

# The Changing Face of Community Pharmacy Practice

Increasing time for our priorities

CPS

Preferences

Priorities

Cost-Effectiveness



Jeroen M. van de Pol



# **The Changing Face of Community Pharmacy Practice**

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Layout design and printing: Ridderprint | [www.ridderprint.nl](http://www.ridderprint.nl)  
ISBN: 978-94-6416-454-1

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The work presented in this thesis was performed at the Division of Pharmacoepdemiology and Clinical Pharmacology, Utrecht Institute for Pharmaceutical Sciences, Utrecht University. Financial support was provided by BENU Apotheken and by the Royal Dutch Pharmacists Association (KNMP).

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# **The Changing Face of Community Pharmacy Practice**

**Increasing time for our priorities**

## **Een Andere Rol voor de Openbaar Apotheker**

**Meer tijd voor onze prioriteiten  
(met een samenvatting in het Nederlands)**

PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Universiteit Utrecht  
op gezag van de rector magnificus, prof.dr. H.R.B.M. Kummeling,  
ingevolge het besluit van het college voor promoties in het openbaar te  
verdedigen op maandag 27 september 2021 des middags te 2.15 uur

door

Jeroen Marius van de Pol  
geboren op 17 oktober 1988 te Veenendaal

**Promotor:** Prof. Dr. M.L. Bouvy

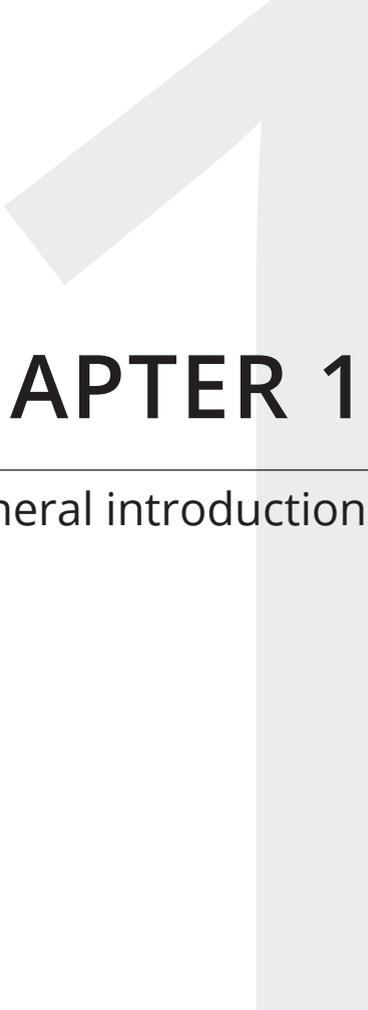
**Copromotor:** Dr. E.S. Koster

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CPS



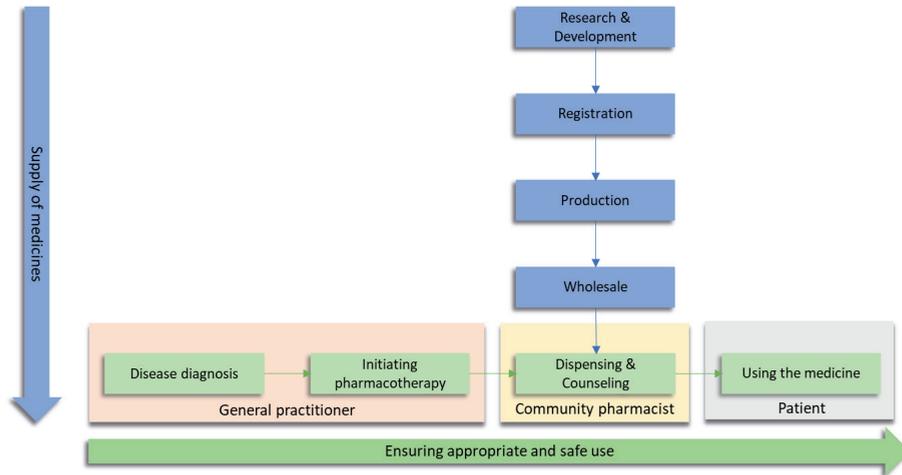
# CHAPTER 1

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General introduction

## Community pharmacy practice in the Netherlands

Community pharmacies in the Netherlands are positioned at a crossroad where two main responsibilities of community pharmacists within the healthcare system meet [1]: (1) the safe distribution of medicines to patients and (2) the provision of adequate support to patients in order to ensure effective and safe use of medicines (see Figure 1).



**Figure 1: Community pharmacy practice at the crossroad of supply and the provision of care [2].**

A community pharmacist holds full responsibility for the quality and outcome of all processes within the pharmacy according to professional guidelines and Dutch law [1]. However, due to the number of patients a community pharmacy serves (the average patient population for a community pharmacy in The Netherlands is 8,000) [3], a single community pharmacist is unable to perform these tasks alone. Depending on the size of the community pharmacy, roughly four pharmacy technicians support the pharmacist on a workday and in some cases, the community pharmacist is supported by an additional (secondary) pharmacist (mostly called a locum pharmacist). Although officially only the registered community pharmacist is allowed to dispense prescription medicines, in daily clinical practice locum pharmacists and pharmacy technicians will dispense medicines and counsel patients under the supervision of a registered community pharmacist. Community pharmacist perform a mandatory final check on every prescription that has been processed within the community pharmacy. During this final check, the community pharmacist will check whether the appropriate medicine has been dispensed and potential clinical risks (e.g. drug-drug or drug-

disease interactions) have been adequately addressed. Also, the community pharmacists checks, when applicable, if appropriate information and counseling has been provided to the patient [4].

The community pharmacist has multiple tasks in daily community pharmacy practice, such as the organization and management of the community pharmacy, managing the dispensing process, adequate stock keeping, finances and quality management. Next to such activities, the community pharmacist provides cognitive pharmaceutical services (CPS) such as clinical medication reviews, home-visits after hospital discharge and pharmacotherapy audit meetings with prescribers.

## Cognitive Pharmaceutical Services

Cipolle et al. defined care related services provided by pharmacists as '*Cognitive Pharmaceutical Services*' (CPS) [5]. The definition is '*the use of specialized knowledge by the pharmacist for the patient or health professionals for the purpose of promoting effective and safe drug therapy*'. This definition explicitly implies that the role of the community pharmacists goes beyond the dispensing of medicines and even beyond basic clinical risk management such as checks on drug-drug interactions and contra-indications. CPS aims to improve patients' quality of life by ensuring safe and effective medication use tailored to patient' needs.

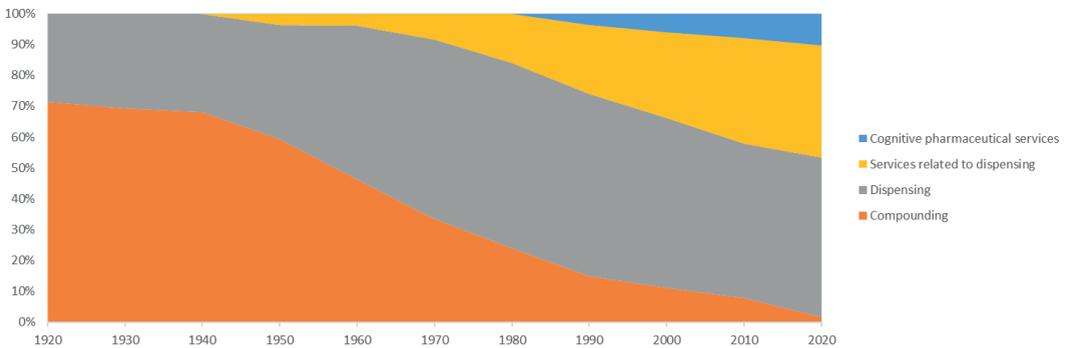
Community pharmacists provide a wide range of CPS that can focus on different healthcare conditions [6-12]. One example of these services is the pharmacist led medication review [13]. The pharmacist led medication review is a service in collaboration with the GP to identify drug related problems (DRPs) and optimizing therapy for patients. Based on patient' needs, focus can be put on personal goals of patients using goal attainment scaling (GAS) [14]. Other examples are the community pharmacist conducting a home-visit after patients get discharged from the hospital [15], services to improve medication adherence [16], but also activities like pharmacotherapy audit meetings [17] that do not include direct patient contact are considered CPS concerning the definition of Cipolle [5].

## Transition of community pharmacy practice

Community pharmacy practice has seen multiple transitions over the last century. At first, the profession focused on compounding and dispensing. From the 1920s, the profession was increasingly questioning its own professional standing with the introduction of large scale premanufactured medicines. From the 1950s, multiple new medicine discoveries have been made putting more and more emphasis on dispensing and less on compounding. This motivated the first patient-care

## Chapter 1

oriented community pharmacists to start thinking of offering care related services to patients related to dispensing. In the 1970s and 1980s developments were made regarding clinical pharmacy and viewing the community pharmacists more as a healthcare provider instead of a retailer. From the 2000s, developments regarding non-dispensing services (better known as CPS) took form in daily practice [18, 19]. Developments regarding CPS were deemed desirable to put more emphasis on the expertise of community pharmacists [20, 21]. See Figure 2 for a schematic overview.



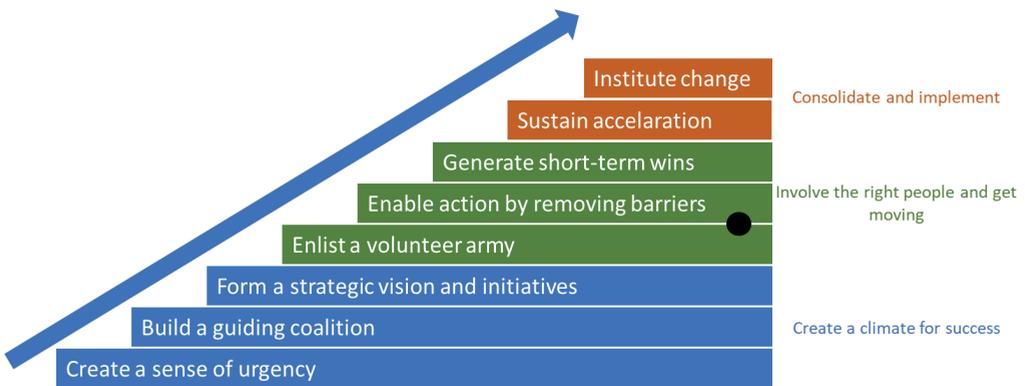
**Figure 2: Schematic overview of developments within community pharmacy practice over the years. Percentages are indicative.**

Community pharmacy practice is still within a transitional phase, in which the primary focus of the profession is being shifted from traditional tasks such as dispensing and compounding of medicines leading towards the provision of CPS (non-dispensing services). This transitional phase encompasses multiple changes for the community pharmacy profession, both within the community pharmacy in tasks to be performed, as well as on the outside regarding topics such as the call to curb the ever-increasing healthcare costs [22] and concomitantly seek reimbursement for new pharmacy services. As any professional, healthcare professionals who do not recognize the need to constantly adapt their practice to the demands of their changing environment run the risk of becoming redundant over time.

Therefore, change management is probably one of the most important challenges within healthcare and therefore also for community pharmacy practice. To keep up with changes occurring in healthcare and developments within society, healthcare professionals and policymakers have to consider and respond to a wide variety of demands from different stakeholders. It is sometimes even stated that healthcare is considered to be continuously developing with new and emerging insights and information presenting itself in an ever increasing pace [23]. Demands

from patients are of paramount importance and need to be considered when developing healthcare services including community pharmacy services. However, one should not forget the demands and opinions of healthcare professionals themselves and try to align these with demands from patients. If this step is not undertaken, the risk is being introduced that healthcare professionals become disengaged [23]. Experiences of disengagement may result in future resistance to change. Change management requires careful thought, but also the courage to make decisions that will get the support from- and direct health care providers in the desired directions [23, 24].

The transitional phase currently ongoing within community pharmacy practice can be described with Kotter's 8-step change model, which has been used successfully in other healthcare sectors both to describe and implement change [25]. This model describes eight different steps towards successful implementation of change (Figure 3).



**Figure 3: Kotter's 8 step model to implement change successfully. The dot illustrates the current position of change within community pharmacy practice.**

With regard to change towards an increased care provide role of the community pharmacist the first steps within Kotter's 8-step change model have actually already been made in the past decades. The dot in Figure 3 illustrates the current position of community pharmacy practice within the transitional phase according to Kotter's 8-step change model. This indicates that steps from a sense of urgency to enlisting a volunteer army have already been undertaken in certain degree. Currently, the profession is at a point that barriers need to be identified and resolved. The steps that have already been undertaken will be highlighted next.

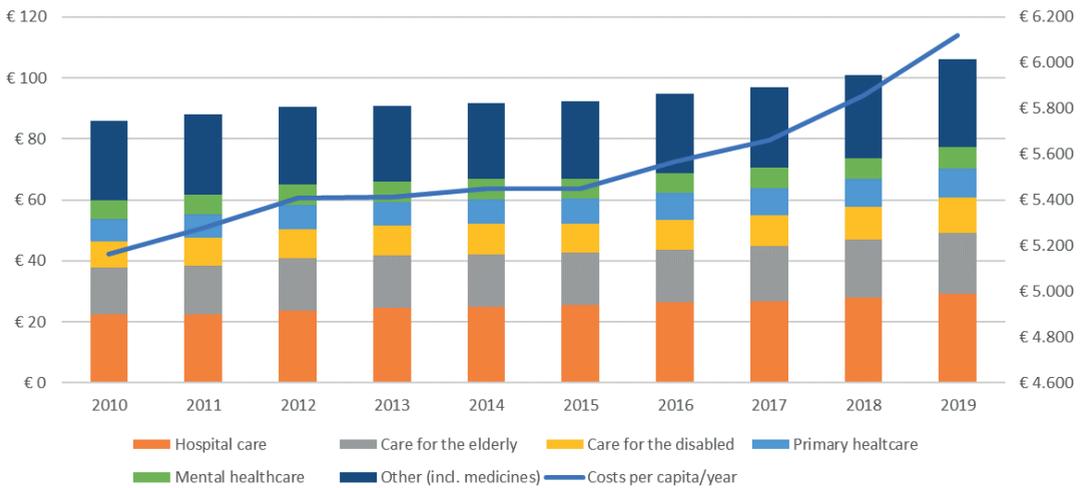
## Sense of urgency

A sense of urgency needs to be present to motivate different stakeholders into actually agreeing on the necessity of change and starting the change process. Kotter states that a sense of urgency can be created through a bold, aspirational opportunity statement [25].

A sense of urgency was created by the 2006 HARM-report regarding hospital admissions related to medication. Results from this report stated that 2.4% of all hospital admissions and 5.6% of emergency hospital admissions were related to medication. A total of 46% of these admissions were deemed potentially avoidable. The estimated costs associated with these potentially avoidable admissions was estimated around 85 million Euros per year [26]. Similar conclusions were presented in a review article, which stated that one out of 10 hospital admissions are due to adverse drug reactions and that in most cases these were considered preventable [27]. Other research concluded that the contribution of community pharmacists within all these fields contribute to a better and sustainable healthcare system [28].

Stakeholders such as healthcare insurers and governmental bodies are increasingly aware of the potential added value that community pharmacy practice can have when focusing primarily on the provision of CPS and the role community pharmacists can have within the healthcare system that is ever increasing in complexity and costs.

All over the world the burden on healthcare systems is ever increasing [29, 30]. Reasons are the ageing population with increasing numbers of chronic conditions and increased healthcare demand. Innovative medical technology including medicines and shortages of healthcare providers further increase healthcare costs. And whereas new technologies further extend life expectancy, this also further increases the financial burden on the healthcare system [31]. See Figure 4 for a brief overview of the increasing Dutch healthcare costs over the years.



**Figure 4: Costs of Dutch healthcare system over the years presented in billion Euros (left y-axis) and costs for healthcare per capita per year (right y-axis) [29].**

Policymakers concomitantly realized that the provision of care needs to transition from secondary to primary care as much as possible. Due to this transition, more and more (complex) patients need to be treated within the primary care system. This shift is predominantly driven by financial motivators. Also, the utilization of the healthcare system by Dutch citizens is increasing with people paying more visits to general practitioners (GPs) office over the years, in part due to the ageing population [29]. This increases pressure on healthcare providers within the primary care system and especially the GP. Regarding pharmacotherapy, community pharmacists are key players within the primary care system capable of supporting general practitioners in handling and managing complex pharmacotherapy in patients. However, to facilitate community pharmacists to support prescribers, a revision of the current role and time-utilization of community pharmacists is probably needed to enable community pharmacists to better support GPs and patients by providing CPS.

Although most care is being provided in the primary care system, the costs within the secondary care system are higher. However, the use of secondary care is not always necessary. This explains the necessity of shifting care provision from secondary care towards primary care [32]. But at the same time, policymakers state that the quality of care should be upheld (or even improved). A study in 2018 demonstrated that two-thirds of GPs experience the current workload as too high and are not able to finish the amount of work in the therefore available time. The majority also states to have a negative attitude regarding the workload

even further increasing in the upcoming years [33]. This has the full attention of the Dutch minister of health [34]. So for the transition from secondary- to primary care to be successful, GPs are in need of support. Especially regarding medicines that are of increasing complexity requiring expertise that community pharmacists predominantly have. Therefore, to be able to contain healthcare costs by transitioning from secondary care to primary care, extensive collaboration between healthcare professionals within the primary care setting is a necessity to manage the increasing burden (predominantly by supporting GPs with the increased burden). This therefore creates an opportunity for the community pharmacy as a profession to step in. However, as stated earlier, the role of the community pharmacist is predominantly focused on the dispensing of medicines and compounding medicines and not primarily on the provision of CPS.

Currently, community pharmacists can be considered healthcare providers that are under-utilized, as they are able to provide more CPS, but are not enabled in doing so. This whilst community pharmacists are well trained and educated healthcare providers to support both patients and other healthcare providers using their pharmaceutical expertise. Community pharmacists have always played a vital role in containing costs of pharmaceutical treatment by stimulating the usage of affordable (generic) medicine when possible [35]. But also, medicines need to be properly used and adhered to, to be effective. Community pharmacists are highly approachable healthcare professionals that can play a vital role in achieving this [36 - 38], next to activities already being performed like checking for drug-drug interactions and contra-indications.

The Royal Dutch Pharmacists Association is aware of the under-utilized value of community pharmacists and the necessity to change community pharmacy practice and have been continuously working on providing insights to different stakeholders. Examples of an opportunity statement as stated by Kotter is the campaign "*Klaar om te wenden!*" (translated to English: "*ready about!*") initiated by The Royal Dutch Pharmacists Association in 1993 to promote more direct patient contact in community pharmacy practice [20]. Other examples of opportunity statements are the white paper published in 2010 on which the future position and role of the community pharmacist is presented [21] and a vision on the future of community pharmacy practice [39].

## A guiding coalition

The second step in Kotters' 8-step change model states that a guiding coalition is a coalition of effective people that can guide, coordinate and communicate [25]. This can be seen as the formation of a group with enough impact that can actually lead the change. Within the Netherlands, the Royal Dutch Pharmacists Association is the most likely party, supported by the larger community pharmacy chains. This coalition will need the support of other stakeholders as well such as GP professional bodies and governmental bodies.

The current community pharmacy market is highly divided. With the majority of roughly the nationwide 2,000 community pharmacies being part of one of four community pharmacy chains that negotiate on their behalf with healthcare insurance companies [40]. These four companies also compete with each other and have diverging interests. So this creates a risk for the community pharmacy profession in which these diverging interests can lead to a reduction in cooperation and realizing necessary developments within the profession. However, the Royal Dutch Pharmacists Association in cooperation with these companies have organized a regular recurring meeting to discuss issues such as professional developments. This to create common grounds within the entire profession to facilitate developments based on the quality of care.

## Form a strategic vision and initiatives

Within Kotters' 8-step change model, a strategic vision and initiatives directly linked to the vision clarifies on how the future will be different from the past and present [25].

Already in the year 1993 the Royal Dutch Pharmacists Association (KNMP) in the Netherlands launched a campaign called "*klaar om te wenden!*" (translated to English: "*ready about!*"). The campaign was initiated to inspire community pharmacist to redefine their position within the healthcare setting by putting more emphasis on relationships with both patients and general practitioners [20]. However, the effect that the campaign eventually had was small. The KNMP also published a whitepaper in 2010 stating the role and position of the community pharmacist within healthcare [21]. Nowadays, the KNMP has stated a vision for the future '*your pharmacist in 2020*' [39] and is also developing a renewed vision for 2025. However, some topics that were relevant regarding the transition of community pharmacy practice in 1993 and 2010 are still current topics today. This shows that shifting focus within a profession is a gradual process and suggests multiple barriers when implementing the strategic vision into daily community pharmacy practice.

## **Enlist a volunteer army**

In Kotters' 8-step change model, enlisting a volunteer army means rallying a number of people around a common opportunity to get change in motion [25]. Within community pharmacy practice, this means some community pharmacists that are willing and able to pioneer within the field of community pharmacy in offering CPS to patients and participating in research. This can also be seen as the classic diffusion of innovations [41] with a volunteer army representing the innovators.

Individual community pharmacists already started to design and implement CPS in daily practice. Some examples are the pharmacist-led clinical medication review focusing on patients' personal goals (of which the benefits to society will be addresses later in this thesis in chapter 4), the HomeCome program developed to support patients who are being discharged from the hospital [15] and community pharmacists organizing collaboration with GPs to position a community pharmacist at the GPs office [42 - 44]. A study concerning self-care management found that community pharmacists are capable of advising and supporting patients [45] and that patients with regard to CPS provided by community pharmacists are overall satisfied with CPS provided by community pharmacists [46]. The role of the community pharmacist is most successful when fully integrated within the primary care team [9, 47]. Next to benefits on health outcome and costs, research has found that community pharmacists could potentially play a role in alleviating time constraints that GPs and nurses are currently facing [48 - 50].

Despite the aforementioned initiatives and signs of the potential added value of CPS provision by community pharmacists, the strategic vision which emphasizes the focus on CPS provision cannot be considered to have been implemented nationwide and most community pharmacies are struggling with the shift towards CPS provision. This indicates that certain barriers are present that are difficult to overcome. According to the diffusion of innovations [41], this probably most likely affects the late majority and the laggards.

## **Enable action by removing barriers**

Enabling action by removing barriers is the next step within Kotters' 8-step change model. These barriers can differ with regard to the necessary change. Examples are removing inefficient processes and hierarchies to provide some degrees of freedom to implement change [25]. Specifically within the field of community pharmacy practice, barriers in the transition towards CPS provision need to be identified first. Some have already been identified and studied before and some are the main subject of the chapters further on in this thesis.

