over the three groups. The mean of days late for pick up the refill in the PTC group is 1.01 with a maximum of 37 days. Moreover, 92.2% of the PTC group versus 88.8% in the non-PTC group picked up their refill medication before the first prescription was finished. For the non-PTC group the mean days late is 1.74 with a maximum of 46 days. In the usual care group the mean was 3.92 (18.9).

4. Discussion

This study's results show that patients often do not know how to repeat their medication (59 patients), fear its side effects (35 patients), experience side effects (193 patients) and are failing to see the need to continue the medication as they do not notice any effects (32 patients). Two studies from 2011 confirm these findings.[27,28] In the study of Krueger JL et al. 70.7% of the patients would have liked more information about adverse effects and 69.7% more information about prescription refill. [27] This indicates that not all patients pay attention to or receive information about how to repeat their medication. Also, patients might not get all the possible side effects explained by the pharmacy technician at first fill, because they do not want the patient to worry or receive more information than they can process at one time. However, our results conflict with three other nationwide studies, where only 21-56% of the patients discussed side effects.[27] This difference could be explained by the difference between groups of medications used in the study. The present study focused solely on cardiovascular medication, while the contradictory studies covered all medication groups. To forestall these two problems, patients should receive extra information about refill and side effect at first prescription fill should be provided.

In Addition, the pharmacist provided mostly recommendations on the necessity of medication (273 patients, 27.4%) and explained about adverse events (261 patients, 28.7%). 5.2% of the recommendations were given without a precursory question or concern from the patient. A possible explanation for this might be because the pharmacist felt it was needed. Patients in the study of Messerli et al. who underwent a polymedication check by a pharmacist said they highly appreciated the pharmacist recommendations and scored 9.45 out of 10 for this aspect.[29] And Barber et al. indicated about half of the patients needed more information about their medication 10 days after the start of new medication.[30] This shows that patients are open to (unsolicited) advice from the pharmacist and the need for information is there. We advise the pharmacist to rely on their professional intuition and provide unsolicited advice to patients in similar circumstances.

Interestingly, this study showed that the contribution of the PTC showed higher MUSE (23.80 vs 21.46) and SIMS (11.67 vs 9.28) scores to patients who received usual care. This is in line with two other studies that performed a MUSE and SIMS questionnaire. Appalasamy et al. and Cameron et al. showed, disregarding variances in methodology and sample population, higher MUSE scores correlate with higher medication adherence.[23,26] Also, Kooij et al. illustrates that a PTC at the start of the therapy showed improved adherence with RAS-inhibitors and lipid lowering drugs.[10] Both of these findings might indicate a possible higher adherence rate in the current study.

Finally, various stop reasons have been determined which might show the possible non adherent patients, the 'unknown' stoppers. Where in the PTC and non-PTC group 9.9% and 10.8% of the patients have an unknown reason to stop refilling their medication, when the usual care group only shows 4.0%. The study of Weimar et al. searched reasons for discontinuation of two antiplatelet agents and 8.1% of the reasons to stop was unspecified, which corresponds mostly with the PTC and non-PTC groups.[31] The differences between the usual care group and PTC and non-PTC group are: the usual care group differs in lower sample size, a lower mean of other cardiovascular medication in use at start of the new chronic medication and the earlier time of monitoring the patient group. These differences might have a slight influence on the percentages, but none of them has been established in this study.

4.1 Strengths and Limitations

This is the first PTC study with patients who receive their first cardiovascular medication. Other PTC studies have taken place, but none were solely appointed to new cardiovascular medication in a setting with healthcare collaboration as this study.[12,13,15,17,20,21,22] By focusing only on cardiovascular patients the benefits for this group have been explicitly examined. Firstly, the study was performed in a real-life setting, which already demonstrates a good reflection of the implementation in day-to-day life. Secondly, in this setting all pharmacies are linked with the same pharmacy information system, which makes it easy to see any filled prescription from any pharmacy in Almere. The outpatient pharmacy is located in the Hospital and therefore is in close collaboration with physicians. Besides, this pharmacy is also part of the 15 care-group pharmacies which makes transitions in care and related information transmission easier to conduct and follow. This is in contrast with England, because of lacking collaboration between the GP and pharmacist the patient received contrasting information about the NMS.[21] Thirdly, the pharmacist followed a checklist with questions in this study which had to be filled in an online MS Forms. This assured that all topics were discussed with the patient and possible new topics raised questions with the patient. Whereas in England, the questions became more simple as the pharmacist became accustomed with the service.[21]