One example of such a barrier is the current reimbursement system for community pharmacies. Currently, community pharmacists are still primarily reimbursed for the distribution and dispensing of medicines [48]. So the economic incentive still comes from these traditional activities, whereas the fees for CPS related activities are insufficient to keep the pharmacy business running [48, 51]. Concomitantly, policymakers and healthcare insurers are acting reservedly regarding (adequate) remuneration of care related services provided from a community pharmacy. This is due to the fact that the cost-effective nature of CPS in daily community pharmacy practice is still part of debate. The community pharmacy practice is confronted with a similar challenge in other countries, but these countries are already implementing solution strategies. For example, in the United Kingdom the NHS has launched the *Minor Ailment Scheme*. This enables community pharmacists to diagnose and treat certain minor ailments, in support of general practitioners [52]. The department of health in Australia presented the *Sixth Community Pharmacy Agreement (6CPA)*, enabling community pharmacists to provide more CPS [53].

Like most health care professionals, community pharmacists are being confronted with large amounts of red tape and the accompanying administrative burden [54]. The current medicine shortages, increase community pharmacists' administrative burden even further. Logistic issues are consuming more time and further limiting the amount of time that can be spent on the provision of CPS. To get further insights into the actual time-utilization of community pharmacists, could benefit the profession in identifying possible chokepoints and providing further insights to enable the profession to focus more on the provision of CPS.

Next to barriers, opportunities for community pharmacy practice should also be identified and further researched. An important potential opportunity is the needs of patients and the general public regarding services to be provided by community pharmacists. Patient demand can act as a major opportunity in further developing the profession. Also, the potential benefits of CPS provided by community pharmacists as mentioned earlier is an opportunity for the profession and more insights in these benefits can help the profession in its argument to transition towards CPS.

### **Next steps according to Kotters' 8-step change model**

The first five steps of Kotters' 8-step change model [25] have been briefly highlighted and in differing degrees, progress has been made in daily practice. The major focus within the community pharmacy profession is currently on identifying different barriers and facilitators. Simultaneously trying to overcome barriers and further enhance facilitators. After this however, a few more steps have to be made according to Kotters' 8-step change model. These will be further discussed within the general discussion at the end of this thesis.

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So in summary, community pharmacy as a profession has been shifting its focus from traditional tasks to the provision of CPS over 30 years. Despite this long process, community pharmacists are still undergoing this transitional phase. This exemplifies the complexity of a major change in a profession and therefore also the necessity to identify barriers and opportunities to support the profession achieving change.

## Objectives

The aim of this thesis was to get more insights into current community pharmacy practice and to identify barriers and facilitators that either support or hamper the community pharmacy profession to shift focus on the provision of CPS in daily community pharmacy practice.

The following objectives were defined:

In **Chapter 2.1** an overview of the daily activities of the community pharmacist is generated. As insight in the current time utilization of community pharmacists is essential before we can propose potential changes in time utilization;

**Chapter 2.2** identifies characteristics of community pharmacists that are able to focus more on the provision of CPS compared to those that are less able to focus on CPS provision to see if some characteristics hamper or enable community pharmacists to focus on CPS;

Identifying how community pharmacists prioritize CPS is discussed in **Chapter 3**. CPS is compared to other activities in daily community pharmacy practice to identify the importance of CPS perceived by community pharmacists;

Providing insights into the cost-effective value of CPS provided by community pharmacists, **Chapter 4** discusses a cost-utility and cost-effectiveness analysis from a societal perspective of a patient-centered clinical medication review;

In **Chapter 5.1** the preferences of healthcare consumers in general is explored to identify the type of services they currently prefer within community pharmacy practice;

**Chapter 5.2** identifies preferences from patients regarding future services in community pharmacy practice to gain more insights on which services to further develop within the community pharmacy profession;

In **Chapter 6**, the results presented in this thesis are put in a broader perspective, including recommendations for both community pharmacy professional bodies and policymakers.

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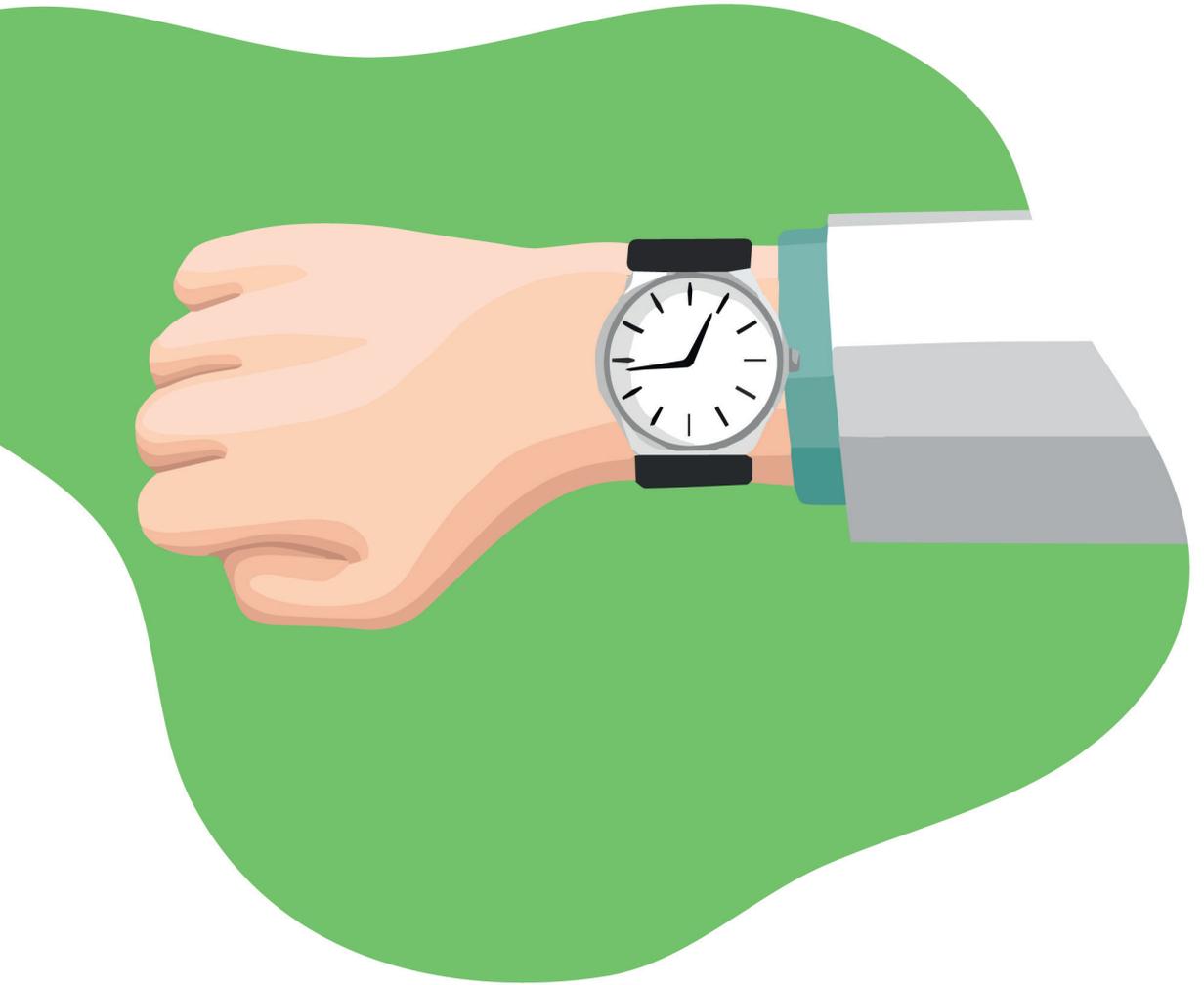
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# PART 1

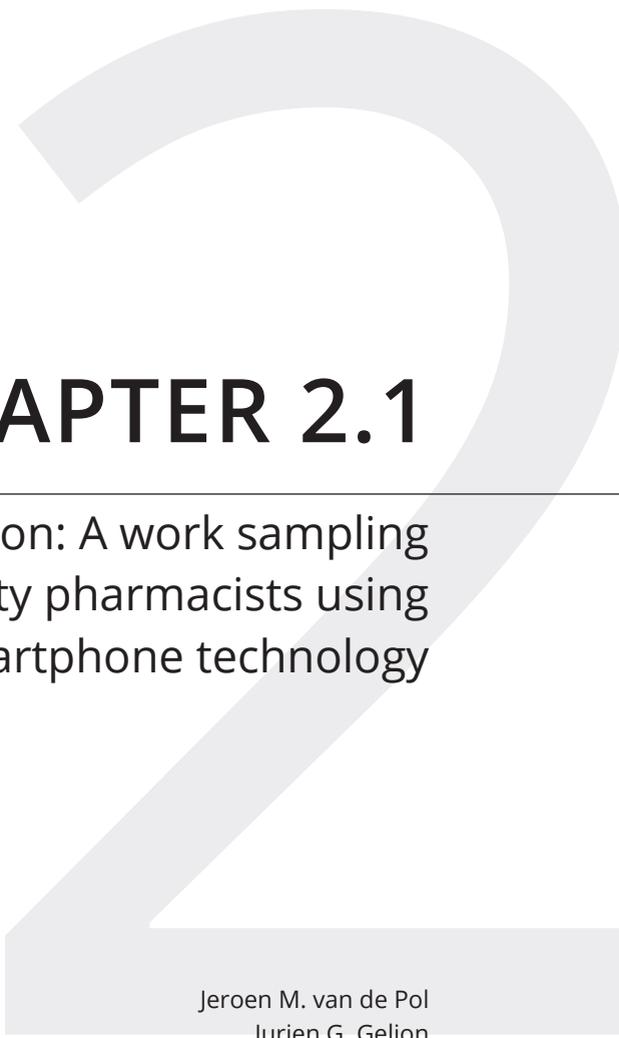
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## TIME-UTILIZATION BY COMMUNITY PHARMACISTS





CPS



# CHAPTER 2.1

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Pharmacy in transition: A work sampling study of community pharmacists using smartphone technology

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**Research in Social and Administrative Pharmacy 2019;15:70-6.**

## Abstract

### Introduction

The nature of community pharmacy is changing, shifting from the preparation and distribution of medicines to the provision of cognitive pharmaceutical services (CPS); however, often the provision of traditional services leaves little time for innovative services. This study investigated the time community pharmacists spend on the tasks and activities of daily practice and to what extent they are able to implement CPS-related services in daily practice.

### Methods

Self-reporting work sampling was used to register the activities of community pharmacists. A smartphone application, designed specifically for this purpose, alerted participants to register their current activity five times per working day for 6 weeks. Participants also completed an online survey about baseline characteristics.

### Results

Ninety-one Dutch community pharmacists provided work-sampling data (7848 registered activities). Overall, 51.5% of their time was spent on professional activities, 35.4% on semi-professional activities, and 13.1% on non-professional activities. The proportion of time devoted to CPS decreased during the workweek, whereas the time spent on traditional task increased.

### Discussion and conclusion

This study shows it is feasible to collect work-sampling data using smartphone technology. Community pharmacists spent almost half of their time on semi-professional and non-professional activities, activities that could be delegated to other staff members. In practice, the transition to CPS is hampered by competing traditional tasks, which prevents community pharmacists from profiling themselves as pharmaceutical experts in daily practice.

## Introduction

Worldwide, the role of community pharmacists is changing, shifting from the traditional preparation and distribution of medicines to the provision of cognitive pharmaceutical services (CPS). Both policy makers and professional pharmacy organizations emphasize the necessity of this transition for the future of the profession and for the benefit of the ageing population [1-6]. Population ageing will increase the need for healthcare provision, with increasing demands being made of all healthcare providers, especially when managing patients with multimorbidity and polypharmacy.

Community pharmacists can have an important role as medicine experts in the increasingly demanding healthcare setting [7]. In current daily practice, community pharmacists are underutilized as a healthcare provider, even though their value to healthcare is widely recognized. New services, like medicines use reviews (MUR), discharge counselling or Inhaler Technique Assessment Service (ITAS) are incorporated slowly into community pharmacy practice [8]. Next to reimbursement issues, many community pharmacists encounter a lack of time in daily practice [9-11]. It is therefore important to gain insight into how much time community pharmacists devote to different activities and tasks.

Earlier time utilization studies have shown that community pharmacists devote considerable time and effort to logistic processes, such as labelling and dispensing [6,12-21]. Work sampling is a generally accepted technique to obtain insight into time utilization and can be applied to assess the time community pharmacists invest in labelling and dispensing and direct patient care [22]. It is based on the assumption that a sufficient number of random observations enable a reliable estimate to be made of the time spent on different activities. However, these studies are time consuming for both participants and researchers and have therefore generally involved relatively small sample sizes. The advent of smartphones provides new possibilities for efficient data collection, by reducing the workload of work sampling by eliminating the need for trained external observers. This method is labor intensive and can cause a "Hawthorne" effect (participants changing their behavior as a consequence of the presence of an observer) [12]. Another possibility is to let participants estimate their time commitment to specific activities, but this method is considered unreliable due to recall bias [12].

The aim of this study is to assess the amount of time community pharmacists spend on different activities (taking into account whether these activities are professional, semi-professional or non-professional) and how these activities are divided over the workweek.

## Methods

### Study design

Cross-sectional study using a work-sampling technique based on self-reporting at random intervals was conducted with community pharmacists between January and July 2016. A smartphone application was developed to register the activities of participating pharmacists. The application randomly alerted pharmacists to record their activities five times between 9.00 and 19.00 hours each working day (within  $\pm 60$  minutes of 10.00, 12.00, 14.00, 16.00, and 18.00 hours). This timing was purposely chosen to register activities during the entire workday, while reducing the risk of registering activities with a daily cyclical nature. When presented with an alert, participants were asked to fill in their precise activity at that specific moment. The activities were registered in an online database. Participants could register activities directly after the initial alert or optionally until the end of the workday. After that, an alert was coded as missing. The time that elapsed between the alert and the actual registration of the activity was recorded. Participants were also asked to complete an online survey on baseline characteristics. The duration of this study lasted 6 weeks for each participant to ensure that activities with a monthly cyclical nature (e.g. the monthly billing cycle) would be recorded at least once during the observation period.

### Participants

Community pharmacists were recruited through the Utrecht Pharmacy Practice network for Education and Research (UPPER), which includes approximately 1,200 of the in total 1,900 Dutch community pharmacies [23]. All registered community pharmacists in the UPPER network were informed about the study by means of a short announcement in the UPPER newsletter and a random selection of 400 community pharmacists was invited by e-mail.

### Mobile application development

Categories and subcategories of activities were based on previous community pharmacy work-sampling studies performed in Northern Ireland [13,17] and were slightly modified to fit current Dutch pharmacy practice. Subsequently, five Dutch practicing community pharmacists tested a beta version of the application. Their feedback was used to define the final categories and subcategories (see table 1 and supplementary material table 1). They also deemed five alerts per workday acceptable. To prevent misclassification, a short description of the type of activities in each subcategory was provided (see supplementary material table 1).

If pharmacists were unable to categorize their activities, they could enter free text, which was recoded by the authors (JvdP, MB) after data collection was finished. Free texts that could not be interpreted by the authors were excluded.

The risk of misclassification was assessed in a pilot study by asking eight practising community pharmacists to classify 50 activities into one of the main categories listed in table 1. The agreement between the eight pharmacists, and between the pharmacists and the categorization made by the researchers, was assessed. Kappa was calculated for both situations to adjust for chance agreement. The agreement between the eight pharmacists had a Fleiss' kappa of 0.799. On the basis of this result, the researchers made the final categorization. There was substantial agreement between the eight pharmacists and the final categorization (Cohen's kappa 0.71–0.93) [24].

## Ethics and confidentiality

The research proposal was approved by the Institutional Review Board of Utrecht University. The smartphone application provided each participant with a unique *user code*. These codes could not be linked to identifiers of individual participants. Acquired data were anonymous and treated as confidential.

## Data analysis

The data were collected on an online server using Microsoft Excel and analyzed using Microsoft Excel, Microsoft Access, and SPSS 23.0. The number of registered activities is expressed as the mean and median percentage of the total number of registered activities and interquartile range. Percentages can be converted to actual time dedicated to each activity [18]. Activities were classified in three levels based on the necessity of the professional skills of a pharmacist to perform the activity: professional, semi-professional, and non-professional. A professional activity needs the specific expertise of a pharmacist; semi-professional activities can be delegated to pharmacy technicians under the supervision of a pharmacist; and non-professional activities do not require the expertise of either a pharmacist or pharmacy technician. Consensus on the classification of activities was reached by a panel of six practising community pharmacists (see supplementary material table 1).

**Table 1: Classification of pharmacists' activities (a more detailed description is given in supplementary material table 1).**

<b>Main activity</b>	<b>Definition</b>
Cognitive pharmaceutical services	Direct contact with patients or healthcare providers (e.g. counselling). Performing medication reviews. Updating patient status.
Logistics	Stock maintenance. Ordering products from suppliers. Contact with patients regarding the supply of products.
Organizational activities	Internal staff meetings. External meetings on communal healthcare projects.
Quality assurance	Updating the quality manual. Attending audits. Performing customer satisfaction research.
Human resource management	Staff appraisal. Making work schedules. Supervising interns.
Household chores	Cleaning the pharmacy. Repairing broken or malfunctioning equipment.
Finances	Bookkeeping. Health insurance negotiations.
Dispensing process	Validating, labelling, preparing, and checking medicines.
Final check of prescription	Checking the appropriateness of the prescription. Checking drug indication, dose and suitability for the patient.
Clinical risk management	Checking all medication alerts (e.g. interactions, drug dose, intolerability).
Education	Attending post-graduate education
Non-professional encounters and other	General chat with patients, colleagues or other healthcare professionals.
Rest	Lunch, coffee breaks, toilet breaks.

## Results

A total of 156 community pharmacists agreed to participate and registered 11,918 activities using the smartphone application between 11 January and 27 July 2016; 65 participants who did not complete the online survey were excluded. Results from the excluded versus included participants are presented in supplementary material table 2. In total, 734 alerts occurred when participants were not at work (because of holidays or part-time employment); these responses were excluded (not formal activities). All analyses were performed on the remaining dataset consisting of 7848 registered activities provided by 91 participating pharmacists (see figure 1). Demographic data of the participants are shown in table 1.

Data analysis using non-parametric Mann-Whitney U test showed no statistical differences between the activities registered by participants who did or did not complete the online survey. However, there were statistical differences between participants who responded within an hour on average compared to participants who did not (see supplementary material table 2).

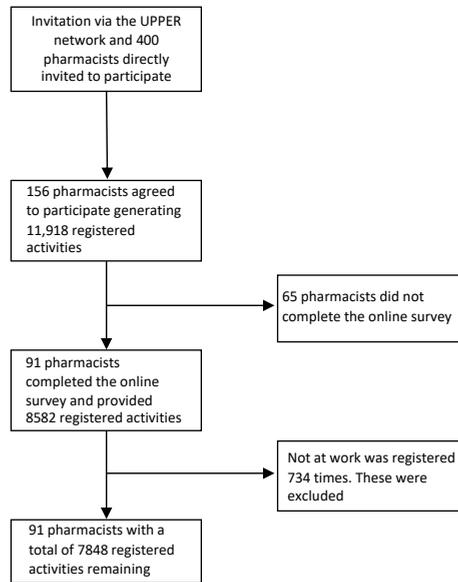


Figure 1: Data flowchart.

Table 2: Demographic data.

Characteristic	N = 91
Age in years (mean ± SD)	39.4 ± 10.7
Male gender	30 (33.0%)
Working experience in years (mean ± SD)	14.4 ± 10.1
Graduation year (mean ± SD)	2002 ± 10
Type of pharmacist:	
Pharmacist owner	27 (29.7%)
Pharmacist in employment	33 (36.3%)
Locum pharmacist	31 (34.1%)
Working hours per week (mean ± SD)	36.7 ± 7.32
Response rate on presented alerts (mean % ± SD)	72.4 ± 18.1

## Chapter 2.1

Most participants were women and were on average 40 years old (table 2), consistent with Dutch employment statistics for pharmacists [25]. The participants had an average of about 15 years of working experience and showed a response rate of 72.4% on average on presented alerts. Throughout the workweek, community pharmacists spent most time (51.7%) on professional activities, with CPS, the dispensing process, and checking prescriptions being the most frequently recorded activities (table 3, figures 2 and 3).

**Table 3: Average and median percentage of time (with interquartile range) community pharmacists spend on various activity groups.**

Main activity	Average $\pm$ SD (%) N = 91	Median (%) N = 91	Interquartile range (IQR) (%)
Cognitive pharmaceutical services	14.2 $\pm$ 8.2	14.3	7.8 – 19.4
Logistics	5.0 $\pm$ 4.2	3.8	1.7 – 6.8
Organizational activities	8.7 $\pm$ 7.5	6.3	2.8 – 12.5
Quality assurance	2.9 $\pm$ 3.0	1.9	0.0 – 4.5
Human resource management	7.0 $\pm$ 6.2	5.4	3.0 – 8.9
Household chores	1.7 $\pm$ 2.1	1.0	0.0 – 3.0
Finances	6.1 $\pm$ 7.4	3.6	1.4 – 8.1
Dispensing process	15.7 $\pm$ 10.6	14.7	8.1 – 22.2
Final check of prescription	15.9 $\pm$ 7.3	14.9	11.1 – 20.5
Clinical risk management	5.7 $\pm$ 5.1	4.5	1.7 – 8.6
Education	5.4 $\pm$ 5.0	4.5	1.6 – 8.7
Rest	5.5 $\pm$ 3.9	5.2	2.3 – 8.1
Non-professional encounters and other	6.3 $\pm$ 3.8	6.1	3.2 – 8.3
Professional	51.5 $\pm$ 12.2	53.2	42.9 – 60.4
Semi-professional	35.4 $\pm$ 10.7	35.7	28.0 – 41.3
Non-professional	13.1 $\pm$ 6.8	12.2	8.0 – 16.5

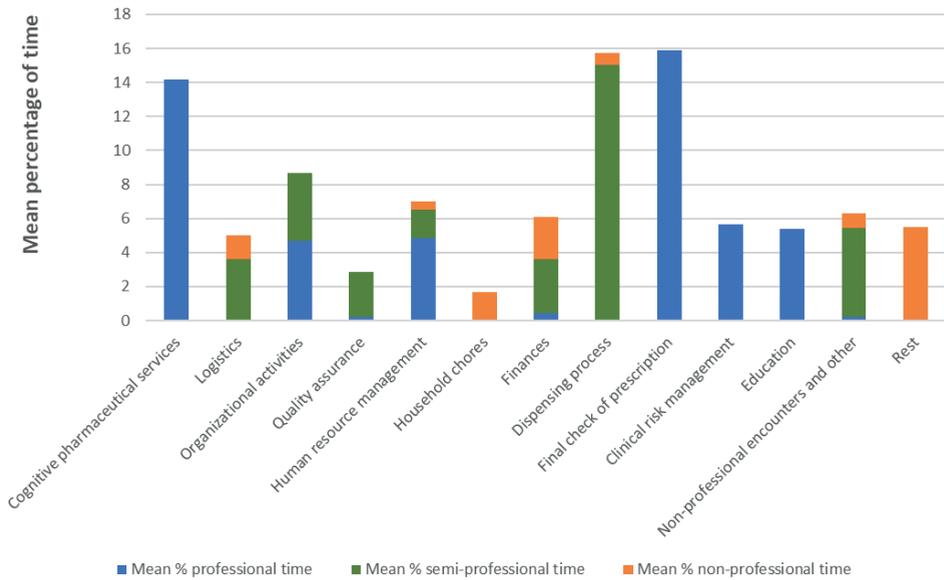


Figure 2: Mean percentage of time spent on each main activity, classified by whether the pharmacist’s professional skills were needed to perform the activity.

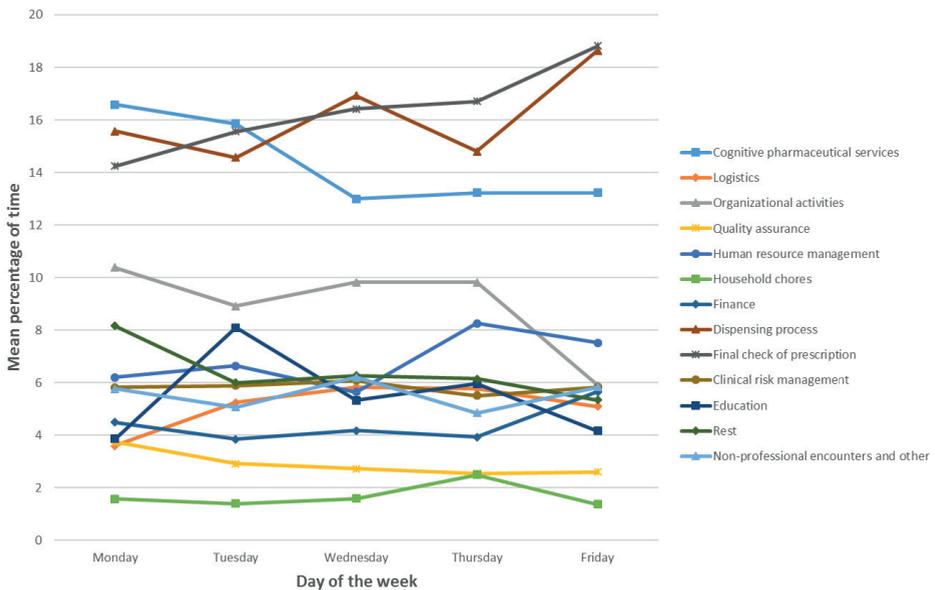


Figure 3: Variation in main activities during the working week.

## Discussion

This study shows that community pharmacists have a diverse and demanding set of activities in daily practice. While pharmacists spent approximately half (51.5%) of their time on activities that require their specific professional expertise, they spent a substantial proportion of their time on semi-professional activities (35.4%) and to a lesser extent on non-professional activities (13.1%). Although all professionals want to focus on their professional tasks as much as possible, it is impossible to avoid semi- and non-professional tasks, e.g. administrative work [23]. The current study population is representative of Dutch community pharmacists, and therefore this study provides a fair representation of time utilization by community pharmacists in the Netherlands [25].

Data was collected over a 6-month period, which makes it unlikely that results in other periods would be different. Activities that mainly took place outside this timeframe would be structurally missed; however, Dutch pharmacies are generally open between 8.00 and 18.00. Although this study reveals how community pharmacists spend their time in daily practice, it does not provide insight into the quality of the activities done [14].

Findings suggest that there is ample room to increase the time spent on CPS (currently 14.2%), although this will be at the expense of other activities. Dispensing activities (15.7%) and the final prescription check (15.9%) seem to compete with CPS, as suggested by the observation that less time was spent on CPS and more time was spent on dispensing and checking prescriptions as the week progressed. Both professional organizations and policymakers emphasize the importance of an increased focus on CPS. The results of this study show that community pharmacists are still mainly occupied with traditional tasks. It will be necessary to discontinue or delegate some of these traditional tasks in order to be able to redirect attention to CPS.

The dispensing process seems to be the primary candidate. Dispensing consists mainly of semi-professional activities that can be automated and delegated to other pharmacy staff. Although the final prescription check is considered a professional task and in many countries is mandatory for pharmacists, recent technological developments and in-process control mechanisms, such as barcode scanning, automated dispensing and clinical decision support systems, could render a final check by a pharmacist superfluous. These regulatory changes will be necessary in order to help pharmacists perform this task more efficiently (e.g. delegating the final check of low-risk prescriptions to pharmacy staff or support from intelligent software), and it will be necessary to demonstrate that changing these processes does not affect patient safety. However, some pharmacists may feel uncomfortable about delegating certain tasks [26].

The time (15.7%) that pharmacists spend on the dispensing process may be due to understaffing that is the result of reduced remuneration in community pharmacy. In the Dutch community pharmacy setting, dispensing has always been viewed as a typical task of the pharmacy technician, not the pharmacist. Thus, understaffing may have caused pharmacists to perform activities that could be delegated to technicians or support staff such as dispensing, managing finance (6.1%) and logistics (5.0%). Here again, the lack of remuneration may indirectly prevent pharmacists from devoting more time to CPS [22]. The administrative red tape required for reimbursement for the increasing number of (expensive) drugs and medical devices is time consuming and of very limited added value to society. Not only pharmacists but also other healthcare professionals report a high administrative workload that limits their ability to provide care-related services and directly impedes job satisfaction [27-30].

Though rest is a non-professional activity, its importance should not be underestimated. Too little rest carries the risk that the pharmacist makes medication errors [14]. In this study, community pharmacists had 45 minutes of rest during an 8-hour working day. This may explain the high burnout rate among Dutch community pharmacists, which is currently 1 in 3 [31]. Dutch and United Kingdom community pharmacy collective working agreements state that community pharmacists should have a 20- and 30-minute rest break every 6 hours (respectively 5.6–8.3%).

Work-sampling studies in community pharmacy are sparse, which makes it difficult to compare results, especially because pharmacists' tasks and responsibilities may differ nationally [12]. A review from 1996 reported that pharmacists spend between 17.6% and 46.9% of their time on professional activities [12]. Two more recent work-sampling studies from Northern Ireland performed in 1999 and 2009 also showed that pharmacists spend roughly half of their time on professional activities [13,17]. Little seems to have changed between 1999 and 2009. These studies also showed that pharmacists spend most of their time on dispensing.

These results suggest that the barriers that community pharmacists face in their transition to CPS are universal. More needs to be learned about these barriers – they could be financial (lack of remuneration) or professional (perceived importance of both traditional activities and CPS) [22,26]. More insight is needed into how to reform community pharmacy practice to prepare it for future demands and overcome obstacles in the process. Community pharmacists need to profile themselves as pharmaceutical experts.

## Chapter 2.1

This study shows that work sampling can be done in an efficient and user-friendly way by using smartphone technology. This technology makes it possible to include large groups of participants so as to generate more data and to repeat studies. Moreover, using self-reporting limits the “Hawthorne” effect compared to direct observation [32]. Another advantage is that pharmacists have a better insight into their activities than trained observer [33]. However, there are drawbacks to self-reported data. Participants may provide socially desirable answers and they may classify activities differently. The participants were provided with feedback on their time registration and included a benchmark, so as to discourage socially desirable responses. In the pilot stage of this study, it was found that the impact of misclassification was limited, perhaps because the smartphone application provided a brief explanation of what each activity entailed. This helped participants to choose the category that fitted best to their activity.

The use of a smartphone application meant that participants had to keep their smartphone with them at all times, which might not always be possible or desirable in daily clinical practice. Therefore, some activities were registered with a delay after the original alert, which could introduce recall bias and more socially desirable answers. Sensitivity analysis, however, showed no major differences between responses given within an hour after the alert versus responses given more than an hour after the alert. However, there was a significant difference between participants responding on average within an hour to alerts and those who responded later. This is probably because some activities (e.g. counselling patients) are not easily interrupted and so they are registered later.

A potential study limitation is recruitment bias. Community pharmacists with efficient coordinated work streams might have been over-represented, because they had more time to participate in research. However, the invitation letter encouraged pharmacists to participate in the study as it would give insight into own activities and would provide a benchmark. This might have stimulated pharmacists who are struggling with inefficient work streams to participate. Some participants actually reported that the study helped them gain insight into their own time utilization.

## Conclusion

Community pharmacists spend half of their time on professional activities, mainly CPS, dispensing tasks, and the final prescription check. This study suggests that various aspects of the current situation are barriers to the optimal utilization of the community pharmacy workforce.

## Acknowledgements

The authors thank Piet van der Wal from Umenz Benelux BV for developing the smartphone application used in this study. The authors also thank BENU Apotheken BV for funding this research and especially Eduard Lip, Peter de Braal and Rogier Hofman for their support.

## Conflicts of interest

None.

## Funding

This research received funding from BENU Apotheken to develop the smartphone application.

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## Supplementary material

**Table 1: Main activities and subcategories used in the smartphone application.**

Main activity	Subcategory	Level of professionalism
Cognitive pharmaceutical services	Medication use review	Professional
	Care-related contact with a patient (not a medication review)	
	Contact with another healthcare professional(s) about a patient (not a medication review)	
	Periodic meeting with GPs and pharmacists on prescribing policy	
	Updating clinical information from patients	
	Clinical rules	
Logistics	Contact with a patient about logistics	Semi-professional
	Stock management	
	Processing a recall	
	Stock-taking	
	Processing orders from the wholesaler	
Organizational activities	Contact with other healthcare professionals for organizational reasons	Professional
	Preparing or attending work meetings	Semi-professional
	General organization management	
Quality assurance	Supervising an audit	Professional
	Working on the quality manual	Semi-professional
	General quality assurance management	
	Investigating customer satisfaction	
	Investigating satisfaction with other healthcare professionals	
Human resource management	General employee management	Professional
	One-on-one conversation with an employee, e.g. job performance evaluation	
	Supervising an intern	
	Hiring new employees	Semi-professional
	Making and updating work schedules	
	Employee administration, e.g. salary, worked hours etc.	Non-professional
Household chores	General housekeeping tasks	Non-professional

Main activity	Subcategory	Level of professionalism
Finances	Assessing contracts with health insurance companies	Professional
	Checking declarations and authorizations	Semi-professional
	Administrative tasks for patients	
	Registering cash money in cash register and/or safe	Non-professional
	General financial administration	
Dispensing process	Processing prescriptions	Semi-professional
	Filling prescriptions	
	Checking filled prescriptions	
	Hand out filled prescriptions to patients	
	Preparing or checking a prepared drug	Non-professional
	Copying prescriptions for the digital archive	
Final check of prescription	Checking for inappropriate prescribing and possible distribution errors	Professional
Clinical risk management	Checking for inappropriate prescribing and faulty drug combinations	Professional
Education	Following a refresher course	Professional
	Teaching a refresher course to others	
	Studying work-related literature	
Rest	Taking a break at work	Non-professional
Non-professional encounters and other	Conducting research for other institutions	Professional
	Processing mail and e-mail	Semi-professional
	General chat with other healthcare professional(s)	Non-professional
	General chat with a patient	

## Chapter 2.1

**Table 2: Sensitivity analysis survey responders vs. non-responders.**

Main activity	Survey		Non-survey		p-value
	Mean (%)	Median (%)	Mean (%)	Median (%)	
Cognitive pharmaceutical services	12.1	11.0	9.8	7.5	0.098
Logistics	4.3	3.0	3.8	3.0	0.336
Organizational activities	7.4	5.0	7.8	6.0	0.974
Quality assurance	2.4	1.5	2.3	1.0	0.501
Human resource management	5.9	5.0	4.9	4.0	0.262
Household chores	1.4	1.0	0.8	1.0	0.199
Finances	5.5	3.0	3.7	2.0	0.339
Dispensing process	13.6	11.5	11.9	8.0	0.081
Final check of prescription	13.7	13.0	11.5	9.0	0.100
Clinical risk management	5.0	3.0	3.6	2.5	0.161
Education	4.6	3.5	5.0	4.0	0.836
Non-professional encounters and other	5.4	5.0	4.7	4.0	0.194
Rest	4.7	4.0	5.0	4.5	0.717

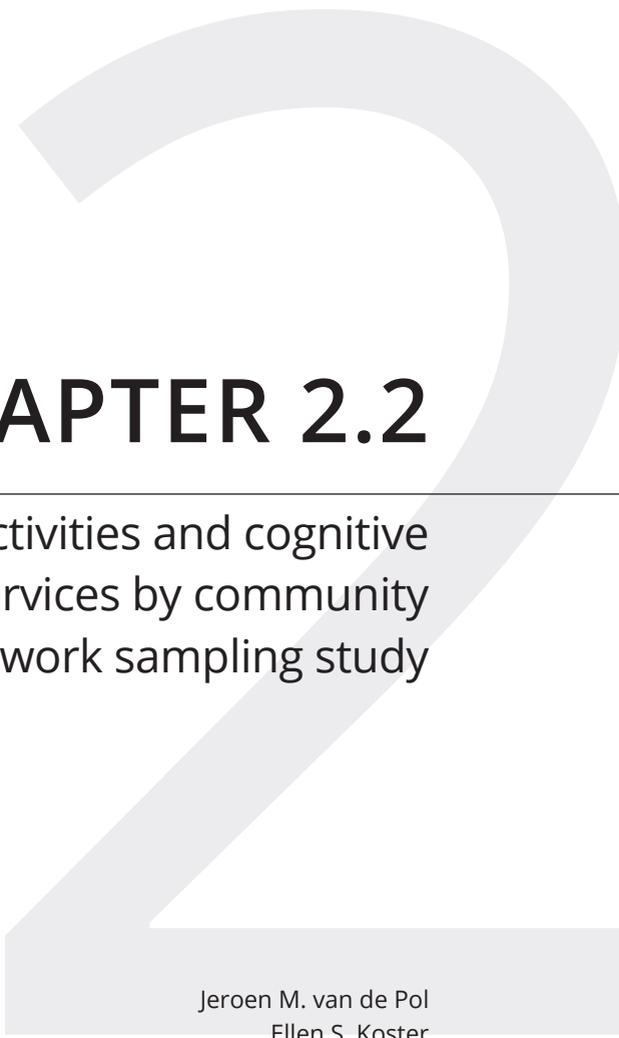
**Table 3: Sensitivity analysis based on response time being within 60 minutes or after 60 minutes after initial alert.**

Main activity	Within 60 min.		Longer than 60 min.		p-value
	Mean (%)	Median (%)	Mean (%)	Median (%)	
Cognitive pharmaceutical services	13.3	13.0	9.0	9.0	0.016
Logistics	4.2	3.0	4.4	3.0	0.466
Organizational activities	8.1	6.0	5.6	3.0	0.023
Quality assurance	2.5	2.0	2.2	1.0	0.737
Human resource management	6.4	5.0	4.5	3.0	0.026
Household chores	1.4	1.0	1.5	1.0	0.771
Finances	6.0	3.0	4.4	3.0	0.411
Dispensing process	14.3	11.0	11.8	12.0	0.286
Final check of prescription	14.4	14.0	11.8	10.0	0.044
Clinical risk management	5.6	4.0	3.4	2.0	0.093
Education	5.2	4.0	3.3	2.0	0.045
Non-professional encounters and other	5.4	5.0	5.2	5.0	0.923
Rest	4.9	5.0	4.1	4.0	0.516





CPS



# CHAPTER 2.2

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Balancing traditional activities and cognitive pharmaceutical services by community pharmacists: A work sampling study

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**International Journal of Clinical Pharmacy 2019;41:872-9.**

## Abstract

### Background

Community pharmacy is undergoing a transition, shifting focus from traditional roles to the provision of cognitive pharmaceutical services (CPS). However, traditional activities performed by community pharmacists reduce the amount of available time for implementing and providing CPS. Therefore, hampering the community pharmacist in the transition.

### Objective

To identify characteristics of community pharmacists that spend more time on CPS and to identify activities that especially compete with time spent on CPS by community pharmacists.

### Setting

Daily community pharmacy practice.

### Method

Self-reporting work sampling using smartphone technology was used to register the activities of community pharmacists. Participating pharmacists recorded their current activity five times per working day for 6 weeks and also completed an online survey about baseline characteristics.

### Main outcome measure

Time utilization.

### Results

Ninety-one Dutch community pharmacists provided work-sampling data. The results showed that community pharmacists are predominantly spending less time on managerial activities when spending more time on CPS (from 25,7% to 14,5%,  $p=0.016$ ). Pharmacists who are spending more time on CPS, want to spend even more time on direct patient contact compared to pharmacists who spend less time on CPS ( $p=0.030$ ).

## Conclusion

This study shows that community pharmacists that spend more time on CPS are devoting less time on managerial activities, logistics and other activities. Pharmacists spending more time on CPS are mostly locum pharmacists or work at a pharmacy located in a residential area with largely older inhabitants.

## Introduction

Community pharmacy around the world is undergoing a transition. Traditional pharmacist tasks such as the compounding and distribution of medicines gradually become less prominent and are being replaced by cognitive pharmaceutical services (CPS). This transition, like in other countries, is also ongoing in the Netherlands.

CPS has been defined as “the use of specialized knowledge by the pharmacist for the patient or health professionals for the purpose of promoting effective and safe drug therapy” [1]. Examples of CPS are clinical medication review (CMR), discharge counseling or Inhaler Technique Assessment Service (ITAS) [2].

The urgency of this transition was already emphasized in the 90’s of the previous century, as it was expected that solely dispensing was not going to be a sustainable basis for pharmacy practice [3]. It has also been stated earlier that the sole dispensing of medicines cannot be seen as pharmaceutical care [4]. However, over two decades later, the transition is still unfinished.

In the meantime, policymakers are confronted with an ageing population and the introduction of more complex medication use by patients. In this increasingly demanding healthcare setting policymakers and insurance companies are scrutinizing all healthcare professionals and expecting them to provide effective and efficient healthcare.

This increases the need of a more clinical role of pharmacists to support patients with multimorbidity and polypharmacy. It has been found in previous research that community pharmacist have a positive impact on the healthcare system [5] and that pharmacist led interventions can benefit patients with diverse conditions such as high blood pressure, hyperlipidemia and tobacco dependence [6,7]. Also, numerous studies have shown that CMR performed by pharmacists, identifies and solves drug related problems (DRP) and inappropriate prescribing [8,9] and improves adherence to medication [10].

Recent research has shown that community pharmacists in the Netherlands have a diverse set of daily recurring activities that are all competing over the available time of the pharmacist [11]. These daily recurring activities are often essential to manage the pharmacy, but may hamper the community pharmacist in the amount of time he/she can dedicate to CPS [4, 12-18].

## Aim of the study

The aim of this study was to identify characteristics of community pharmacists that spend a higher proportion of their time on CPS and to identify activities that compete with time spent on CPS by community pharmacists.

## Ethics approval

The research proposal was approved by the Institutional Review Board (IRB) of Utrecht University. The study used a smartphone application called FarmaCheck [11] which provided each participant with a unique user code and could not be linked to individual participants. Data was anonymous and treated as confidential.

## Method

### Study design

A cross-sectional study design was used with a work-sampling technique based on self-report of activities at random intervals as described in an earlier paper [11]. In short, participants were provided with a smartphone application to register activities during daily community pharmacy practice.

#### *Participants*

Practicing community pharmacists were recruited through the Utrecht Pharmacy Practice network for Education and Research (UPPER) [11, 19].

#### *Data collection*

During the study period (from January till July 2016), participating community pharmacists registered their daily activities using a smartphone application called 'FarmaCheck'. This application asked participants at five random times per workday to register their current activity. Pharmacists were asked to do this during six consecutive weeks [11]. To get insights in the background characteristics of participants, each pharmacist was asked to fill in a brief online survey.

## Data analysis

#### *Outcome measures*

Proportions of time spent on different activities was obtained by dividing the number of times a certain activity was chosen in the smartphone application by the total number of registered activities. Activities were categorized into five activity groups. These five activity groups were comprised of similar activities that

## Chapter 2.2

were found in previous research [11]. The groups are cognitive pharmaceutical services (CPS), pharmacy management (PM), quality assurance (QA), logistical processes (LP) and other (see Table 1).

**Table 1: Activity groups. Detailed information regarding each activity group can be found in [11] and supplementary material table 1.**

<b>Composed activity groups</b>	<b>Activity groups from [11]</b>
Cognitive pharmaceutical services	Cognitive pharmaceutical services
Pharmacy management	Organizational activities Human resource management Finance
Quality assurance	Quality assurance Final check of prescription Clinical risk management
Logistical processes	Logistics Dispensing process
Other	Household chores Education Non-professional encounters and other Rest

## Statistical analysis

Participants who did not complete the online survey or responded to less than 30% of generated alerts were excluded from analysis. Results are presented as the average percentage of alerts that were recorded into one of the five activity groups. Three groups of participants were formed based on the amount of time spent on CPS.

Descriptive statistics were calculated for each group based on background information. Univariate analysis was conducted on the characteristics and the amount of time spent on the five activity groups. Due to the non-parametric distribution of the data, Mann-Whitney U tests were performed in the univariate analysis when dealing with dichotomous variables. When dealing with more than two variables, Kruskal-Wallis tests were performed. Statistical analysis were performed using Microsoft Excel and SPSS 23.0.

## Results

In total 11,918 activities were registered by 156 participants. A total of 65 community pharmacists did not provide data on background characteristics and were therefore excluded. The remaining 91 pharmacists registered an activity for 72,4% on average of the alerts. A total of 734 activities coded by the participants as “not at work” were excluded.

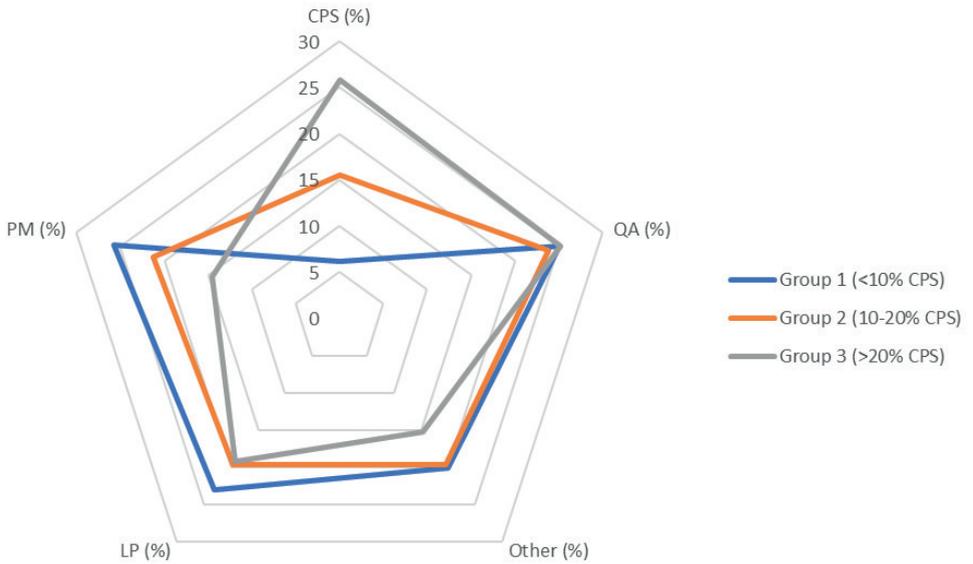
**Table 2: Demographic data. When type of pharmacist is defined as resident, this means that he/she is the pharmacist within the community pharmacy that holds final responsibility for all activities within the community pharmacy practice.**

Characteristic	N = 91
Age in years (mean ± SD)	39.4 ± 10.7
Male gender	30 (33.0%)
Graduation year (mean ± SD)	2002 ± 10
Type of pharmacist:	
• Resident and (partial) owner	27 (29.7%)
• Resident in paid employment	33 (36.3%)
• Locum	31 (34.1%)
Working hours per week (mean ± SD)	36.7 ± 7.3
Pharmacy part of pharmacy chain or partnership	
• No	32 (35.2%)
• Partnership with < 5 pharmacies	20 (22.0%)
• Between 5-25 pharmacies	23 (25.3%)
• Chain > 25 pharmacies	16 (17.6%)
Community pharmacists stating being in control of time utilization	
Yes, fully in control	48 (52.7%)
More or less in control	43 (47.3%)

Descriptive analysis of the distribution of the amount of time spent on CPS showed that three groups of approximately equal size could be defined based on the amount of time they spend on CPS.