However, some limitations should also be considered. First, only 7/8 questions of the MUSE questionnaire were used, which resulted a lower accumulated score. However, the scoring was appointed per question: 3 or 4 points per questions was referred to as 'good', thus the same scoring measures could be used with a matching cut-off point (≥21) as defined in literature.[26] Another limitation concerns the SIMS questionnaire that was used in this study, which had only 15 out of the 17 questions in the first few months. However, the two questions only effected the 'action on use' part of the questionnaire. Therefore, a calculation was made to see to what extent the additional two questions might add up to a higher overall score (divided by 17 or 15) was found in the PTC group that had the extra two questions 0.82 vs 0.62 in the usual care group and 0.78 in the PTC group with 15 questions. This indicates that the results of this study could give an underestimation of the SIMS score, while the score with 17 questions gave a higher score per question.

In addition to the other limitations, the pharmacists in this study were not always able to perform a PTC with the patients because of logistic reasons; sickness, shortage of staff. Alternatively, a pharmacist sometimes found that a PTC would not be necessary. Consequently, some possible helpful PTC's have not been performed. Though, this shows a realistic setting and leaves room for improval for the pharmacist. Finally, only Dutch speaking patients were included, which could have led to missing out important patient groups that might have bigger problems understanding their medication.

4.2 Implications for practice

This study calls for the conclusion that the PTC should be continued by the pharmacists. Furthermore, it could be of value to know beforehand which patients would benefit from PTC, for instance polypharmacy could be a trigger. This would make the pharmacists' time and effort most worthwhile. Consequently, the high numbers of problems detected and recommendations given should encourage the pharmacist to perform the PTC's every week and be more involved in the patients' therapy and perceptions. Possibly, the prescriber can estimate whether the patient would benefit from the PTC and communicate this with the pharmacist. A non-Dutch speaking patient may have bigger problems understanding their medication information. A dragoman could solve this problem.

The intervention provides a bridge between the second and primary care, which is most vulnerable for information and medication errors with the patient.[14,15,16] The pharmacist is educated to identify patients with extra need for information about medication and decide to provide a follow-up phone call to those who will benefit most from extra counseling. This makes him/her crucial for the PTC. In fact, patients feel more comfortable discussing their medications with their outpatient healthcare providers after having a follow up phone call.[32] The checklist makes it easy to run through all topics that might rise questions with the patients. Besides, it serves as a red line through the conversation and helps the patient to discover any other rising questions he or she may not have thought of yet. Therefore, the checklist is a great tool to guide the conversation and possibly other trained pharmacy staff will be able to conduct a PTC in the future.

In this real-life setting the exclusion criteria changed a little as the study was progressing. This shows that adjustments in the selection of eligible patients are still made. Further research on which patients should get the intervention is needed to spend the pharmacists' time most efficiently and keep the intervention beneficial for patient and useful for the pharmacist to perform.

At last, a previous study of Kooij et al. illustrated that other literature counseling showed an increased adherence or clinical outcomes on antiplatelet therapy and statins.[10] We could not find any other comparable literature for antihypertensives.[10] More research in the effect of PTC on adherence is needed to determine the long term effect of the PTC and possible further improvements to the service.

5.Conclusion

For the first time in the Netherlands, the effect and outcomes of a PTC with new chronic cardiovascular patients were evaluated. The results showed that the most encountered problems were side effects and complexity of medications. The most given recommendations by the pharmacist were about side effects and necessity of medication. In fact, 71.2% of the PTC patients reported one or more problems regarding their new cardiovascular medication. Subsequently, the pharmacist provided 75.1% of the PTC patients with (unasked) recommendations. This indicates that nearly three-quarters of the patients with a PTC, experienced its benefits. Leading to, the results of the SIMS and MUSE both showed a higher score in the PTC group. This illustrates the extra value the PTC has on the experience of patients in their information needs and self-efficacy.