**Table 3: Definition of the three groups based on the amount of time spent on cognitive pharmaceutical services (CPS).**

Group	Defined by time spent on CPS (%)	Average time ± SD spent on CPS (%)
1 (n = 34)	0 – 10	6.1 ± 2.8
2 (n = 37)	10 – 20	15.5 ± 2.8
3 (n = 20)	> 20	25.8 ± 5.4



**Figure 1: Time utilization based on 5 activity groups.**

Analysis of the amount of time the three groups (based on the amount of time spent on CPS), spent on the 5 different activity groups using the Kruskal Wallis test provided the results in table 4.

**Table 4: Time utilization of pharmacists spending different amounts of time on CPS. Results acquired using the Kruskal Wallis test. CPS: Cognitive pharmaceutical services, PM: Pharmacy management, QA: Quality assurance, LP: Logistical processes.**

	CPS %	PM %	QA %	LP %	Other %
Group 1	6.1	25.7	25.1	23.0	20.1
Group 2	15.5	21.3	23.9	19.7	19.6
Group 3	25.8	14.5	25.2	19.2	15.3
p-value	<0.001	0.016	0.874	0.378	0.023

**Table 5: Background information on the three groups. When type of pharmacist is defined as resident, this means that he/she is the pharmacist within the community pharmacy that holds final responsibility for all activities within the community pharmacy practice.**

	Group 1	Group 2	Group 3	p-value
Background information	N = 34	N = 37	N = 20	
Gender (%)				0.711
• Male	38.2	29.7	30.0	
Age in years (average ± SD)	39.6 ± 10.7	40.7 ± 10.4	36.6 ± 11.2	0.359
Graduation year (average ± SD)	2001 ± 10.0	2000 ± 10.0	2004 ± 10.0	0.312
Type of pharmacist (%)				0.318
• Resident and (partial) owner	26.5	40.5	15.0	
• Resident in paid employment	41.2	29.7	40.0	
• Locum pharmacist	32.4	29.7	45.0	
Working hours per week (average ± SD)	36.3 ± 9.1	36.8 ± 6.1	37.3 ± 6.2	0.470
Self-reported extent of control over time utilization (%)				0.894
• Yes, fully in control	55.9	51.4	50.0	
• More or less in control	44.1	48.6	50.0	
Pharmacy part of a chain or partnership (%)				0.883
• Not part of a chain- or partnership	38.2	32.4	35.0	
• Yes. Less than 5 pharmacies	23.5	21.6	20.0	
• Yes. Between 5-25 pharmacies	17.6	32.4	25.0	
• Yes. With over 25 pharmacies	20.6	13.5	20.0	
Age of population of residential area (%)				0.233
• Mostly younger inhabitant	11.8	16.2	5.0	
• Both young and old inhabitants	52.9	37.8	30.0	
• Mostly older inhabitants	35.3	45.9	65.0	
Utilizing centralized prescription processing (central fill) (%)				0.664
• Yes	55.9	62.2	50.0	
• No	44.1	37.8	50.0	
Want to spend more time on direct patient contact (%)				0.030
• Yes	52.9	81.1	75.0	
• No	47.1	18.9	25.0	
Completely satisfied with current time-utilization (%)				0.272
• Yes	2.9	10.8	15.0	
• No	97.1	89.2	85.0	
Extra financial support from healthcare insurer to stimulate cooperation with GP (%)				0.226
• Yes	26.5	18.9	40.0	
• No	73.5	81.1	60.0	

## Discussion

The results show significant differences between community pharmacists regarding the amount of time they spend on CPS and can be divided into three groups. Pharmacists that spend more time on CPS, are especially spending less time on pharmacy management, logistics and other activities.

The results show a few characteristics that may explain the difference in the amount of time being spent on CPS. However none of these characteristics is significantly associated with a different pattern of time utilization. Pharmacists that spend more time on CPS tend to consist more of locum pharmacists. In The Netherlands, when a locum pharmacist is present, there is always a resident pharmacist working in the pharmacy. So this could be the effect of task delegation, where the resident pharmacist focuses primarily on activities concerning pharmacy management and the locum pharmacist focusing primarily on CPS. Also, the residential area of where the community pharmacy is located in tends to consist of an older population in group 3 and could therefore have an increased need for CPS. Also, group 2 and 3 consist of more female pharmacists compared to group 1. This could imply that female pharmacists tend to spend more time on CPS. However, this effect is probably due to the relatively high influx of female pharmacists into community pharmacy in the past decades. Therefore this effect is probably more likely to be attributable to age and the type of pharmacist (most younger community pharmacists work as a locum pharmacist) instead of gender.

Compared to group 3, groups 1 and 2 contain more resident pharmacists that also (partially) own a community pharmacy. Resident pharmacists that own a pharmacy are more likely to be responsible for pharmacy management than locum pharmacists. This result underlines the hampering effect of managerial activities on the amount of time that can be spent on CPS.

It could be expected that pharmacists working in pharmacies belonging to a chain of pharmacies or a partnership would be able to spend more time on CPS, as pharmacy management may more often be organized from a head office. However, the results do not support this. So the limited amount of time being spent on CPS due to the hampering effect of other activities seems to be present through the entire community pharmacy market. This has also been found in earlier research, also in the United States, that showed that pharmacists employed by drug chains and independent pharmacists did not differ both regarding desired and actual time spent on CPS [20, 21].

It has been suggested earlier in international literature that community pharmacists experience a lack of confidence or fear of new responsibilities when

trying to provide CPS [22]. This could also explain why pharmacists are hesitant to spend more time on CPS. This could also explain that relatively young locum pharmacists are spending more time on CPS due to the fact that their education focused more on the provision of CPS [23]. This in contrary to older (resident) pharmacists who's education focused on (analytical) chemistry and compounding instead of pharmacotherapy and patient counselling.

The results from this study also show that utilizing centralized prescription processing (CPP) does not influence the amount of time being spent on CPS. In the Netherlands, many pharmacists apply CPP that implies outsourcing of the preparation of a drug order and labelling to a central fill pharmacy. One of the benefits being that time normally devoted to picking and labelling in the pharmacy, can be redirected to other activities (hence CPS). Reason for the absence of this result could be due to staff reductions after the introduction of CPP and therefore not using CPP as a tool to redirect available time to CPS.

Community pharmacists that state they have full control of their time utilization, spend as much time on CPS as community pharmacists who state they have only partial control. This could be an indication that pharmacists do not feel a need to spend more time on CPS. However, concurrently the majority of pharmacists stated to want to spent more time on direct patient contact (being part of CPS). This is in line with previous research that showed that community pharmacists want to spend more time on consultation and medication management and less time on activities concerning dispensing and business management [20, 21]. Notable result found in this study is that pharmacists belonging to group 1 are, next to spending less time on CPS, also less eager to spend more time on direct patient contact compared to pharmacists from group 2 and 3. This result implies that some community pharmacists within group 1 are consciously avoiding the provision of CPS.

Studies, both from inside and outside the Netherlands also showed that pharmacists were positive about services such as CMR and discharge counselling, but were experiencing a lack of time, lack of sufficient supporting staff and insufficient reimbursement [24, 25].

The lack of focus on CPS that is predominantly present in group 1 can be detrimental. As policymakers and professional bodies are trying to redefine the role of community pharmacy practice in the Netherlands, to address societal needs and also ensuring a long-term future for the profession, community pharmacists such as those belonging to group 1 can hamper this process. On the other hand this was only a minority of all participants and furthermore we may also need pharmacists who concentrate on 'back-office' tasks. As long as these pharmacists are joined with more CPS oriented pharmacists there may not be an issue.

## Strengths and limitations

The characteristics of the community pharmacists who participated in this study are largely comparable to known characteristics of all community pharmacists in The Netherlands: 33% male compared to 46% nationally, 66% resident pharmacists compared to 72% nationally, 0.97 full-time equivalent (FTE) vs 0.89 FTE nationally [26].

Using a smartphone application to gather work-sampling data is considered user-friendly and an efficient way to attract participants to generate more data. The self-reporting aspect limits the “Hawthorne” effect, as participants feel less scrutinized than when being observed. This will limit behavioral changes in this study [27]. In previous research, it has been found that sensitivity analysis showed no major differences between responses given within an hour versus responses after more than an hour [11]. It has also been stated earlier that pharmacists have better understanding of their (current) activities than observers would have [28].

However, this type of research methodology also comes with disadvantages. Participants may provide socially desirable answers in using both the smartphone application, but also when providing background information (e.g. wanting to spend more time on CPS). However, it is expected that this effect is limited due to the provision of insights into time utilization and benchmark data. Also, using a smartphone application meant that participants had to keep their phone with them as much as possible, which could be undesirable in daily practice. Thereby, only pharmacists with good and coordinated workstreams may have participated, because only they may have had the time to participate. This would generate recruitment bias. A total of 65 initial participants did not provide background information which could be a result of this. However, participating pharmacists were provided with information about their own time utilization. This might have encouraged pharmacists who are struggling with their time utilization to also participate [11]. Also, the group of 65 excluded participants contained participants who may not have had the intention to fully participate in the study. Within this group a relatively high proportion downloaded the smartphone application but only used it a limited number of times. They installed the application and registered a few activities, but dropped out early. Participating pharmacists were provided with information about their own time utilization, including a benchmark of other pharmacists. We expect that this will have encouraged pharmacists who are struggling with their time utilization to participate [11]. Moreover, feedback and benchmarking is likely to stimulate honest reporting.

## Conclusion

Time dedicated to the provision of CPS has to be balanced with time dedicated to pharmacy management, logistics and other activities. Community pharmacists spending more time on CPS, predominantly spend less time on pharmacy management. Pharmacists spending more time on CPS compared to others tend to be locum pharmacists or work at a community pharmacy located in a residential area with largely older inhabitants, however these characteristics were not very strong predictors, suggesting that there probably are additional characteristics of pharmacists or pharmacies that determine the time spent on CPS.

2

## Acknowledgement

The authors thank Piet van der Wal from Umenz Benelux BV for developing the smartphone application used in this study. The authors also thank BENU apotheken BV for funding this research and especially Eduard Lip and Rogier Hofman for their support.

## Conflicts of interest

Authors declare no conflict of interest.

## Funding information

The smartphone application used in this research was funded by BENU Apotheken BV.

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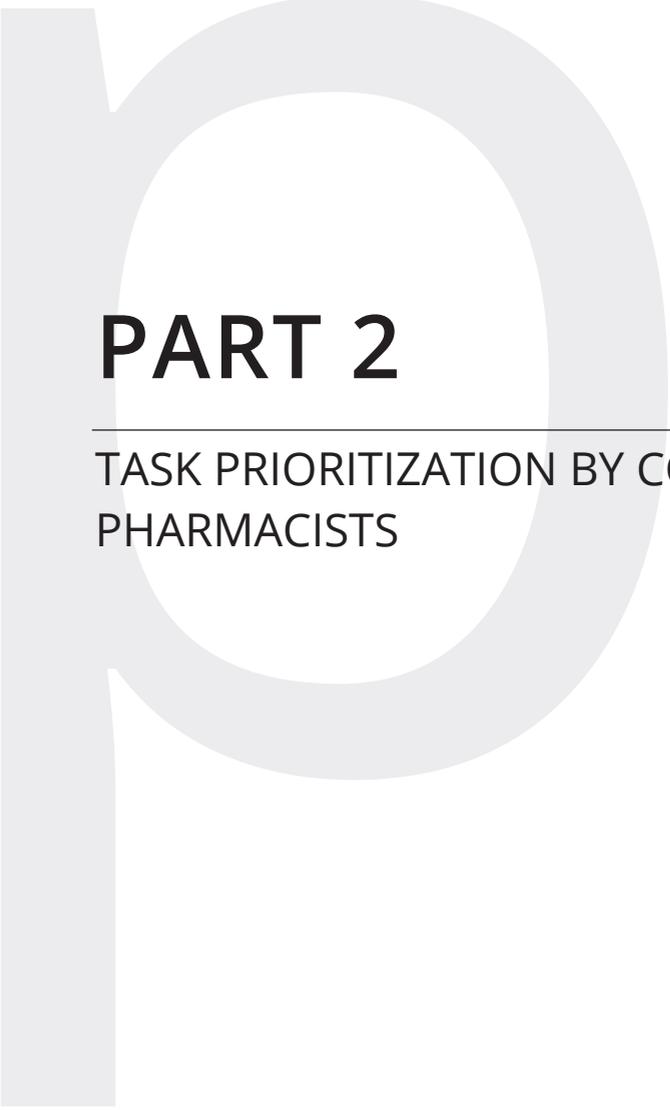
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## Supplementary material

**Table 1: Main activities and subcategories used in the smartphone application.**

<b>Composed activity group</b>	<b>Activity group from [10]</b>	<b>Sub activities belonging to activity group from [10]</b>
Cognitive pharmaceutical services	Cognitive pharmaceutical services	Medication use review Care-related contact with a patient (not a medication review) Contact with another healthcare professional(s) about a patient (not a medication review) Periodic meeting with GPs and pharmacists on prescribing policy Updating clinical information from patients Clinical rules
Pharmacy management	Organizational activities	Contact with other healthcare professionals for organizational reasons Preparing or attending work meetings General organization management
	Human resource management	General employee management One-on-one conversation with an employee, e.g. job performance evaluation Supervising an intern Hiring new employees Making and updating work schedules Employee administration, e.g. salary, worked hours etc. General employee management
	Finance	Assessing contracts with health insurance companies Checking declarations and authorizations Administrative tasks for patients Registering cash money in cash register and/or safe General financial administration
Quality assurance	Quality assurance	Supervising an audit Working on the quality manual General quality assurance management Investigating customer satisfaction Investigating satisfaction with other healthcare professionals
	Final check of prescription	Checking for inappropriate prescribing and possible distribution errors
	Clinical risk management	Checking for inappropriate prescribing and faulty drug combinations

<b>Composed activity group</b>	<b>Activity group from [10]</b>	<b>Sub activities belonging to activity group from [10]</b>
Logistical processes	Logistics	Contact with a patient about logistics Stock management Processing a recall Stock-taking Processing orders from the wholesaler
	Dispensing process	Processing prescriptions Filling prescriptions Checking filled prescriptions Hand out filled prescriptions to patients Preparing or checking a prepared drug Copying prescriptions for the digital archive
Other	Household chores	General housekeeping tasks
	Education	Following a refresher course
		Teaching a refresher course to others
		Studying work-related literature
Non-professional encounters and other	Conducting research for other institutions	
	Processing mail and e-mail	
	General chat with other healthcare professional(s)	
Rest		General chat with a patient
		Taking a break at work



# PART 2

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## TASK PRIORITIZATION BY COMMUNITY PHARMACISTS

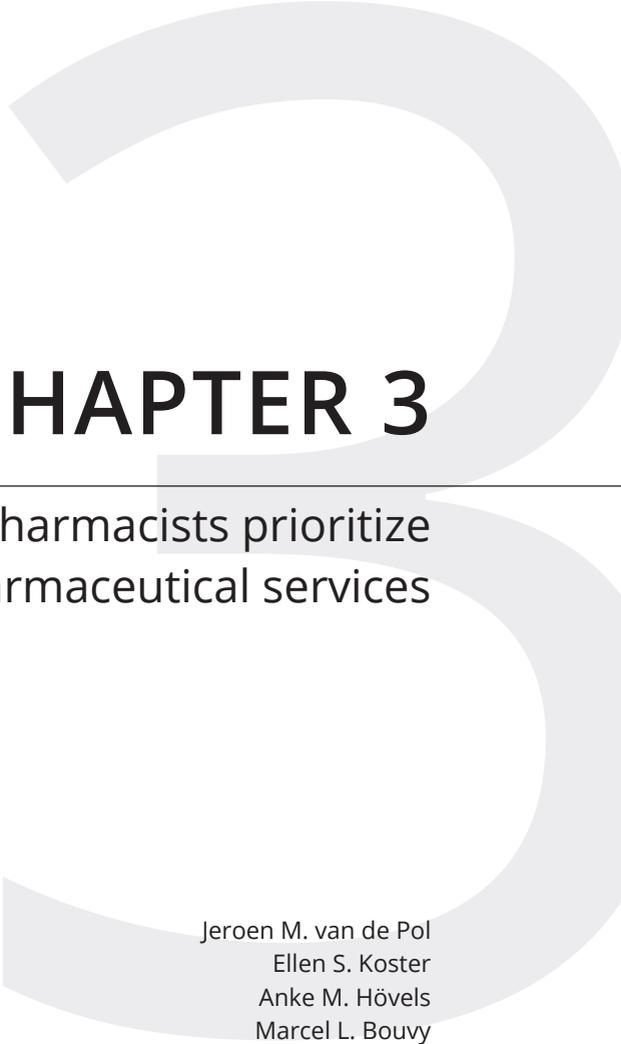


CPS

Priorities



CPS



# CHAPTER 3

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## How community pharmacists prioritize cognitive pharmaceutical services

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**Research in Social and Administrative Pharmacy 2019;15:1088-94.**

## Abstract

### Introduction

There is broad consensus that community pharmacists should focus on the provision of pharmaceutical care. Studies, however, have shown that community pharmacists still spend a considerable amount of time on traditional activities such as dispensing instead of cognitive pharmaceutical services (CPS). It is not clear whether community pharmacists prefer their current time-utilization or if they are willing to spend more time on CPS.

### Aim

The aim of this study was to identify how community pharmacists ideally would prioritize CPS compared to other daily activities.

### Methods

A cross-sectional study design with Q-methodology was used to identify different viewpoints regarding task prioritization. Community pharmacists were asked to rank a total of 48 daily activities. Data was collected online using FlashQ©. Q-sorts were analyzed by principal component factor analysis and varimax rotation using PQmethod 2.35.

### Results

In total, 166 community pharmacists participated in this study. Three distinguishing groups were found based on task prioritization explaining 59% of the total variance among respondents. All groups ranked the provision of CPS as important, in differing degrees. Group 1 ranked CPS as most important and was also the group that contained most participants. Group 2 and 3 ranked quality assurance as most important with CPS as second. Logistics and pharmacy management were ranked low by all groups.

### Discussion and conclusion

Community pharmacists rank the provision of CPS as important. So factors, probably other than task prioritization, are keeping the pharmacist from focusing on CPS in daily practice. In other studies, time constraints are mostly mentioned as major barrier. Activities such as logistics and pharmacy management are given less priority and should be delegated to supporting staff members as much as possible, to enable pharmacists to focus their available time on activities they deem important.

## Introduction

The role of the community pharmacist is shifting from traditional 'product centered' activities, such as compounding and dispensing, to a more 'patient centered' approach by providing cognitive pharmaceutical services (CPS) such as medication review and discharge counselling. Due to the ageing population and the increasing complexity of drug therapy, policy makers and professional bodies are of the opinion that this shift to CPS is necessary to maintain a sustainable healthcare system [1].

In the past 20 years, time utilization by community pharmacists has been studied multiple times in different countries. These studies generally show that community pharmacists spend a considerable amount of time on logistics and pharmacy management and are therefore less capable of focusing the available time on CPS. There seems to be limited change in community pharmacists time utilization over the past years [2-13].

Competing activities hamper the community pharmacist in the provision of CPS. This is emphasized by studies that aimed to introduce care related services in the community pharmacy setting. Pharmacists frequently complained about a lack of time to adequately implement these new services in their daily routine [1, 14-17].

The aforementioned studies gave insight in the actual time utilization, but most lack information about the preferences of community pharmacists regarding the amount of time spent on CPS. An important driver for time utilization in daily practice may be how community pharmacists ideally prioritize their daily activities.

Therefore, the primary aim of this study was to identify how community pharmacists ideally would prioritize CPS compared to other daily recurring activities in the community pharmacy setting. Also, this study aimed to identify potential differences in task prioritization between community pharmacists.

## Methods

### Study design and population

A cross-sectional study design with Q-methodology was used to identify different viewpoints regarding task prioritization in community pharmacy practice. Q-methodology, developed in the 1930's, is useful to study both agreement and diverging opinions among participants [18, 19] and has been used in several other studies [20, 21]. By using Q-methodology it is possible to identify both shared

understandings and diverging opinions about a certain subject. Other than Likert-scale questionnaires, Q-methodology forces the participant to rank statements [19].

Practicing community pharmacists from the Utrecht Pharmacy Practice network for Education and Research (UPPER) network were invited by e-mail. Approximately 65% (1,295 out of 2,000) of all Dutch community pharmacies is affiliated with the UPPER network [22].

A random sample of 100 pharmacies were additionally contacted by phone (JvdP). In order to increase attention for the study an item was published in the UPPER newsletter and on the website of The Royal Dutch Pharmacists Association (KNMP).

### Development of Q-set

Q-methodology consists of several steps. The first step is the construction of the Q-set. A Q-set consists of multiple statements regarding a specific subject. Specifically for this study, potential activities of community pharmacists, rather than statements were presented. The activities considered for this Q-study were based on a previous time-utilization research in which actual time-utilization in daily practice was obtained [13]. It was deliberately aimed to have a balanced set of traditional and more innovative activities. In total 61 activities were defined.

These 61 activities were reviewed by a panel of ten practicing community pharmacists. Activities were rated based on whether they were performed on a daily, weekly or monthly basis and checked if activities were clearly written. Based on the feedback provided by the panel, 13 activities were discarded because they were deemed not relevant or not practiced on a regular basis. Activities were reformulated if the panel did not deem the activity clearly written. The remaining 48 activities were divided into 5 different categories: Cognitive pharmaceutical services (CPS; 17), logistics (L; 12), Pharmacy management (PM; 10), quality assurance (QA; 6) and other (O; 3). The list of the 61 starting activities and final 48 activities can be found in supplementary material table 2.

### Data collection: Q-sorting by the participants

The next step in Q-methodology is Q-sorting. Participants were asked to rank the importance of certain activities that they could perform in community pharmacy practice. When ranking the activities, participants were explicitly asked to rank the importance of these activities regarding their role as a pharmacist and not taking the current restrictions and possibilities from daily practice into account. Participants were first asked to categorize the 48 activities as “important”,

“neutral” or “not important”. Next, participants were asked to place the activities in the Q-grid (see Figure 1). Participants were obliged to adhere to the Q-grid. This forced them to carefully consider the position of every activity. Participants used the online software program FlashQ©, which takes participants through the Q-sorting process step by step in order to facilitate the Q-sorting process [23].

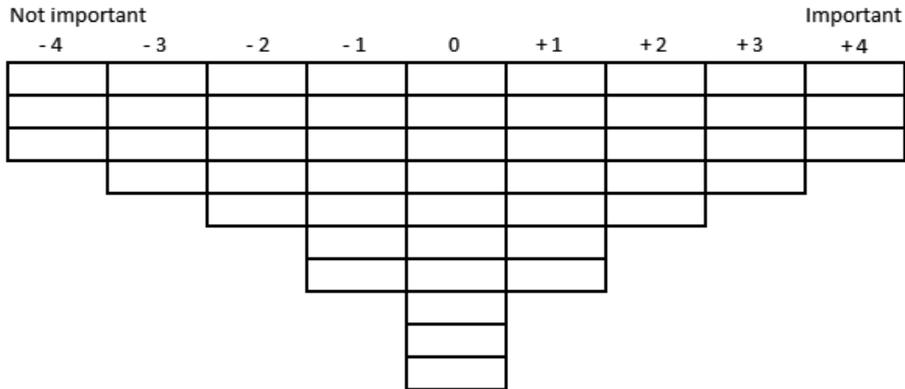


Figure 1: Q-grid used to fill in the 48 activities.

## Data analysis

Factor analysis was used to identify correlation between participants with similar task prioritization. A group of participating pharmacists that correlate regarding task prioritization is called a factor [24]. A factor can be seen as a group of individuals that share a common understanding regarding the prioritization of the activities. However, for sake of readability, a factor will be called a group. Factor analysis can also render a subset of individuals that do not belong to any group. The number of factors/groups found is based on the amount of variance they explain.

Analysis of the Q-sorts was performed using PQmethod 2.35 software [25]. Principal component factor analysis (PCFA) and varimax rotation were used to obtain the least amount of groups that explain the most of the variance. This approach renders factors/groups that can be statistically explained instead of allowing the researcher to influence the dataset to obtain certain groups [19]. Idealized Q-sorts were constructed for each group. These Q-sorts give insight in how a typical participant within this group would rank the 48 activities. Activities were considered important when they were ranked from +1 to +4, not important when ranked -1 to -4 and neutral when ranked as 0. Descriptive statistics were used to define each group based on their task prioritization and background characteristics of the participants.

## Results

### Study population

A total of 166 community pharmacists participated in this study. Baseline characteristics are shown in Table 1 and are representative for the overall population of Dutch community pharmacists [26]. In total, 148 out of 166 pharmacists were included in three different groups (Table 2). Supplementary material table 1 shows detailed background information of the participants in the different groups.

**Table 1: Characteristics of the participants.**

Characteristic of the participants	Total population (N = 166)
Age, years (mean $\pm$ SD)	40.0 $\pm$ 10.7
Female gender, n (%)	103 (62.0%)
Working experience in years (mean $\pm$ SD)	13.5 $\pm$ 10.0
Type of pharmacist, n (%)	
• Resident and owner	33 (19.9%)
• Resident in paid employment	92 (55.4%)
• Non-resident in paid employment	41 (24.7%)
Working hours per week (mean $\pm$ SD)	37.0 $\pm$ 6.4
More than one pharmacist in the pharmacy, n (%)	107 (64.5%)

**Table 2: Distribution of participants among the three defined groups.**

Characteristic	Group		
	1	2	3
	N = 76	N = 27	N = 45
Explained variance (%)	29	12	18
Cumulative (%)	29	41	59
Correlation between groups			
1	1.00	0.51	0.77
2	0.51	1.00	0.46
3	0.77	0.46	1.00

Q-analysis of the Q-sorts supported seven groups in total. Only three groups were chosen as the most desirable solution. These three groups cumulatively explained 59% of the variance in the dataset with a total of 148 of 166 participants included in one of these three groups. An analysis with 7 groups would explain only 11% of additional variance and the four additional groups contained less than 5 participants each.

Table 3 shows how a participant would rank the 48 activities when completely agreeing with one of the 3 groups. The activity groups are organized alphabetically.

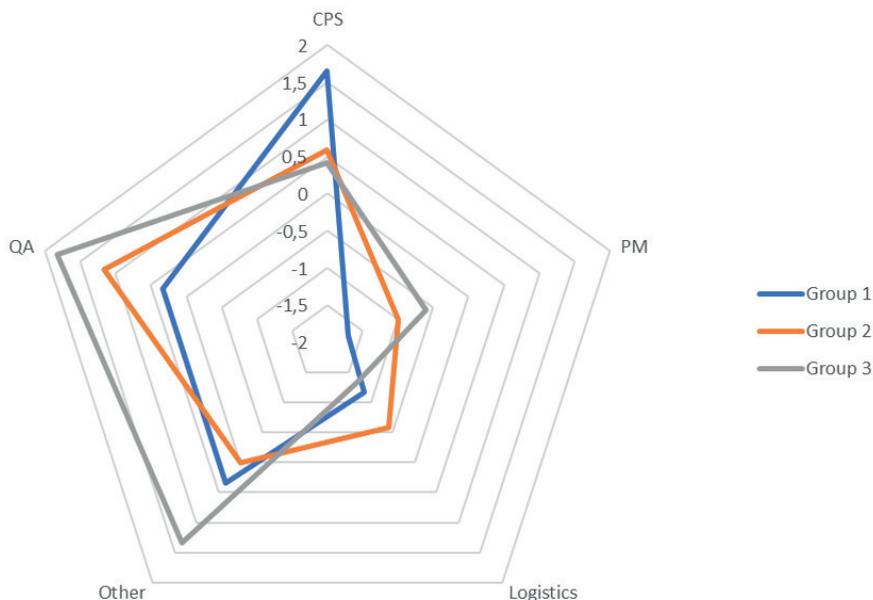
**Table 3: Ranking of activities per group based on type of activity in alphabetical order. CPS: Cognitive Pharmaceutical Services, PM: Pharmacy Management, QA: Quality Assurance. + indicates a consensus activity (15 and 16).**

#	Activity	Activity group	Group 1	Group 2	Group 3
2	Maintaining the local drug formulary	CPS	0*	-4*	0*
3	Diagnostics(e.g. blood pressure, glucose level or cholesterol levels)	CPS	-1*	-4	-4
5	Organizing an informational session for patients	CPS	0*	-4*	-1*
7	Having a leading role within the primary healthcare organization	CPS	2*	-3*	0*
9	Organize and start healthcare projects with other healthcare providers	CPS	3*	0*	2*
13	Counselling patients to improve medication adherence	CPS	2	1	0*
22	Providing advice on OTC products	CPS	0*	1*	-2*
28	Prepare and lead the pharmacotherapy quality circles between GP's and pharmacists	CPS	3	0*	2
33	Updating lab results in the patients' files	CPS	-1*	2*	-2*
34	Discharge counselling	CPS	2	2	0*
38	Counseling at first dispensing of a new medicine	CPS	1*	3*	-1*
41	Patient interview for a medication review	CPS	4*	2*	1*
42	Discussing the results from a medication review with the GP	CPS	4	4	4
43	Updating patient files	CPS	1	1	0
44	Analyzing the medication of a patient in light of a pharmacist-led medication review	CPS	4	3*	4
45	Checks and intervention based on clinical rules (e.g. stop start criteria)	CPS	1	2*	1
46	Clinical risk management of drug-drug and drug-disease interactions and other potential prescribing errors	CPS	3	4*	3
1	Stock taking	Logistics	-4	-3*	-4
17	Adjusting stock parameters based on sales	Logistics	-2	-2	0*
18	Adjusting stock to the preference of health insurance companies or to achieve optimal margins	Logistics	-2*	0	-1
27	Adjusting stock in computer based on stock taking	Logistics	-3	-1*	-3*
4	Compounding medicines	Logistics	-1	-2	-4*

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#	Activity	Activity group	Group 1	Group 2	Group 3
6	Releasing a compounded drug	Logistics	0*	-1*	1*
14	Judging pharmacotherapeutic and pharmaceutical rationality of requested compounded drugs	Logistics	1	-2*	2
15+	Finding an alternative supplier in case of drug shortages	Logistics	-1	-2	-1
20	Filling prescriptions and checking filled prescriptions	Logistics	-2*	1*	-3*
24	Judging the need to repeat a prescription	Logistics	1*	0	0
36	Processing a prescription into the pharmacy information system	Logistics	-1*	2*	-2*
39	Dispensing a filled prescription to a patient	Logistics	0*	3*	-1*
10	Salary administration	PM	-3*	-3	-2
12	Looking for a refresher course for supporting pharmacy staff	PM	0*	-1*	0*
16+	Making a work schedule	PM	-2	-2	-2
19	Accounting	PM	-3*	-3	-3
21	Performance appraisal of supporting staff	PM	1*	0*	3*
23	Cashing out the cash register	PM	-4*	-1*	-3*
26	Checking financial indicators	PM	-1	-1	1*
29	Claiming provided medicine and care related activities at healthcare insurer	PM	-2*	1*	0*
32	Organizing a staff work meeting	PM	0*	1	1
40	Administrative tasks for patients (e.g. credit or cancelling an invoice)	PM	-3*	-1	-1
8	Perform and analyze the results from customer satisfaction research	QA	0	0	1*
11	Performing a prospective risk analysis	QA	0*	-1*	1*
25	Analyze complaints by customers and mistakes made at the pharmacy	QA	0	1	2
30	Updating the quality manual	QA	-1	0	0*
47	Final check of dispensed prescriptions	QA	1*	4	3
48	Checking the clinical risk management alerts (e.g. drug-drug interactions)	QA	2*	3*	4*
37	Maintenance of electronical equipment	Other	-4*	0*	-1*
31	Informal contact with patients and healthcare providers	Other	2	0*	2
35	Post graduate education or reading professional literature	Other	3*	0*	3*

Figure 2 shows how typical pharmacists in the three groups ranked the activity groups. All groups regard CPS as important (Q-grid score > 0). Group 1 ranks CPS as most important, while group 2 and 3 rank quality assurance as most important. Logistics and pharmacy management are both considered as not important (Q-grid score < 0) by all three groups.



**Figure 2: Distribution of average preferences per activity group.**

The results show that participants have a shared understanding regarding some specific activities. All pharmacists give high priority to activities related to CPS, such as those that are associated with medication review (activity 41, 42 and 44). However, the pharmacists in group 2 and 3 rated a patient interview less important compared to the pharmacists in group 1. Quality assurance (QA) in the form of checking prescriptions and clinical risk management alerts (activity 47 and 48) are also considered important by all. Some activities regarding Pharmacy management (PM) or logistics were considered not important by all participants, such as salary administration or stock taking.

Group 1 gives less priority to Pharmacy management (PM) and Quality assurance (QA) (figure 2). The differences in prioritization of PM are mostly due to differences in the ranking of activities considering personnel (activity 21) or financial management (activity 29 and 40).

## Discussion

Next to similarities in task prioritization, diverging preferences (differences in emphasis) can be found in task prioritization and thereby creating three distinguishable groups: “the CPS providing pharmacist” (group 1), “the logistics focused pharmacist” (group 2) and “the (quality) management focused pharmacist” (group 3). There is a fair amount of correlation between the groups. Correlation ranges from 0.46 (between group 2 and 3) to 0.77 (between group 1 and 3) [see table 2]. This is illustrated by the fact that some activities are rated equally (un) important by all three groups.

All three groups perceived CPS as important, as all three groups ranked CPS activities on average more than zero. However, pharmacists who are part of group 1 give CPS a much higher priority, which is especially reflected in high prioritization of activities with direct patient contact such as a ‘Patient interview for a medication review’ (activity 41) and ‘Counselling patients to improve medication adherence’ (activity 13). Though Q-methodology is not designed to identify prevalence, it is notable to see that participants identify most frequently with group 1 (76 out of 166). Based on table 3, pharmacists who give higher priority to CPS, seem to be willing to save time on activities such as checking prescriptions and clinical risk management alerts. These are generally considered routine tasks of pharmacists. Pharmacists in group 2 and 3 still rate these activities as very important.

Based on these results, it seems that QA and PM compete with CPS over the priority given to them by the community pharmacists in this study. This is probably due to the fact that pharmacists also feel responsibility towards their traditional roles and are needed to run the pharmacy. This has several causes, one of them being that the pharmacy’s revenue is heavily dependent on logistics and dispensing and not on the provision of CPS [1]. This is partly in line with a review on consumer and pharmacists views on community pharmacy [27]. This review suggested that community pharmacists are positive about the provision of CPS, but consider these services secondary to traditional roles, such as dispensing.

In a recent focus group study, some pharmacists were still reluctant to relinquish their drug distribution role [28]. The current study suggests that community pharmacists generally rank logistics as an unimportant daily activity. Some pharmacists explained in the comments that logistics do not require the expertise of a pharmacist. In the Dutch situation, logistics is mostly handled by pharmacy assistants. This is consistent with the study of Schommer et al. [11] where also a decline in the amount of time that has to be spent on logistics is preferred.

Regarding pharmacy management, participating pharmacists state that some of these activities can be easily delegated to supporting staff members. This is consistent with an earlier study in which pharmacists prefer to spend less time on management than the actual time they are spending on this type of activity [11]. Due to the perceived unimportance of PM and logistics by community pharmacists, it is important to investigate ways to delegate these activities. One example could be to delegate some managerial activities to a pharmacy technician or a store manager. This would save time for the community pharmacist which could be spent on CPS that is ranked important [13].

The three groups differ in their prioritization of quality assurance (QA). Differences between group 1 and 3 regarding QA mostly come from the final checking of prescriptions (activity 47) and checking the clinical risk management alerts (activity 48). Some pharmacists in group 1 stated that they experience these activities as time consuming without having a clear added benefit and lacks visibility to both patients and other healthcare professionals. A possible welcome development for group 1 would be to delegate these activities (to a certain degree) to pharmacy technicians [29]. On the other hand, pharmacists belonging to group 3 state that they consider that these activities need to be performed by pharmacists to ensure the safe use of drugs.

The characteristics of pharmacists belonging to one of the three different groups (see also supplementary material table 1) are slightly different. Group 2 has a higher proportion of male participants in comparison to group 1 and 3 and also consists of more pharmacy owners. Pharmacists in group 2 are also slightly older than participants in group 1 and 3. This suggests that older, male pharmacists that own a community pharmacy regard logistics and QA as relatively more important. Surprisingly even these pharmacists, who more frequently own a pharmacy do not give high priority to pharmacy management.

## Strengths and limitations

The first strength of this study is the use of Q-methodology, which forced participants to prioritize activities. Therefore Q-methodology may generate more valuable information compared to the Likert-scale questionnaires that are generally used for this type of study. Second, community pharmacists were able to participate online anonymously. This lowers the threshold to participate and therefore enhances the response rate [30]. Third, a comparison with previously reported characteristics of community pharmacists in The Netherlands suggests that the group of participating pharmacists in this study resemble the Dutch population of community pharmacists [26]. Still, we cannot exclude that a certain

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subset of community pharmacists responded to partake in this research and therefore limiting the generalizability of the results found in this study.

Q-methodology also comes with limitations. First, Q-methodology is not designed to provide the precise prevalence of the different groups found. So, the distribution of participants has to be interpreted reservedly. Also, Q-methodology ranks individual activities. However, combining activities into several activity groups is arbitrary. Participants were given the explicit instruction to disregard all current limitations in daily community pharmacy practice and to prioritize based on a desired situation. A possible limitation of the study could be that participating pharmacists found it difficult to prioritize activities without their knowledge of the current limitations in community pharmacy practice. Also, due to the cross sectional design of this study, results found are a snapshot in time. However, we do not expected that task prioritization will change rapidly, as participants were explicitly asked to prioritize based on a desired situation and not on their current situation.

## Conclusion

Previous studies showed that community pharmacists spend little time on CPS, but were not clear on whether community pharmacist prefer to devote more time to the provision of CPS. This study shows that the group that prioritizes CPS the highest, also contains the majority of participating pharmacists. All participating community pharmacists give low priority to logistics and pharmacy management, whereas previous studies have shown that in daily practice substantial time is devoted to these activities. Policymakers and the pharmacy profession should join forces to delegate the latter activities in order to enable community pharmacists to increase their commitment to CPS.

## Acknowledgements

The authors like to thank Jurjen Geljon for his contribution in this research.

## Conflicts of interest

None.

## Funding

This study did not receive any funding.

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## Supplementary material

**Table 1: Background characteristics of participating pharmacists and group segmentation using Q-methodology.**

Characteristics of the participants	Group 1	Group 2	Group 3
Number of respondents	76	27	45
Age in years (mean ± SD)	38.3 ± 9.8	45.6 ± 11.3	38.0 ± 10.0
Gender			
Male	25 (32.5%)	15 (57.7%)	12 (27.9%)
Graduation year (mean ± SD)	2004 ± 9	1998 ± 11	2004 ± 10
Working experience in years (mean ± SD)	11.9 ± 9.1	18.4 ± 10.9	12.1 ± 9.7
Type of pharmacist			
• Resident and owner	15 (19.4%)	8 (30.8%)	4 (9.3%)
• Resident in paid employment	37 (48.1%)	13 (50.0%)	29 (67.4%)
• Non-resident in paid employment	25 (32.5%)	5 (19.2%)	10 (23.3%)
Working hours per week (mean ± SD)	35.9 ± 7.6	39.5 ± 4.7	37.2 ± 5.6
<b>Characteristics of the community pharmacy and surroundings</b>			
More than one pharmacist in the pharmacy			
• Yes	47 (61.0%)	17 (65.4%)	33 (76.7%)
Average socioeconomic status			
• Poor residential area	12 (15.6%)	3 (11.5%)	7 (16.3%)
• Middle class residential area	57 (74.0%)	17 (65.4%)	32 (74.4%)
• Wealthy residential area	8 (10.4%)	6 (23.1%)	4 (9.3%)
Average age of population			
• Mostly young inhabitants	2 (2.6%)	1 (3.8%)	1 (2.3%)
• Both young and older inhabitants	61 (79.2%)	19 (73.1%)	28 (65.1%)
• Mostly older inhabitants	14 (18.2%)	6 (23.1%)	14 (32.6%)
Level of urbanization			
• Not urbanized (rural)	16 (20.8%)	1 (3.8%)	2 (4.6%)
• Hardly urbanized	11 (14.3%)	4 (15.4%)	10 (23.3%)
• Moderately urbanized	38 (49.4%)	13 (50.0%)	21 (48.8%)
• Heavily urbanized (big city)	12 (15.6%)	8 (30.8%)	10 (23.3%)
Part of a chain of pharmacies or a partnership			
• No	20 (26.0%)	11 (42.3%)	9 (20.9%)
• Yes, < 5 pharmacies in total	18 (23.4%)	5 (19.2%)	8 (18.6%)
• Yes, with 5-25 pharmacies in total	7 (9.1%)	4 (15.4%)	8 (18.6%)
• Yes, > 25 pharmacies in total	32 (41.6%)	6 (23.1%)	18 (41.9%)
Grading (1-10) the cooperation between the pharmacist and general practitioner	8.1 ± 1.1	7.9 ± 1.5	7.6 ± 1.5

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**Table 1 (continued): Background characteristics of participating pharmacists and group segmentation using Q-methodology.**

<b>Characteristics of the participants</b>	<b>Total</b>	<b>No group</b>
Number of respondents	166	18
Age in years (mean ± SD)	40.0 ± 10.7	43.5 ± 11.9
Gender		
• Male	63 (38.0%)	11 (55.0%)
Graduation year (mean ± SD)	2003 ± 10	2000 ± 12
Working experience in years (mean ± SD)	13.5 ± 10.0	15.9 ± 11.0
Type of pharmacist		
• Resident and owner	33 (19.9%)	6 (30.0%)
• Resident in paid employment	92 (55.4%)	13 (65.0%)
• Non-resident in paid employment	41 (24.7%)	1 (5.0%)
Working hours per week (mean ± SD)	37.0 ± 6.4	37.2 ± 3.3
Characteristics of the community pharmacy and surroundings		
More than one pharmacist in the pharmacy		
• Yes	107 (64.5%)	10 (50.0%)
Average socioeconomic status		
• Poor residential area	29 (17.5%)	7 (35.0%)
• Middle class residential area	117 (70.5%)	11 (55.0%)
• Wealthy residential area	20 (12.0%)	2 (10.0%)
Average age of population		
• Mostly young inhabitants	4 (2.4%)	0 (0.0%)
• Both young and older inhabitants	120 (72.3%)	12 (60.0%)
• Mostly older inhabitants	42 (25.3%)	8 (40.0%)
Level of urbanization		
• Not urbanized (rural)	23 (13.9%)	4 (20.0%)
• Hardly urbanized	28 (16.9%)	3 (15.0%)
• Moderately urbanized	80 (48.2%)	8 (40.0%)
• Heavily urbanized (big city)	35 (21.1%)	5 (25.0%)
Part of a chain of pharmacies or a partnership		
No	45 (27.1%)	5 (25.0%)
• Yes, < 5 pharmacies in total	36 (21.7%)	5 (25.0%)
• Yes, with 5-25 pharmacies in total	19 (11.4%)	0 (0.0%)
• Yes, > 25 pharmacies in total	66 (39.8%)	10 (50.0%)
Grading (1-10) the cooperation between the pharmacist and general practitioner	7.8 ± 1.3	7.4 ± 1.5

**Table 2: List of all 61 activities of whom 13 were discarded (strikethrough in the table) and 48 remained for this study.**

#	Activity
1	Stock taking
2	Maintaining the local drug formulary
3	Diagnostics(e.g. blood pressure, glucose level or cholesterol levels)
4	Compounding medicines
5	Organizing an informational session for patients
6	Releasing a compounded drug
7	Having a leading role within the primary healthcare organization
8	Perform and analyze the results from customer satisfaction research
9	Organize and start healthcare projects with other healthcare providers
10	Salary administration
11	Performing a prospective risk analysis
12	Looking for a refresher course for supporting pharmacy staff
13	Counselling patients to improve medication adherence
14	Judging pharmacotherapeutic and pharmaceutical rationality of requested compounded drugs
15	Finding an alternative supplier in case of drug shortages
16	Making a work schedule
17	Adjusting stock parameters based on sales
18	Adjusting stock to the preference of health insurance companies or to achieve optimal margins
19	Accounting
20	Filling prescriptions and checking filled prescriptions
21	Performance appraisal of supporting staff
22	Providing advice on OTC products
23	Cashing out the cash register
24	Judging the need to repeat a prescription
25	Analyze complaints by customers and mistakes made at the pharmacy
26	Checking financial indicators
27	Adjusting stock in computer based on stock taking
28	Prepare and lead the pharmacotherapy quality circles between GP's and pharmacists
29	Claiming provided medicine and care related activities at healthcare insurer
30	Updating the quality manual
31	Informal contact with patients and healthcare providers
32	Organizing a staff work meeting
33	Updating lab results in the patients' files
34	Discharge counselling
35	Post graduate education or reading professional literature