Acknowledgements

I would like to thank pharmacy ‘de Brug’ for allowing me use their facilities, Dr. E.S. Koster for giving me feedback and Dr. H.T. Ensing for supporting me and providing me with helpful comments and insights.

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Appendix

Appendix 1: classified medication group on 3-digit ATC-code. (In the selection procedure a five-digit code was used)

ATC-code	Drug class	Examples
B01	Antithrombotic agents	Acenocoumarol, clopidogrel, dabigatran, rivaroxaban
C01	Cardiac therapy	Digoxin, amiodarone
C02	Antihypertensives	Methyldopa
C03	Diuretics	Hydrochlorothiazide, spironolactone, furosemide,
C07	Beta blocking agents	Metoprolol, sotalol
C08	Calcium channel blockers	Amlodipine, verapamil
C09	Agents acting on the renin-angiotensin system	Captopril, losartan
C10	Lipid modifying agents	Simvastatin, ezetimibe, evolocumab

Appendix 2: Problems found by pharmacist

Problems found by pharmacist n=549 problems		% total problems (n=549), 100%
A. Medication intake	**N=28 (%)**	**5.1%**
intake schedule unclear	16 (57.1)	2.9%
forgotten dosage	10 (35.7)	1.8%
Problem opening the package/ blister	2 (7.1)	0.4%
Problems adapting the medication (cut in half)	2 (7.1)	0.4%
Problems with taste and shape of the medication	1 (3.6)	0.2%
Technical problem with injection of inhaler	1 (3.6)	0.2%
B. Daily routine	**N=17 (%)**	**3.1%**
Not being able to keep medication in stock at home	12 (70.6)	2.2%
Not being able to fit medication intake in the daily routine	5 (29.4)	0.9%
C. Complexicity medication	**N=122 (%)**	**22.2%**
Uncertainty about the method of repeating prescriptions	59 (48.3)	10.7%
Uncertainty about the duration of use (chronic/ acute)	17 (13.9)	3.1%
Many different intake moments per day	18 (14.8)	3.3%
Many different medicines	24 (19.7)	4.4%
Uncertainty due to changes after hospitalization	4 (3.3)	0.7%
D. side effects	**N=193**	**35.2%**
Headache, dizziness, tiredness		
E. Necessity medication	**N=56 (%)**	**10.2%**
Failing to see the need: notices no effect	32 (57.1)	5.8%
Not motivated to follow treatment	11 (19.7)	2.0%
Doubts about the correctness of the diagnosis	7 (12.5)	1.3%
Failing to see the need: does not experience any symptoms of illness (anymore)	6 (10.7)	1.1%
F. Worries about medication	**N=49 (%)**	**8.9%**
Fear of side effects	35 (71,4)	6.4%
Concerns about long-term effects of medication	9 (18.4)	1.6%
Concerns about drug dependence	3 (6.1)	0.5%
Patient is afraid to stop (e.g. with temporary medicine)	2 (4.1)	0.4%

G. Knowledge barriers	**N=64 (%)**	**11.7%**
Lack of knowledge about medication/ disease/ body	52 (81.3)	9.5%
Received conflicting information about the drug	7 (10.9)	1.3%
Lack of insight into own drug use	5 (7.8)	0.9%
H. understanding information	**N=17 (%)**	**3.1%**
Language barrier/ cultural differences	9 (52.9)	1.6%
Limited health skills/ low literacy	5 (29.4)	0.9%
Memory problems	3 (17.7)	0.5%
K. Costs	**N=3 (%)**	**0.5%**
Uncertainty about costs	3 (100)	0.5%