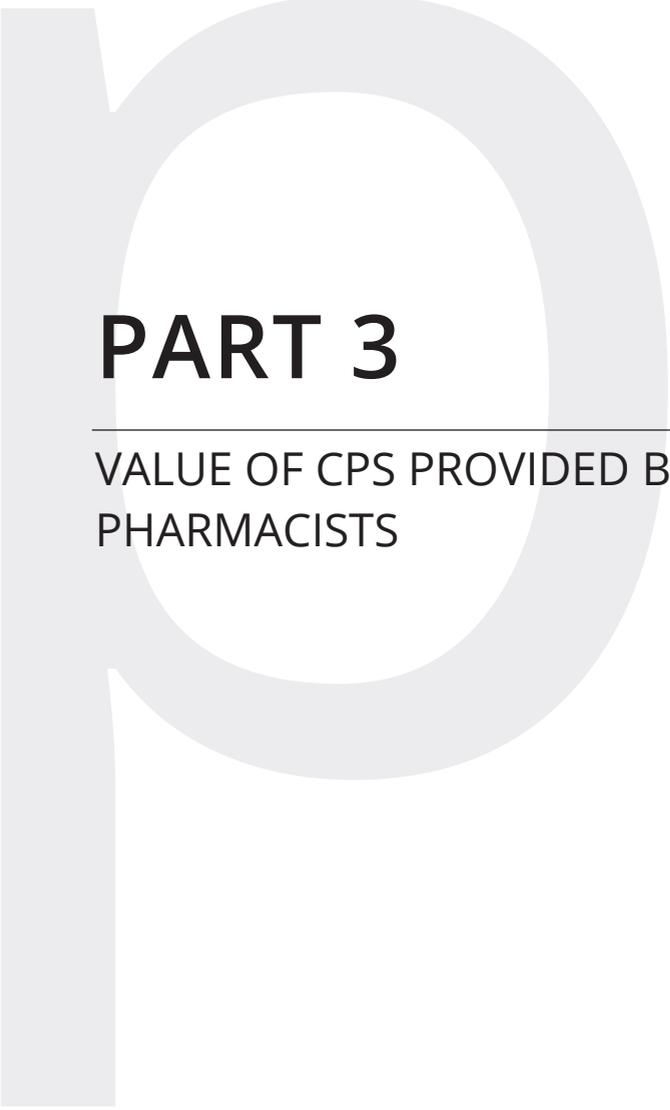
## Chapter 3

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#	Activity
36	Processing a prescription into the pharmacy information system
37	Maintenance of electronical equipment
38	Counseling at first dispensing of a new medicine
39	Dispensing a filled prescription to a patient
40	Administrative tasks for patients (e.g. credit or cancelling an invoice)
41	Patient interview for a medication review
42	Discussing the results from a medication review with the GP
43	Updating patient files
44	Analyzing the medication of a patient in light of a pharmacist-led medication review
45	Checks and intervention based on clinical rules (e.g. stop start criteria)
46	Clinical risk management of drug-drug and drug-disease interactions and other potential prescribing errors
47	Final check of dispensed prescriptions
48	Checking the clinical risk management alerts (e.g. drug-drug interactions)
49	Cleaning the community pharmacy
50	Buying groceries for the community pharmacy
51	Negotiate with healthcare insurer
52	Checking expiration dates of stock
53	Perform and analyze the results from healthcare professional satisfaction research
54	Conducting or participating in pharmacy practice research
55	Judge changes in weekly medication of multi-dose dispensing systems
56	Explain insurance issues to patients
57	Checking order before processing
58	Performing a recall
59	Supervise an intern
60	Adjusting stock parameters
61	Starting a new project in the pharmacy

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# PART 3

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## VALUE OF CPS PROVIDED BY COMMUNITY PHARMACISTS



CPS

Cost-Effectiveness



CPS

# CHAPTER 4

Cost-utility and cost-effectiveness analysis  
of a clinical medication review focused  
on personal goals in older persons with  
polypharmacy compared to usual care:  
Economic evaluation of the DREAMEr study

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**British Journal of Clinical Pharmacology 2021;87:588-97.**

## Abstract

### Aims

The ageing society may lead to increasing healthcare expenditure. A clinical medication review (CMR) could potentially reduce costs. The aim of this study is to perform a cost-utility and cost effectiveness analysis from a societal perspective of a patient-centered CMR.

### Methods

A trial-based cost-utility and cost-effectiveness analysis was performed as part of the DREAMeR study, a pragmatic controlled trial that randomized patients aged  $\geq 70$  years using at least seven drugs to either CMR or usual care. Over six months, healthcare consumption and drug use were collected to estimate costs, and effects were collected in terms of quality-adjusted life years (QALYs) measured with EQ-5D-5 L and EQ-VAS and as reduced health-related complaints with impact on patients' daily lives.

### Results

The total mean costs per patient ( $n = 588$ ) over six months were  $\text{€}4,189 \pm 6,596$  for the control group ( $n = 294$ ) and  $\text{€}4,008 \pm 6,678$  for the intervention group ( $n = 294$ ), including estimated intervention costs of  $\text{€}199 \pm 67$ , which resulted in a mean incremental total cost savings of  $\text{€}181$  for the intervention group compared to the control group. Compared to the control group, for the intervention group, the mean incremental QALYs over six months were:  $-0.00217$  measured with EQ-5D and  $0.003$  measured with EQ-VAS. The incremental effect of reduced health related complaints with impact was  $-0.34$ . There was a likelihood of  $>90\%$  that the intervention was cost-saving.

### Conclusions

The benefits of a patient-centered CMR were inconsistent with no benefits on HR-QoL measured with EQ-5D-5 L and small benefits on HR-QoL measured with EQ-VAS and health-related complaints with impact on patients' daily lives. Additionally, a CMR could potentially be cost saving from a societal perspective.

## Introduction

In most developed countries the number of older people with multimorbidity and chronic medication use is expected to continue to rise in the coming decades [1]. The chronic use of multiple drugs may lead to drug-related problems (DRPs) and inappropriate prescribing [2,3]. This may have a large impact on healthcare expenditure and is a major challenge for the upcoming years [4-8]. To reduce DRPs and to prevent people from medication-related hospital admissions, guidelines recommend a regular review of medication use by clinical medication reviews (CMR) [9]. A CMR is 'a structured critical examination of patient's medicines with the objective of reaching an agreement with the patient about treatment, optimizing the impact of medicines, minimizing the number of DRPs and reducing waste' [10]. It has a multidisciplinary approach and the patient, physician and pharmacist are involved.

There is abundant evidence on the effectiveness of CMRs regarding the reduction of DRPs. Moreover, several studies have shown positive effects on intermediate outcomes, such as LDL-cholesterol, HbA1c or hypertension. The evidence for effects on more clinically relevant outcomes, such as pain-scores, falls, hospital admissions, health-related quality of life (HR-QoL) and on cost savings is limited [11-19]. A CMR may reduce healthcare expenditures, but a CMR itself is labor intensive and could therefore contribute to a further rise in healthcare costs. For studies to measure the cost-effectiveness of CMR, they should ideally measure HR-QoL and estimate quality-adjusted life years (QALYs) [20]. However, many interventions that are performed during CMR are unlikely to improve HR-QoL for the short term (e.g. starting statins or acetylsalicylic acid as primary or secondary prevention will not increase HR QoL on a time horizon of six months).

We expect that more specific attention to older patient's preferences, personal goals and complaints related to their health and medication during a CMR can potentially increase their HR-QoL. The 'Drug use Reconsidered in the Elderly using goal Attainment scales during Medication Review' (DREAMeR) study was designed based on these assumptions to assess the clinical and economic impact of a CMR for older persons ( $\geq 70$  years) using at least seven drugs in primary care. The aim of this economic analysis is to perform a cost-utility and cost-effectiveness analysis from a societal perspective of this patient centered CMR focused on patient's preferences, personal goals and complaints, compared to usual care.

## Methods

### Desing and setting

This study was a trial-based cost-effectiveness and cost-utility analysis of the DREAMeR study (Netherlands Trial Register; NTR5713). The design, conduct and reporting of this analysis adheres to the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) and International Society for Pharmacoeconomics and Outcomes Research (ISPOR) guidelines [20-22]. The DREAMeR study was a pragmatic randomized controlled trial (RCT) performed in 35 community pharmacies of the franchise formula Service Apotheek and collaborating general practices in the Netherlands [23]. The target population comprised patients aged 70 years and over using seven or more chronic drugs. The selected pharmacists were accredited and experienced with CMRs. Pharmacists received a day of training before the start of the study, where they were instructed on all aspects of the study. The general practitioners (GPs) were informed by the pharmacists about the study. Participants were recruited by their community pharmacists. First, the pharmacists screened all their patients by the inclusion criteria. Then the pharmacists sent the lists with the selected patients to patients' GPs. The GPs judged the patients on the exclusion criteria. An anonymized list was then sent to the researcher to randomly assign 50 patients per pharmacy who would be invited first. These patients were subsequently invited by letter and/or telephone consultation by their pharmacist. Randomization of participants to the intervention or control group was carried out at patient level and performed after recruitment of the participants. Block randomization per pharmacy using a computer-generated list of random numbers was applied by the researcher to obtain equal numbers of persons per pharmacy per group. A block consisted of the number of patients who agreed to participate in a pharmacy. The study design, study protocol, procedure and informed consent were approved by the Medical Ethics Committee of the University Medical Centre of Utrecht (protocol number 15/737). Participation was voluntary and all participants have signed informed consent. The full study protocol of this RCT has been published elsewhere [23].

### Intervention and comparator

The intervention was a CMR with a patient centered approach, focused on patient's preferences, personal goals and health-related complaints. The CMRs were performed according to a structured method described in the Dutch multidisciplinary guideline 'Polypharmacy in the elderly' [9]. Before the start of the CMR, questionnaires were completed about health-related complaints which could be used as input for the pharmacist. In addition, proposing personal goals together with patients was new in this study. The pharmacist discussed all aspects (e.g. effectiveness, safety and practical

issues) of the drugs in use. Subsequently the pharmacist discussed the personal goals, preferences and other DRPs with the GP during a personal conversation. Recommendations were proposed in a pharmaceutical care plan, which was then discussed with the patient. Actions that both the patient, GP and pharmacist agreed upon were implemented gradually and two follow-up moments were scheduled (within approximately three months) to evaluate the attainment of goals and the agreed upon actions. The pharmaceutical care plan was adjusted when needed. Patients in the control group received usual care and were scheduled to receive a CMR after the study had finished (postponed intervention).

## Effects

The primary outcome measures in the DREAMeR study were HR-QoL and the number of health-related complaints per patient with moderate to severe impact on the patient's daily life. Health-related quality of life was measured with the Dutch version of the EQ-5D-5 L and EQ-VAS [24]. These outcome measures were collected through written questionnaires at baseline, 3 months and 6 months. Questionnaires were sent to patients by the pharmacists, but completed independently by the patients. If in need of assistance, patients could obtain help from an independent research assistant. All questionnaires were recorded in duplicate by two independent research assistants to enable checks on registration mistakes. The EQ-5D-5L describes health status in terms of five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Scores on these five domains were used to estimate health utility values with the use of the Dutch EQ-5D-5L tariff, which ranges from -0.329 (less than death) to 1 (indicating best possible health status) [25]. In addition, the EQ-VAS was used to measure a person's health status with scores ranging from 0–100, in which 0 indicates the worst and 100 indicates the best possible health status. In this economic analysis, the effects were determined with QALYs. The QALYs were calculated with the health utility values from the EQ-5D-5 L and EQ-VAS using linear interpolation between time points. Within the time horizon of the study (6 months), the maximum number of QALYs that a patient could gain was 0.5.

## Health-related complaints

Health-related complaints were measured with a written questionnaire [23] and were based on the most common complaints in older people and the most common side effects of drugs [23,26]. Twelve complaints, e.g. pain, dizziness and stomach problems, were registered. The severity of these complaints was measured on a visual analogue scale (VAS), with a range from 0 to 10, and influence on a patient's daily life with a 5-point Likert scale. To add clinical relevance, a health-related

## Chapter 4

complaint with moderate to severe impact on patient's daily life was defined as the following: a severity score with VAS  $\geq 5$  and influence on daily life of moderate, severe or extreme ( $\geq 3$  points on a 5-point Likert scale) [27]. Effectiveness was determined as the number of reduced health-related complaints with impact per patient 6 months after the study period.

## Costs

### Identification

This study evaluated costs from a societal perspective. Healthcare costs were divided into direct costs and indirect costs. Direct healthcare costs included healthcare consumption and drug costs measured in the RCT. Indirect healthcare costs included informal care maximized to 16 hours per day. Productivity costs were not included given that all patients were expected to be retired as they are all older than 70 years.

### Measurement

Healthcare consumption was measured with the Dutch Medical Consumption (iMTA) Questionnaire including an extra question about informal care through telephone assessments performed by independent study assistants at baseline and 3 and 6 months after the start date [28]. Data were collected at each time point about the previous 3 months. Total healthcare costs were divided into six different categories: (1) drugs; (2) primary care, including GP, practice nurse, physiotherapist and other visits; (3) secondary care, including emergency department visits, hospital admissions and visits to physicians at outpatient clinics; (4) institutional care, including day visits and admissions to rehabilitation clinics, psychiatric wards and nursing homes; (5) home care, including housekeeping and nursing; and (6) informal care. Informal care was measured by asking patients the amount of time they had received informal care for the past 3 months. Drug dispensing records were collected from the pharmacy information systems to calculate drug costs during the study period of 6 months. To measure the time spent for the CMR, all pharmacists were asked to record the average time spent for every step of the medication review process, including patient interview, DRP analysis, conversation with GP and follow-up and monitoring. In addition, the time spent by the pharmacy technician during the CMR process was recorded.

## Valuation

Healthcare utilization was valued according to guidelines for economic evaluation in healthcare in the Netherlands [29]. Informal care was valued according to iMTA (Medical Technology Assessment) at €14 per hour (2014 prices) and was indexed to 2017 prices. The amount of time for informal care was maximized at 16 hours per day. Drug costs were presented in 2017 euros. Prices from previous years were updated according to the Dutch consumer price index [30]. The costs of the intervention were calculated by multiplying the time spent by the pharmacist, pharmacy technician and GP with the average wage of these healthcare providers based on an earlier report presenting costs associated with a CMR [31].

## Analysis

Descriptive statistics were used to describe patient characteristics. Costs were calculated over the 6 month period. To account for missing data in effects and costs (e.g. due to patients not being reachable), the method of multiple imputations was used to generate ten imputed data sets with predictive mean matching, assuming that the data were missing at random.

The effectiveness of the intervention was expressed in estimators that are important for patients' daily lives, namely HR-QoL and health related complaints with an impact on patient's daily life. Results of the cost-effectiveness analysis were expressed in terms of the incremental cost effectiveness ratio (ICER) 6 months after the intervention. These ICERs were calculated for all three outcomes: (1) costs/QALY measured with EQ-5D health utility values, (2) costs/QALY measured with EQ-VAS scores, and (3) costs/reduced complaint with impact.

The total costs included drug costs, all healthcare costs including informal care and intervention costs, calculated over 6 months from the start date of the study. In order to analyze the uncertainty of the ICER results, we performed a probabilistic sensitivity analysis (PSA) with 1,000 replications with gamma distributions for all costs and health-related complaints with impact, a normal distribution for health utility values and a beta distribution for EQ-VAS scores. The resulting 1,000 replicates were plotted on the cost-effectiveness plane and used to construct a cost-effectiveness acceptability curve. The graphical presentation of the cost-effectiveness is presented as the difference in costs on the vertical axis and the difference in effects on the horizontal axis. Deterministic sensitivity analyses (DSA) were conducted for all different cost parameters to test the robustness of the analyses. Estimates for all different types of costs in both groups were varied between their 95% confidence intervals to assess the confidence. The resulting ranges of costs are presented in a tornado plot. Base case analysis shows unadjusted values. An additional analysis, in

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which data were adjusted for baseline costs and utility simple linear regression, is presented in the supplementary methods.

The data were analyzed using IBM SPSS Statistics 24.0 (IBM Corporation, Armonk, NY, USA) and Microsoft Office Excel and Access 2013 (Microsoft Corporation, Redmond, WA, USA).

## Results

In total, 629 patients of the DREAMeR study were randomised into control (n = 314) or intervention (n = 315) groups. Over six months, the total drop-out rate was 6.7% in the intervention group and 6.4% in the control group (p = 0.88). Costs and effects could not be obtained for 41 participants, who were excluded from the results (see Figure 1). In total, 588 patients were analysed for this study (294 in both groups). Baseline demographics of the participants in both groups are shown in Table 1.

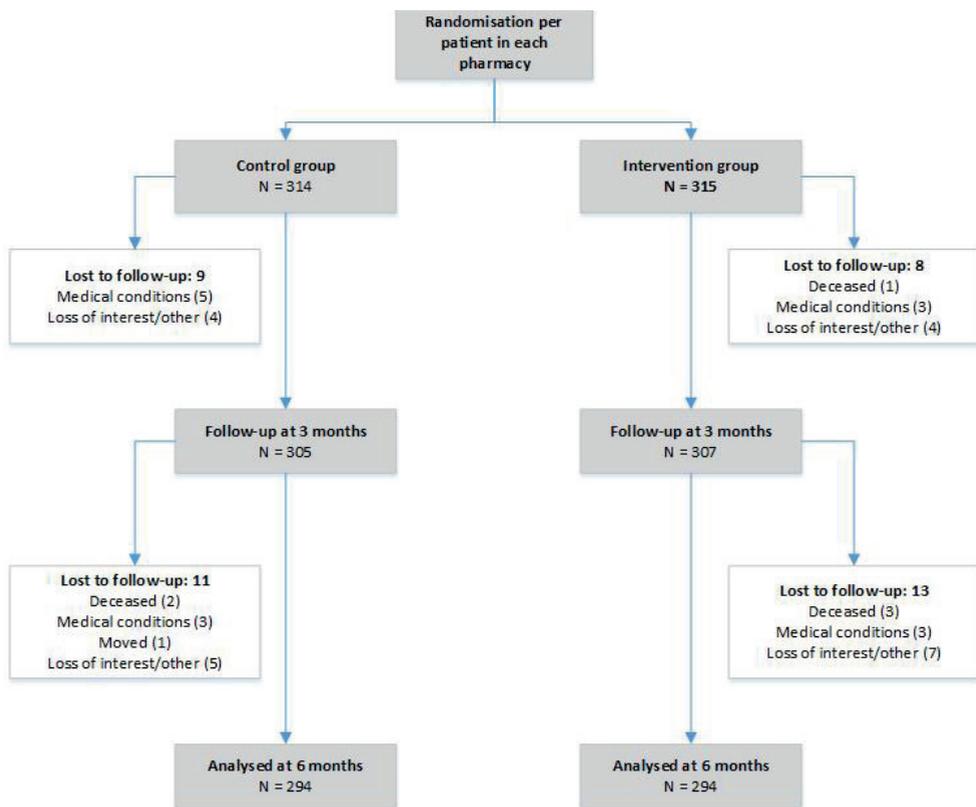


Figure 1: Study flowchart of the economic analysis of the DREAMeR study.

**Table 1: Characteristics of participants in the control and intervention group. Abbreviations: IQR = interquartile range, SD= standard deviation, EQ=EuroQol, VAS=visual analogue scale. \* Complex health problems measured with ISCOPE score (integrated systematic care for older people).**

Characteristic	Control group (n = 294)	Intervention group (n = 294)
Age, median (IQR), years	78 (74-82)	79 (76-83)
Sex, female (%)	51%	56%
Ethnicity, European (%)	98%	97%
Living situation, alone (%)	38%	42%
Complex health problems* (%)	23%	25%
Number of drugs in use, median (IQR)	9.0 (7.5-10.5)	9.0 (7.5-10.5)
EQ-5D health utility values, mean (SD)	0.74 (0.18)	0.73 (0.18)
EQ-VAS scores, mean (SD)	70 (16)	69 (16)
Health-related complaints with impact, mean (SD)	2.6 (2.4)	2.7 (2.4)

## Intervention

The CMR process was divided into different steps and the average time spent per step is shown in Table 2. The mean time (and standard deviation [SD]) to perform a CMR was 107 ± 41 minutes for the community pharmacist, 7 ± 12 minutes for a pharmacy technician and 12 ± 8 minutes for the GP. The time for the GP was only recorded for the conversation with the pharmacist.

**Table 2: Overview of average time (in minutes) spent for the clinical medication review by pharmacist, pharmacy technician and general practitioner. Average time spent in minutes (mean ± SD. \* means various items such as travel time or making appointments).**

Task	Pharmacist	Pharmacy technician	General practitioner
Preparation	13 ± 13	5 ± 7	
Patient interview	50 ± 18		
Discussion pharmaceutical care plan	12 ± 8		12 ± 8
Implementation of actions	11 ± 6		
Follow-up and evaluation	16 ± 15		
Other*	5 ± 11	2 ± 5	
Total	107 ± 41	7 ± 12	12 ± 8

### Effects

Effects on primary outcomes are presented in Table 3 and extensively described in another paper [32]. Mean QALYs measured with EQ-5D per 6 months were 0.369 (0.355–0.377) and 0.367 (0.345–0.370) for respectively the control group and intervention group, resulting in an incremental QALY of –0.00217. Mean QALYs measured with EQ-VAS over 6 months were 0.345 (0.332–0.356) for the control group and 0.348 (0.335–0.362) for the intervention group, resulting in an incremental QALY of 0.003. Effectiveness measured as reduced health-related complaints with impact over 6 months was –0.04 complaints in the control group compared to –0.38 complaints per patient in the intervention group, resulting in an incremental effect of –0.34 complaints in the intervention group compared to the control group. Unadjusted scores for primary outcomes at baseline and at 3 and 6 months are presented in Supplementary Table 1.

### Costs

Table 3 summarizes the different costs over the 6-month study period. The total mean healthcare costs per patient were €3,809 ± 6,678 in the intervention group compared to €4,189 ± 6,596 in the control group, resulting in incremental healthcare costs of –€380. Mean costs for all different cost categories at each time point for both groups are shown in Supplementary Table 2. Combining the average time spent on a CMR and the updated 2017 hourly rates, the average costs of this CMR per patient would range between €145 and €203 for the community pharmacist, €6 and €8 for the pharmacy technician and €20 and €22 for the consultation with the GP [30,31], which results in a mean intervention cost of €199 ± 67 for a CMR per patient. When adding the intervention costs to the total costs, the total mean costs per patient in the intervention group were €4,008 ± 6,678 compared to €4,189 ± 6,596 in the control group. This results in an incremental cost of –€181 for the intervention compared to usual care.

### Cost-utility analysis

To estimate the ICERs, we used the incremental costs and incremental effects (see Table 3). When HR-QoL measured with EQ-5D is the measure of effect, a loss of QALYs (–0.00217) is offset against cost savings (–€181) resulting in an ICER of €86,360. This can be interpreted as the compensation received in costs for a lost QALY. The CMR dominated usual care for the cost/utility analysis determined with EQ-VAS and cost/change in complaint with impact analysis, being both less costly and more effective.

**Table 3: Incremental effects and costs between control and intervention group over six months. Costs are presented as mean cost per patient ± standard deviation. Abbreviations: QALY = quality-adjusted life years, EQ=EuroQol, VAS = visual analogue scale.**

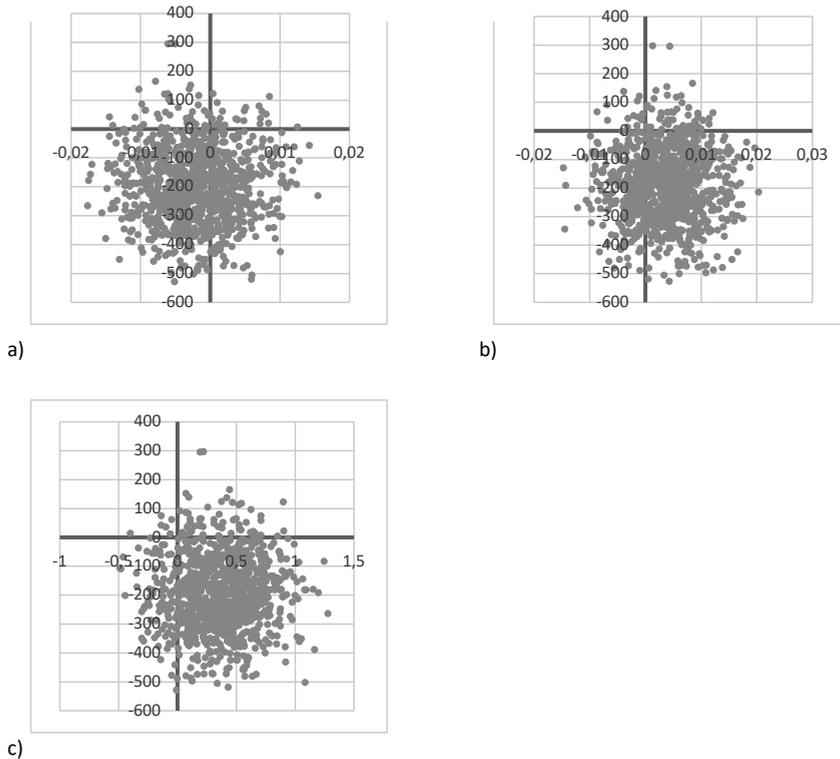
Type of effects and costs	Control group (n=294)	Intervention group (n=294)	Incremental effects or costs
<b>Effects</b>			
QALYs (EQ-5D)	0.369 (0.355-0.377)	0.367 (0.345-0.370)	-0.00217
QALYs (EQ-VAS)	0.345 (0.332-0.356)	0.348 (0.335-0.362)	0.003
Reduced health-related complaints with impact	0.04	0.38	-0.34
<b>Healthcare costs</b>			
Drugs	€ 873 ± 822	833 ± 888	€ -40
<b>Healthcare resources</b>			
Primary care	€ 414 ± 558	€ 346 ± 453	€ -68
Secondary care	€ 755 ± 1,925	€ 700 ± 1,997	€ -55
Institutional care	€ 475 ± 3,507	€ 311 ± 3,655	€ -164
Home care	€ 1,198 ± 2,821	€ 1,296 ± 2,923	€ 97
Informal care	€ 474 ± 2,126	€ 323 ± 1,542	€ -150
Total healthcare costs	€ 4,189 ± 6,596	€ 3,809 ± 6,678	€ -380
<b>Intervention costs</b>			
Clinical medication review	n.a.	€199 ± 67	€ 199
Total costs	€ 4,189 ± 6,596	€ 4,008 ± 6,687	€ -181

### Probabilistic sensitivity analysis

Regarding the results from the cost-utility analysis, the CMR emerged as the dominant strategy for the EQ-VAS and health-related complaints with impact. Based on 1,000 multiple replications, probabilistic sensitivity analyses (PSA) were performed and are presented in Figure 2. Figure 2A illustrates the ICER for costs/QALY measured with EQ-5D. Most of the simulations are located in the lower-left quadrant (59.9%) and in the lower-right quadrant (33.7%) of the cost-effectiveness plane, which results in a probability of 93.6% that a CMR is cost-saving and a probability of 63.7% of QALY loss. Figure 2B presents the ICER for costs/QALY measured with EQ-VAS; most of the simulations are located in the lower-right quadrant (69.2%) and in the lower-left quadrant (24.4%) of the cost effectiveness plane, which results in a chance of 93.6% that a CMR is cost saving and a 26.1% of QALY loss (Figure 2B). Figure 2C offers the ICER for costs/reduced complaint

## Chapter 4

with impact, showing a probability of 93.6% that a CMR is cost saving and a 90.1% probability of also giving a reduction in the number of severe complaints (Figure 2C). The acceptability curves are shown in Supplementary Figure 1.

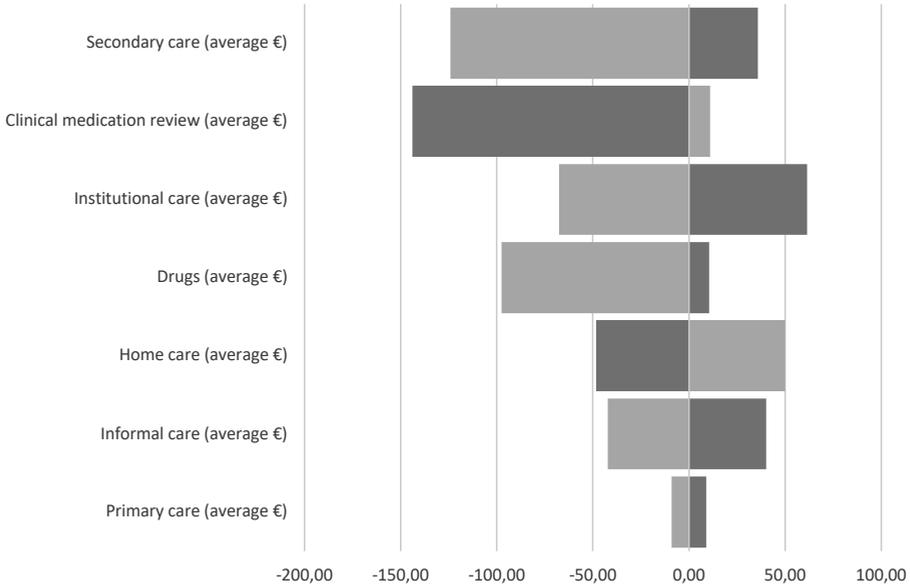


**Figure 2a, b, c: Cost-effectiveness plane for the incremental cost-effectiveness ratios (ICERs) determined as a) costs/QALY measured with EQ-5D-5L health utility values, b) costs/QALY measured with EQ-VAS health utility values and c) costs/effects determined as reduced complaints with impact. The x-axis shows the incremental effects and the y-axis shows the incremental costs in euros. Abbreviation: QALY = quality-adjusted life year.**

## Deterministic sensitivity analysis

Results from the deterministic sensitivity analysis (DSA) are shown in Figure 3. A DSA determines the impact of uncertainty of individual cost parameters on the cost-saving or cost-introducing aspect of an intervention. Bars on the right-hand side show how uncertainty can increase the costs of an intervention and bars on the left-hand side show how uncertainty decreases the costs. The results show that the costs of the intervention, the costs of secondary care (including hospital

admissions) and the costs of institutional care had the highest impact on the uncertainty of the ICER, but the CMR still results in cost savings because the ranges of all variables are lower than the incremental costs of –€181.



**Figure 3: Tornado diagram which describes the effects of uncertainty for the different cost categories.**

## Discussion

This study shows that a CMR focusing on patient's preferences, goals and health-related complaints probably does not lead to an increase in costs from a societal perspective and could potentially be cost saving. The effect a CMR has on HR-QoL is less clear. HR-QoL measured with EQ-5D shows that a CMR could slightly reduce the quality of life. However, HR-QoL measured with EQ-VAS and health related complaints with impact on daily life shows a slight to moderate improvement by increasing the quality of life and reducing the number of complaints with impact on daily life.

There is limited evidence for effects of CMR on clinical and economic outcomes [14,33–35]. The patient centered approach applied during CMR in this study improved relevant outcomes for older patient's lives based on the EQ-VAS and the number of health-related complaints with impact on patients' daily lives. This could possibly be explained by the patient-centered and goal-oriented character

of the CMRs performed in this study. The CMRs in this study focused mainly on the patient's preferences related to their medication and health, and could thereby improve their self-experienced quality of life, whereas other studies in medication review often focused on optimizing treatment according to guidelines [14,33,34]. The goals in the CMRs could be solved by drug changes performed during CMRs as shown by an in depth-analysis of the DREAMeR study [36]. Health utility values did not change significantly. This may be explained by the fact that the EQ-5D is less responsive compared to the EQ-VAS, especially when baseline values are high [37,38]. However, VAS is not a generally accepted way to measure utilities, due to the risk of end aversion bias. To negate end aversion bias, the possibility of conversion of VAS scores has been explored [39]. However, it was chosen not to convert VAS scores due to the fact that utilities measured with EQ-5D and EQ-VAS do not differ substantially, so the presence of end aversion bias seems very limited. Also, this study was conducted among patients aged  $\geq 70$  years and using at least seven drugs, which also reduced the chance of giving a VAS score of 100, and therefore introducing the risk of end aversion bias. VAS does, however, give some additional information on the (improved) health status experienced by the patient themselves and was therefore used to calculate utilities as well.

A previous study conducted in Spain illustrated that their medication review decreased costs, increased HR-QoL measured with both EQ-5D and EQ-VAS and was also seen as the dominant strategy over usual care [19,40]. The effects on HR-QoL were even higher than the effects in our study. Although this Spanish study was not explicitly designed as a patient-centered intervention, CMR in this study was accompanied with many follow-up contacts, which probably contributed to the patient-centeredness of the study. Costs in the Spanish study were not directly comparable to the Dutch situation as these were not calculated from a societal perspective. A decrease in drug costs and hospital admissions was also demonstrated by Desborough et al., but they did not show effects on HR-QoL measured with EQ-5D [41].

The average healthcare costs of the patients in this study are representative of the current Dutch situation for this age group [42]. A CMR could lead to small cost savings in healthcare compared to usual care and an average reduction of 0.5 in the number of drugs in use after 6 months [32]. Although the variation for each cost category was high in both groups, the results are strengthened by the sensitivity analyses, which show that the analysis is robust to variations in variables. The probability of cost savings in healthcare consumption is high (>90%) according to the cost-effectiveness planes of the ICERs.

The costs with the highest influence on the variability of the estimated cost savings were the intervention costs and the costs of institutional care and secondary care.

Utilization of secondary care or institutional care can be expensive (e.g. one admission to a hospital or care home leads to large increases in healthcare costs) and therefore can also increase interpatient variability. However, even when the variation of these costs was performed, conclusions about cost savings were not influenced.

The mean estimated cost for a CMR in this study was €199, which is comparable to the costs of €185 determined in an earlier report [31] and to the budget impact analysis presented in the current Dutch multidisciplinary guideline, which estimated costs for CMR between €136 and €303 [9]. The average time spent by the pharmacists for the patient interview in our study ( $50 \pm 18$  minutes) was relatively high [31], but this can be explained by the patient-centered approach with extra attention to the personal preferences, goals and health-related complaints of the patients. The GP spent at least an average of  $12 \pm 8$  minutes on the CMR in this study, but this reflects only the discussion of the care plan with the pharmacist. There could have been potential other actions performed by the GP resulting from the CMR, that have been performed under standard GP care. Nevertheless, the total costs of primary care were lower in the intervention group compared to the control group.

In the current study, follow-up was limited to two moments, which is lower compared to the Spanish study. Increasing the number of follow-up moments could further increase the effectiveness of CMR, but would also increase costs associated with it. Adequate training is needed to perform CMR, but most Dutch community pharmacists are already accredited to perform CMR. Therefore, training costs were not attributed to the total intervention costs. However, large implementation worldwide would also need budgets to train pharmacists to perform these patient-centered CMRs.

Because of the ageing society, with a rising number of older people with multimorbidity and polypharmacy, attention to maintain older people's health and concomitant containment of healthcare costs is essential. Goal-oriented patient care may improve the management of multimorbidity and polypharmacy [43,44]. When we extrapolate the results of this study to the whole country, there are around 300,000 persons aged 70 years and older using seven or more chronic drugs [9]. If we were to deliver this intervention to all eligible patients, this would cost around €60 million for the intervention, but concomitantly would lead to healthcare cost savings of around €114 million, resulting in a net benefit of €54 million over a period of six months.

## Strengths and limitations

There were several strengths of this study. First, this economic analysis is based on the data from a large pragmatic RCT performed in daily clinical practice, which increases the generalisability of the results. Second, because this analysis was trial based, we could use the actual costs and did not use rates or price agreements. Third, we measured a broader range of healthcare costs compared to most other studies, which results in a complete overview of effects compared to costs.

There were also several limitations of this study. First, due to the nature of the intervention, blinding was not feasible, which might have influenced the results of this trial. To minimise the risk of bias, all questionnaires were captured and recorded by independent research assistants. Control patients were offered a CMR after the end of the 6 months follow-up. Pharmacists are unlikely to have given extra attention to control patients, as they generally lacked time to perform additional reviews during the study period. However, it is possible that control patients could be triggered by participating in this study to consider obtaining advice about their medication, health problems or goals, but this would rather lead to an underestimation of the study results. Second, the healthcare consumption was measured by the medical consumption questionnaire by telephone interviews every 3 months. Although this is a validated method of collecting these data, it could have introduced recall bias as 3 months is a fairly long period of time. However, this bias is unlikely to be different between both groups. Also, drug dispensing records were obtained via the pharmacy information system of the community pharmacy. Medication dispensed outside this pharmacy, as well as over-the-counter drugs, could have been missed in the dataset. However, in the Netherlands, patients prefer to visit one pharmacy [45]. Finally, the follow-up period in this study was 6 months, so we do not know what the results are over a longer period.

## Conclusion

A CMR focused on patient's preferences, personal goals and health related complaints slightly improved health related quality of life measured with EQ-VAS and slightly reduced the number of health related complaints with impact on patients' daily lives in older persons with polypharmacy, but had no effect on health-related quality of life measured with the EQ-5D-5L. Additionally a CMR could potentially be cost-saving from a societal perspective.

## Acknowledgements

The authors thank all patients, GPs, pharmacists and members of Service Apotheek for their participation and support in this study. We also thank the pharmacy students Merve Sivridas, Pawan Rauf, Timo Vogelzang, Sara Cherkaoui, Kim van der Heijden, Zahra Jawad, Manon van Hunnik, Madelon Groenhuis and Milad Rahigh for their help in the data collection. We thank the members of our Scientific Advisory Board for their input regarding the design of the study protocol. This study received unconditional grants from the Royal Dutch Pharmacists Association ('Koninklijke Nederlandse Maatschappij ter bevordering der Pharmacie', KNMP) and from Service Apotheek as part of the PhD project of S.V. The funders of the study had no role in the design, data management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication. Patients received no fee for their participation. Pharmacists received standard reimbursement for the clinical medication reviews from the health insurance companies and a small administrative fee for mailings of questionnaires.

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## Competing interests

There are no competing interests to declare.

## Contributors

S.V. conceptualized and designed the study, performed the data collection and data extraction, carried out analyses and interpretation of data, drafted the initial manuscript, and approved the final manuscript as submitted. J.P. conceptualized and designed the study, carried out analyses and interpretation of data, drafted the initial manuscript, and approved the final manuscript as submitted. A.H. conceptualized and designed the study, carried out analyses and interpretation of data, critically reviewed the initial manuscript, and approved the final manuscript as submitted. H.F.K. participated in study design and critically reviewed the manuscript and approved the final manuscript as submitted. J.B. participated in study design and critically reviewed the manuscript and approved the final manuscript as submitted. J.G. participated in study design and critically reviewed the manuscript and approved the final manuscript as submitted. M.L.B. conceptualized and designed the study, carried out interpretation of data, critically reviewed the initial manuscript, approved the final manuscript as submitted and is the principal investigator of this study.

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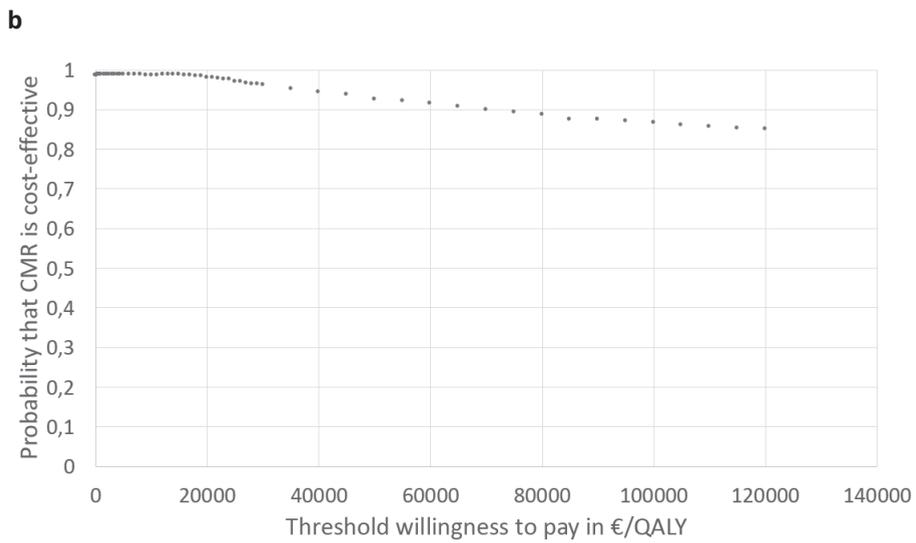
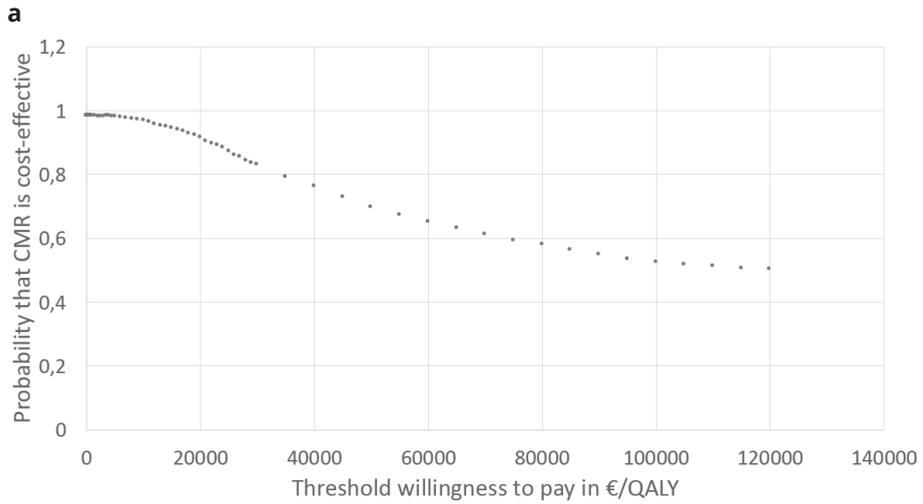
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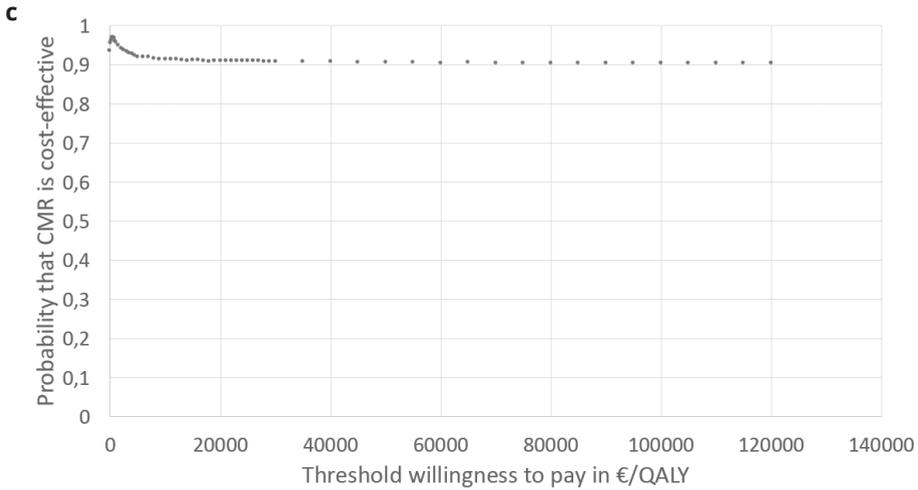
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## Supplementary material



## Chapter 4



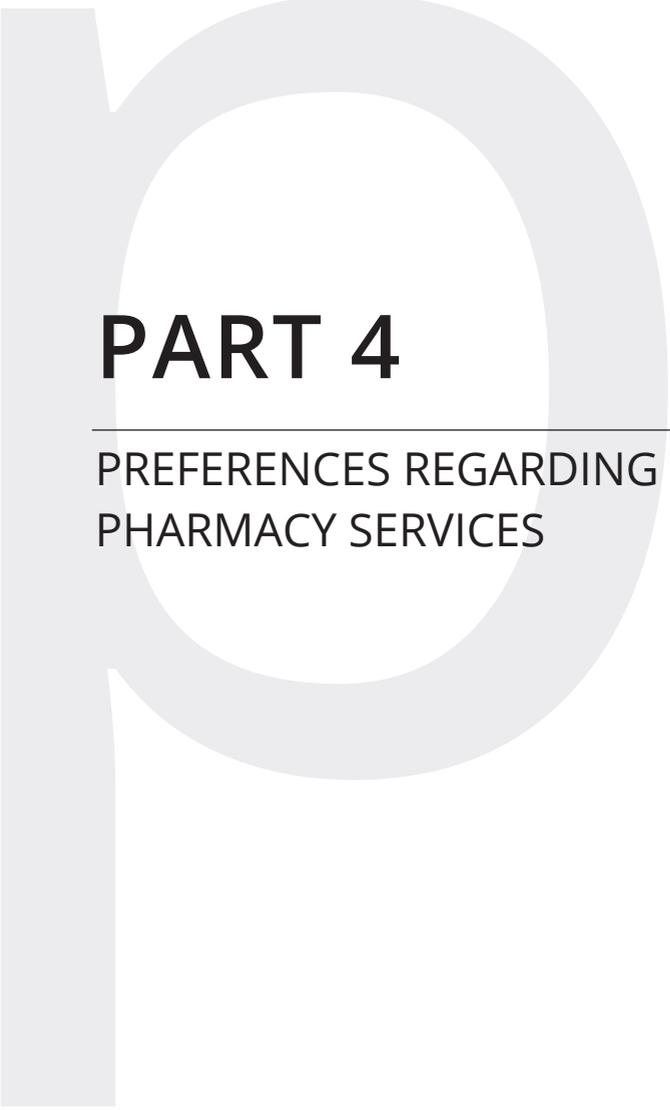
**Figure 1a, b, c: Acceptability curves based on willingness to pay for a) costs/QALY measured with EQ-5D, b) costs/QALY measured with EQ-VAS and c) costs/effects determined as reduced complaints with impact. NB. QALY = quality-adjusted life year.**