Appendix 3: recommendations/actions provided by the pharmacist during PTC

Action/ recommendation	N=953 recommendations	% of total n=953
A. Intake problems	**N=35 (%)**	**3.7**
Provide intake schedule with time and number of medications	13 (37.1)	1.4
Recommend weekly box e.g. to organize different medicine/ intake moments	6 (17.2)	0.6
Provide reminder for intake	4 (11.4)	0.4
Link intake moment to place/moment	4 (11.4)	0.4
Someone in patients' environment can support the intake	3 (8.6)	0.3
Provide swallowing advice	3 (8.6)	0.3
Advise tool to take away package/ edit problems	2 (5.7)	0.2
B. Problems with daily routine	**N=19 (%)**	**2.0**
Explain and recommend repeat service	13 (68.4)	1.4
See with patient if someone in patients' environment can support the medication use	2 (10.5)	0.2
Search repeated daily moments to link intake moments to	2 (10.5)	0.2
Link intake moments to a place/moment (toothbrush)	1 (5.3)	0.1
Make an intake plan with the patient for moments that break routine	1 (5.3)	0.1
C. Complexity with medication	**N=128 (%)**	**13.4**
Explain how the patient can request repeat medication	63 (49.2)	6.6
Orally explain about dosage forms, changes in medication, duration of use and/or storage conditions	19 (14.9)	2.0
Make an intake schedule with time and how often the medication should be used	18 (14.1)	1.9
Advise a weekly medicine box/individualised distribution system to organize different intake moments	15 (11.7)	1.6
Reduce number of intake moments: merge times	4 (3.1)	0.4
Point extra information sources out to the patient	9 (7.0)	0.9
D. Side effects	**N=261 (%)**	**27.4**
Reassure patient with known side effects and explain the course of the side effect	128 (49.0)	13.4
Find out to what extent the experienced side effect pose a problem for the patient	100 (38.3)	10.5
If patient experienced a lot of discomfort (danger of stopping) consult with the doctor about possible alternatives	28 33 (12.7)	3.5
E. necessity of medication	**N=273 (%)**	**28.7**
Provide oral explanation of the purpose of the medicine (indication)	104 (38.1)	10.9
Emphasize the importance of regular use of the medicine for optimal effect	99 (36.3)	10.4
Emphasize that patient can't just stop, only when consulting a doctor	52 (19.0)	5.5

Point extra information sources out to the patient	18 (6.6)	1.9
F. Worries about medication	**N=117 (%)**	**12.3**
Offer a listening ear for worries	53 (45.3)	5.6
Explain orally about the risks and side effects of the medication and reassure the patient as much as possible	36 (30.8)	3.8
Check whether you have allayed concerns with your explanation	18 (15.4)	1.9
Point extra information sources out to the patient	10 (8.5)	1.0
G. Knowledge barriers	**N=88 (%)**	**9.2**
Provide oral explanation about the effect, side effects and use of medication	49 (55.7)	5.1
Emphasize (again) the necessity of use	14 (15.9)	1.5
Point extra information sources out to the patient	12 (13.6)	1.3
Make an intake schedule with when and how often the medicine should be used	5 (5.7)	0.5
See with patient if someone in patients' environment can support the medication use (give confidence)	8 (9.1)	0.8
H. Understanding information	**N= 28 (%)**	**2.9**
See with patient if someone in patients' environment can support the medication use	12 (42.9)	1.3
Check regularly whether the patient has understand the information	7 (25.0)	0.7
Use short sentences, avoid jargon/ difficult words, build in pauses in the conversation	5 (17.9)	0.5
Repeat the most important information	4 (14.2)	0.4
I. Costs	**N=4 (%)**	**0.4**
Explain drug costs/ personal contribution	3 (75.0)	0.3
Check to what extent the personal contribution is a problem	1 (25.0)	0.1

Appendix 4: Pharmacist checklist (in Dutch)

Menukaart afhandeling Telefonische Start Begeleiding

Datum van telefoongesprek: _____ **Patiëntcode:** _____

Geïdentificeerd probleem & oorzaken	Suggesties voor vervolgacties
A. Problemen met inname ☐ Vergeten van geneesmiddel ☐ Innameschema onduidelijk (hoe vaak/ wanneer) ☐ Probleem met openen verpakking/ blister ☐ Probleem met bewerken geneesmiddel (bv. halveren) ☐ Probleem met smaak/vorm geneesmiddel ☐ Technisch probleem, bv. met prikpen, inhalator ☐ GEEN	☐ Verzorg herinnering voor inname (bv. medicijnwekker, alarm op telefoon) ☐ Koppel innamemoment aan plek/ moment (bv. bij tandenborstel, tijdens eten) ☐ Adviseer weekdoos/ baxter om verschillende medicijnen/ innamemomenten te organiseren ☐ Maak innameschema met **wanneer** (tijdstip) en **hoe vaak** het medicijn gebruikt moet worden ☐ Adviseer hulpmiddel om verpakkings- of bewerkingsproblemen weg te nemen (bv. tablettensplitter) ☐ Bekijk met patiënt of iemand in omgeving patiënt kan ondersteunen bij de inname ☐ Geef slikadvies (raadpleeg: Handboek Oralia op KNMP Kennisbank) ☐ Controleer hulpmiddel op gebreken, geef (nogmaals) een gebruiksinstructie
B. Problemen met dagelijkse routine ☐ Medicatie niet kunnen inpassen (bv. onregelmatig werk, druk sociaal leven) ☐ Niet kunnen omgaan met onderbrekingen in dagelijkse routine (bv. vakantie, Ramadan) ☐ Medicatie niet goed thuis op voorraad kunnen houden ☐ GEEN	☐ Maak patiënt bewust van routine onderbrekende gebeurtenissen (momenten waarop inname niet lukt) ☐ Zoek met patiënt naar terugkerende momenten waaraan innamemoment(en) gekoppeld kan worden ☐ Koppel innamemoment aan plek/ moment (bv. bij tandenborstel, tijdens eten) ☐ Maak met patiënt een innameplan voor die momenten die routine onderbreken ☐ Bekijk met patiënt of iemand in omgeving patiënt kan ondersteunen bij medicatiegebruik ☐ Geef uitleg over en adviseer de apotheek herhaalservice
C. Complexiteit medicatie ☐ Veel verschillende geneesmiddelen ☐ Veel innamemomenten per dag ☐ Onduidelijkheid door wisselingen na ziekenhuisopname ☐ Onduidelijkheid over gebruiksduur (chronisch of tijdelijk) ☐ Onduidelijkheid over wijze van herhalen ☐ Onduidelijkheid over toedieningsvormen ☐ Onduidelijkheid over bewaarcondities ☐ GEEN	☐ Geef mondeling uitleg over toedieningsvormen, wisselingen, gebruiksduur en/of bewaarcondities ☐ Maak innameschema met **wanneer** (tijdstip) en **hoe vaak** het medicijn gebruikt moet worden ☐ Adviseer weekdoos/ baxter om verschillende medicijnen/ innamemomenten te organiseren ☐ Verminder aantal innamemomenten: tijdstippen samenvoegen ☐ Verminder aantal innamemomenten in overleg met arts: dosering aanpassen ☐ Verminder aantal innamemomenten in overleg met arts: switchen geneesmiddel ☐ Wijs patiënt op aanvullende informatiebronnen (bv. www.apotheek.nl) ☐ Leg uit hoe de patiënt herhaalmedicatie kan aanvragen (evt. herhaalservice)
D. Ervaren bijwerkingen ☐ Welke: _____ ☐ GEEN	☐ Stel patiënt gerust bij bekende bijwerkingen is (als dat zo is), en bespreek verloop bijwerking ☐ Ga na in hoeverre de ervaren bijwerkingen een probleem vormen voor de patiënt (is er stopgevaar?) ☐ Als patiënt veel hinder ervaart (er is stopgevaar), overleg met arts over mogelijk alternatief
E. Noodzaak van medicatie niet inzien (stopgevaar) ☐ Noodzaak niet inzien: merkt geen effect ☐ Noodzaak niet inzien: ervaart geen klachten (meer) van ziekte ☐ Niet gemotiveerd om de behandeling te volgen ☐ Twijfel over juistheid van diagnose ☐ GEEN	☐ Geef mondeling uitleg over doel van medicijn (vraag eventueel naar de indicatie) ☐ Benadruk belang regelmatig gebruik voor optimaal effect (bv. voorkomen van complicaties, nieuw infarct) ☐ Benadruk dat de patiënt niet zomaar kan stoppen, alleen in overleg met de behandelend arts ☐ Wijs patiënt op aanvullende informatiebronnen (bv. www.apotheek.nl of www.thuisarts.nl, of KIJKsluiter)

Geïdentificeerd probleem & oorzaken	Suggesties voor vervolgacties
F. Zorgen over medicatie ☐ Angst voor bijwerkingen ☐ Zorgen over lange termijn gevolgen van medicatie ☐ Zorgen over afhankelijkheid van medicatie ☐ Patiënt is bang om te stoppen (bv. bij tijdelijk geneesmiddel) ☐ GEEN	☐ Bied luisterend oor voor zorgen ☐ Geef mondeling uitleg over de kans op bijwerkingen (of recidive) en stel de patiënt zo goed mogelijk gerust ☐ Ga na of je met je uitleg (onterechte) zorgen weg hebt genomen! ☐ Wijs patiënt op aanvullende informatiebronnen (bv. www.apotheek.nl)
G. Kennisbarrières ☐ Gebrek aan kennis over medicatie/ ziekte/ lichaam ☐ Gebrek aan kennis over verandering in verpakking ☐ Tegenstrijdige informatie gekregen over geneesmiddel ☐ Gebrek aan inzicht in eigen geneesmiddelengebruik ☐ Gebrek aan zelfvertrouwen om geneesmiddel in te nemen volgens voorschrift ☐ GEEN	☐ Geef mondelinge uitleg over werking, bijwerkingen en gebruik van de medicatie ☐ Geef mondelinge uitleg over reden van verpakkingsverandering en eventuele gevolgen ☐ Benadruk (nogmaals) de noodzaak van gebruik ☐ Wijs patiënt op aanvullende informatiebronnen (bv. www.apotheek.nl of www.thuisarts.nl) ☐ Maak innameschema met **wanneer** (tijdstip) en **hoe vaak** het medicijn gebruikt moet worden ☐ Bekijk met patiënt of iemand in omgeving patiënt kan ondersteunen bij medicatiegebruik
H. Informatie niet (kunnen) begrijpen/ toepassen ☐ Beperkte gezondheidsvaardigheden/ laaggeletterdheid ☐ Taalbarrière/ cultuurverschillen ☐ Geheugenproblemen ☐ Problemen met gehoor/ zicht/ mobiliteit ☐ GEEN	☐ Gebruik korte zinnen, vermijd vakjargon/ moeilijke woorden, bouw pauzes in het gesprek in ☐ Herhaal de belangrijkste informatie ☐ Ga regelmatig na of de patiënt de informatie begrepen heeft ☐ Vraag de patiënt het in eigen woorden te herhalen ☐ Zoek op 'eenvoudig voorlichtingsmateriaal' op www.pharos.nl) ☐ Bekijk met patiënt of iemand in omgeving patiënt kan ondersteunen bij medicatiegebruik
I. Bepaalde (hulp)stoffen niet kunnen nemen ☐ Religieuze overtuiging, bv alcohol ☐ Vegetarisch/ veganistische overtuiging, bv. gelatine, kleurstof ☐ GEEN	☐ Ga na of er een alternatief is waar stof(fen) niet in verwerkt zijn ☐ Overleg met arts over alternatief
J. Kosten ☐ Eigen bijdrage probleem ☐ Onduidelijkheid over kosten ☐ GEEN	☐ Geef toelichting over geneesmiddelenkosten/ eigen bijdrage ☐ Ga na in hoeverre de eigen bijdrage een probleem vormt (is er stopgevaar?) ☐ Ga na of er een alternatief is waarbij de eigen bijdrage minder hoog of niet aanwezig is ☐ Overleg met arts over alternatief
K. Overige problemen, oorzaken en vervolgacties	

Gespreksduur: _____ minuten

Stuur de ingevulde kaart a.u.b. per mail naar: [redacted]