**Table 1: Mean values for health-related quality of life and complaints over time in the control and intervention group. Definition complaint with impact = Severity VAS-score  $\geq 5$  and influence on daily life: moderate, severe, extreme. Abbreviations: EQ-5D = EuroQoL-5D; VAS = Visual Analogue Scale; SD = standard deviation.**

Outcome (mean, SD)	Control group (n = 294)			Intervention group (n = 294)		
	Baseline	T1: 3 months	T2: 6 months	Baseline	T1: 3 months	T2: 6 months
EQ-5D-5L, utility values	0.74 $\pm$ 0.18	0.74 $\pm$ 0.17	0.74 $\pm$ 0.18	0.73 $\pm$ 0.18	0.74 $\pm$ 0.17	0.73 $\pm$ 0.19
EQ-VAS	71 $\pm$ 16	69 $\pm$ 16	69 $\pm$ 16	69 $\pm$ 16	69 $\pm$ 16	70 $\pm$ 16
Health-related complaints with impact	2.6 $\pm$ 2.4	2.5 $\pm$ 2.2	2.5 $\pm$ 2.4	2.7 $\pm$ 2.4	2.5 $\pm$ 2.3	2.3 $\pm$ 2.4

**Table 2: Mean costs per time point for each cost category between control and intervention group. At each time point the costs are calculated over the three months before. NB. Data are presented as mean costs ± standard deviation.**

Cost category	Control group (n = 294)			Intervention group (n = 294)		
	Baseline	T1: 3 months	T2: 6 months	Baseline	T1: 3 months	T2: 6 months
Drugs	454 ± 873	434 ± 519	439 ± 365	383 ± 277	400 ± 316	433 ± 671
Primary care	206 ± 293	193 ± 293	221 ± 308	174 ± 245	186 ± 259	160 ± 232
Secondary care	330 ± 1,087	325 ± 926	430 ± 1,261	272 ± 723	323 ± 1,181	377 ± 1,197
Institutional care	24 ± 205	273 ± 2,227	205 ± 1,757	43 ± 472	114 ± 174	197 ± 2,074
Home care	473 ± 1,031	574 ± 1,551	627 ± 1,433	544 ± 1,203	605 ± 1,579	688 ± 1,697
Informal care	152 ± 1,046	315 ± 1,421	159 ± 1,025	119 ± 6,034	164 ± 849	159 ± 1,258



# PART 4

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## PREFERENCES REGARDING COMMUNITY PHARMACY SERVICES



CPS

Preferences



CPS

# CHAPTER 5.1

How does the general public balance convenience and cognitive pharmaceutical services in community pharmacy practice

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**Research in Social and Administrative Pharmacy 2021;17:606-12.**

## Abstract

### Background

Community pharmacy is shifting its focus from traditional, product-focused roles to the provision of cognitive pharmaceutical services (CPS). Previous research has indicated that community pharmacists predominantly want to devote their capacity to CPS. Ideally, services provided also address users' needs. The general public's preferences regarding the services provided by community pharmacists are currently less understood.

### Aim

This study investigates the general public's preferences and perceived importance of CPS versus convenience in community pharmacy practice.

### Method

An online survey of 1,500 members of the Dutch Health Care Consumer Panel containing questions regarding preferences for CPS and convenience was distributed. Descriptive statistics and linear regression analysis were performed to investigate the relationship between preferences and participant characteristics.

### Results

516 panel members completed all questions regarding preferences and importance of the availability of services. The majority preferred convenience (68.2%) and a smaller proportion preferred CPS (27.7%). However, participants considered it important from a societal viewpoint that CPS is provided (45.0%). Participants who preferred CPS over convenience were generally older ( $p < 0.001$ ) and used more medicines ( $p < 0.001$ ).

### Conclusion

Convenience of community pharmacy services is most preferred by the general public. However, CPS is perceived as important, especially for elderly who use more medicines. Elderly patients who use more medicines more often rate CPS as more important than convenience. These findings suggest that community pharmacists should ensure that pharmacy logistics are organized efficiently before focusing on the provision of CPS.

## Introduction

There is a global trend to shift the role of the community pharmacist from a product-focus, such as compounding and dispensing medicines, to a more patient-focus, such as patient education and counselling (also known as cognitive pharmaceutical services (CPS)). This anticipated shift in focus is driven by an increasing demand for healthcare due to the ageing population and complexity of medication [1]. In daily practice however the uptake of this transition is very slow. The perception of patients about the services provided by community pharmacies may play a role in this slow uptake. Therefore it is important to study these perceptions as they could provide the profession additional information for the development of the community pharmacy profession as a whole. The Dutch healthcare system is (like other countries) currently facing shortages in the number of healthcare professionals [2,3], which might require reallocation of tasks. Pharmacists can take more responsibility for patients' medication management. Thus, there is growing awareness among policy makers that community pharmacists can play a valuable role in the healthcare system by providing CPS [4], rather than limiting their role to solely dispensing medicines. Community pharmacists in The Netherlands are currently offering several CPS such as pharmacist-led clinical medication review (CMR) or medication adherence counselling.

However, the community pharmacist is still an underused healthcare provider for counselling, despite being the most frequently visited healthcare provider with extensive expertise regarding medication [5,6]. Furthermore, the community pharmacist is often the last healthcare provider a patient sees before returning home with filled prescriptions. Especially regarding repeat prescriptions, that are often repeated without a doctors' visit. This gives community pharmacists the opportunity, more than other healthcare professionals, to provide medication counselling and evaluate the effectiveness and safety of drug therapy on a regular basis. Any drug related problem identified by the pharmacist should subsequently be communicated to other involved healthcare professionals. In this way, community pharmacists can play a pivotal role within an integrated primary healthcare team. Many international studies have found that pharmacy services improved generic outcomes, such as medication adherence and self-management, and disease specific outcomes, such as HbA1c, blood pressure, LDL, and BMI [7-14]. Still, patients' utilization of these services lags behind [15-17].

Previous research indicates that community pharmacists want to spend more time on the provision of CPS [18,19]. Furthermore, patients have a positive attitude toward CPS provided by the community pharmacist if they experienced these services first-hand [20].

## Chapter 5.1

In addition to CPS, community pharmacies also offer convenience such as extended opening hours and short waiting times. Currently, there is limited knowledge about how the general public balances CPS versus convenience. However, these preferences are expected to be influenced by the way the general public perceives the community pharmacist. This perception can impact the future development of a more clinical role of community pharmacists and should be considered when further developing the profession as a whole [21].

Therefore, the aim of this study was to identify how the general public balances preferences regarding CPS and convenience provided by the community pharmacist. In addition, we aimed to assess the public's perceived importance of the availability of these services.

## Methods

### Setting

The Dutch Healthcare Consumer Panel facilitated by Nivel (Netherlands institute for health services research) was used for data collection [22]. This panel measures knowledge, experiences, and expectations regarding the Dutch healthcare system from the view of the general Dutch population.

In 2018, the Consumer Panel consisted of approximately 12,000 people aged 18 years and older. The panel is formed by using address files from the general population and general practices of the Netherlands and inviting to partake in the panel. Panel members are not recruited via community pharmacies. The panel is renewed on a regular basis to prevent members developing a certain knowledge of the healthcare system, thereby no longer reflecting the knowledge of the general public and to prevent questionnaire fatigue. People cannot sign up for the panel on their own initiative but must be invited by Nivel. New potential members are purposively invited based on demographic characteristics, such as age and gender, aiming to create a panel representative of the Dutch general population.

For each study, approximately 1,500 members of the Consumer Panel are invited to participate. Individual members are invited to participate in research approximately three to four times a year. Research is mostly conducted via (online) questionnaires, on which members can decide whether to fill out the complete questionnaire, only answer questions regarding a certain topic, or not participate at all. Resigning from the Consumer Panel can be done at any time. Privacy of panel members is guaranteed, since people who analyze the data do not have access to the personal information of the panel members. The panel is partly financed by the Dutch Ministry of Health. [22]

## Population and questionnaire design

A random sample of 1,500 members from the Dutch Healthcare Consumer Panel who indicated a preference for an online questionnaire was invited to complete an online questionnaire on services provided in community pharmacies in the Netherlands. The questionnaire was developed based on a convenience sample of 18 studies identified in international literature (see supplementary material). After the initial questionnaire was sent, panel members received two electronic reminders.

## Main outcomes

### Preferences regarding pharmacy services

Participants had to rate their preferences for nine combinations of three factors related to convenience and three CPS-related services (Table 1). Participants could rate their preferences on a 4-point Likert scale (2, 1, 1, 2). A score of 2 indicated a high preference for a specific service over the other, whereas a score of 1 indicated a slight preference.

For each individual participant, the cumulative score for convenience was subtracted from the cumulative score for CPS. This step created a final score per participant ranging from +18 to -18 in which positive scores reflected a preference for CPS and negative scores reflected a preference for convenience.

### Importance of availability of pharmacy services

Participants rated the importance from a societal viewpoint of availability of 12 pharmacy services on a 4-point Likert scale (1, 2, 3, 4). Four services were convenience-related and eight services were CPS-related (Table 1). Per participant, average scores were obtained for both convenience and CPS, with 4 the most important and 1 the least important. The average score per participant for convenience-related activities were subtracted from the average score for CPS, giving a score ranging from -3, deeming convenience more important, to +3, deeming CPS more important.

## Chapter 5.1

**Table 1: Cognitive pharmaceutical services and convenience used to determine preferences and importance regarding availability.**

	<b>CPS</b>	<b>Convenience</b>
Determining preferences	Provision of extensive information regarding medication	Community pharmacy being close by
	Possibility for a private consultation with the pharmacist	Short waiting times
	Special services for patients with chronic diseases	Extended opening hours
Determining importance of availability	Advice regarding medication	A reminder to repeat a prescription
	Possibility for a private consultation to discuss the medication	A dispensing robot allowing for 24/7 collection of medication
	Organizing walk-in consultation hours to speak with a pharmacist	Delivering medication at home
	Possibility of offering individualized drug dispensing systems (e.g. multidose dispensing)	Providing a separate consultation room
	Pharmacy employees that have specific knowledge regarding certain chronic diseases	
	Special services for patients with chronic diseases (e.g. measuring blood pressure)	
	A pharmacy employee to visit at home after a hospital discharge	
	A yearly clinical medication review led by the pharmacist	

## Covariates

Demographics such as age, gender, educational level, ethnicity, number of chronic diseases, and medicines in use were collected and included as covariates in the analysis. Level of education ranked low, middle, or high. Low is regarded as no education, primary school, or prevocational education. Middle is considered secondary or vocational education. High is considered professional higher education or university. Ethnicity was defined as people with a migratory background having at least one parent with another nationality. In addition, respondents were questioned on their opinion regarding the community pharmacist as a healthcare provider. The opinion of the general public on the pharmacist was also included as covariate. Respondents' views on the pharmacist as a healthcare provider were scored on a Likert scale: fully agree (+2), agree (+1), disagree (-1), or fully disagree (-2).

## Statistical analysis

First, descriptive analysis and visualization of the data was performed using Microsoft Excel 2016. Linear regression, using SPSS 23.0 to calculate regression coefficients and p-values, was used to analyse the effect of the covariates (both continuous and discrete independent variables) on the preferences and importance for CPS or convenience (continuous dependent variable). Univariate analysis was performed for every covariate, and when p-values were under 0.1, the specific covariate was also added in a multivariate model. A chi-squared test was performed to ascertain the correlation between what participants ranked as important and their preferences.

## Ethics and confidentiality

Data were analyzed anonymously and processed according to the privacy policy of the Dutch Healthcare Consumer Panel, which complies with the General Data Protection Regulation. According to Dutch legislation, there is no legal requirement to obtain informed consent nor approval by a medical ethics committee for conducting research through the panel.

## Results

### Study population

A total of 799 panel members started the online questionnaire (response rate of 53%). Of these respondents, 516 participants provided full data on both preferences and importance (Figure 1).

Most participants had a middle or high educational level; the majority had one or more chronic diseases and one or more medicines in use (69.3% and 73.6%, respectively) (Table 2). The 516 participants with complete data on preference and importance had similar background characteristics to the 799 participants that completed part of the online questionnaire.

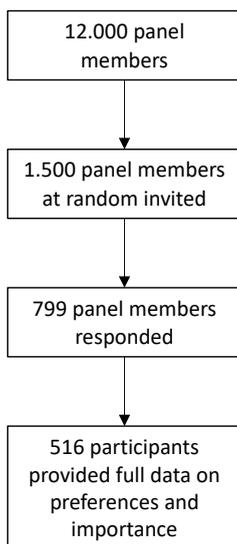


Figure 1. Data flowchart.

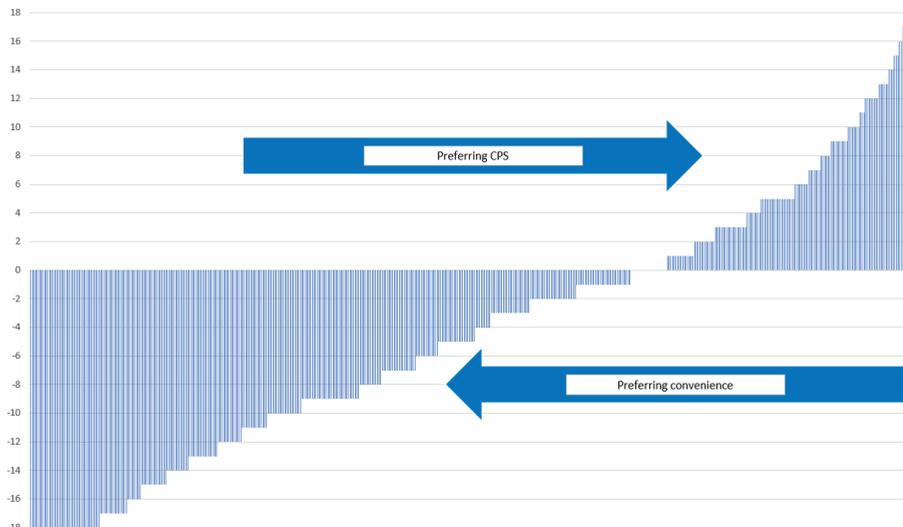
Table 2. Background characteristics.

Background characteristic study population (N = 516)	% (n/N)
Gender	
• Male	49.6 (256)
Age (mean ± SD)	51.1 ± 13.7
Educational level:	
• Low	7.7 (39)
• Middle	45.7 (231)
• High	46.6 (236)
Ethnicity:	
• Dutch	90.4 (461)
• Migratory background	9.6 (49)
Number of chronic diseases:	
• 0	30.7 (156)
• 1	28.3 (144)
• 2	21.4 (109)
• 3	10.6 (54)
• More than 3	9.0 (46)
Number of medicines in use:	
• 0	26.4 (136)
• 1	27.4 (141)
• 2	16.1 (83)
• 3	13.6 (70)
• More than 3	16.5 (85)

Background characteristic study population (N = 516)	% (n/N)
Patient perceives pharmacist as a healthcare provider	17.9 (87)
• Fully agree	55.3 (268)
• Agree	23.1 (112)
• Disagree	3.7 (18)
• Fully disagree	

## Preferences regarding services from the community pharmacy

Figure 2 presents the results for preferences with respect to services provided by the community pharmacy.

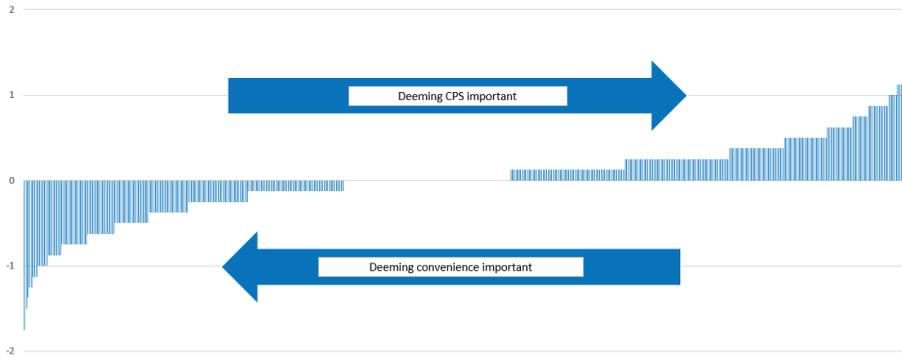


**Figure 2: Preferences of individual participants regarding CPS and convenience provided by community pharmacies.**

The results indicate that most participants preferred convenience (68.2%) over CPS (27.7%). A smaller proportion of respondents (4.1%) did not have a preference for CPS or convenience.

## Importance of availability of services from the community pharmacy

Figure 3 illustrates how important CPS and convenience were deemed by the general public. Most respondents rated the availability of CPS services by community pharmacies as more important than convenience (45.0% versus 36.2%). Some respondents (18.8%) rated the importance of availability of CPS and convenience similarly.



**Figure 3: The perceived importance of the availability of CPS and convenience by individual participants.**

Univariate and multivariate linear regression analyses regarding potential covariates associated with the preference for CPS are displayed in Table 3. The results show a statistically significant effect within the multivariate analysis of participants' age, gender, educational level and view of the pharmacist as a healthcare provider. With increasing age, preference for CPS increased, and female participants preferred CPS more than male participants. A high educational level is associated with a decreased preference for CPS. Viewing the pharmacist as a healthcare provider is associated with a preference for CPS.

Table 3 also provides the results of the univariate and multivariate linear regression analyses regarding the importance of CPS availability. The results show a statistically significant effect within the multivariate analysis of participants' age, educational level, number of chronic diseases, and view of the pharmacist as a healthcare provider. With increasing age and number of chronic diseases, the availability of CPS was deemed more important. A high educational level is associated with a decrease in the perceived importance of CPS availability. Viewing the pharmacist as a healthcare provider increased the importance of CPS availability.

**Table 3: Results from linear regression regarding preferences and importance for CPS.**

<b>Preferences</b>				
	<b>Univariate linear regression</b>		<b>Multivariate linear regression*</b>	
	<b>Regression coefficient</b>	<b>Significance (p-value)</b>	<b>Regression coefficient</b>	<b>Significance (p-value)</b>
Age in years	0.096	< 0.001	0.088	< 0.001
Gender				
• Male	Ref	Ref	Ref	Ref
• Female	1.302	0.018	1.350	0.018
Educational level				
• Low	Ref	Ref	Ref	Ref
• Middle	-0.503	0.581	N.a.	N.a.
• High	-4.577	< 0.001	-3.999	< 0.001
Ethnicity				
• Dutch	Ref	Ref	N.a.	N.a.
• Migratory background	-0.042	0.965	N.a.	N.a.
Number of chronic diseases**	0.440	0.021	N.a.	N.a.
Number of medicines in use**	0.646	< 0.001	0.143	0.364
Perceiving the pharmacist as a healthcare provider	1.147	< 0.001	1.025	< 0.001
<b>Importance</b>				
	<b>Univariate linear regression</b>		<b>Multivariate linear regression*</b>	
	<b>Regression coefficient</b>	<b>Significance (p-value)</b>	<b>Regression coefficient</b>	<b>Significance (p-value)</b>
Age in years	0.002	0.011	0.003	0.030
Gender				
• Male	Ref	Ref	Ref	Ref
• Female	-0.030	0.304	N.a.	N.a.
Educational level				
• Low	Ref	Ref	Ref	Ref
• Middle	-0.096	0.058	-0.104	0.089
• High	-0.128	0.012	-0.139	0.026
Ethnicity				
• Dutch	Ref	Ref	Ref	Ref
• Migratory background	-0.134	0.009	-0.096	0.122
Number of chronic diseases**	-0.024	0.016	-0.047	< 0.001
Number of medicines in use**	-0.016	0.054	N.a.	N.a.
Patient perceiving the pharmacist as a healthcare provider	0.055	< 0.001	0.055	< 0.001

\* Covariates with p-values < 0.1 in the univariate analysis were also added in the multivariate analysis.

\*\* Due to high correlation between the number of chronic diseases and number of medicines in use, only the covariate with lowest p-value in univariate analysis was included in the multivariate analysis.

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Participants who preferred CPS over convenience also deemed the availability of CPS more important than the availability of convenience (chi-square;  $p < 0.001$ ). One of four participants who preferred convenience over CPS thought the availability of CPS was important (data not shown).

## Discussion

This study suggests that the majority of participants ('the general public') prefers convenience over CPS from their community pharmacist (or community pharmacy, as some services may also be provided by pharmacy technicians). However, most participants rated the availability of CPS as more important than convenience. Participants who highly valued CPS were mostly older ( $p < 0.001$ ), had more medicines in use ( $p < 0.001$  based on univariate regression analysis) and had lower educational levels. Elderly patients who use more medicines placed the most value on the availability of CPS. With an ageing population and increasing numbers of home-dwelling elderly patients with multimorbidity and polypharmacy, it is expected that the general public may put more value of the provision of CPS by the pharmacist.

Participants with higher educational levels had a strong preference for convenience, but they also thought that the availability of CPS was more important than convenience viewed from a societal perspective. This result is probably because these people might need less support than people with lower educational levels [23]. Previous studies have shown that people with low literacy skills find it difficult to interpret instructions on labels and information in leaflets [24, 25]. Also, people with low health literacy know significantly less about their condition [26].

The paradox between preferences for CPS and the importance of the availability of CPS is also illustrated by the fact that most participants who preferred convenience, such as short waiting times, concurrently perceived the community pharmacist as an important healthcare provider. These findings may be attributed to most of the general public having a light disease burden but also realizing the importance of more CPS for people in need, including their own potential future needs. Furthermore, regarding preferences and the importance of the availability of services, older participants tended to prefer CPS over convenience and deemed CPS availability more important.

Moreover, the general public may regard the community pharmacist as a healthcare provider but may lack actual experiences and therefore expectations. And also miss the pharmacist-patient relationship to substantiate this claim [27,28]. Furthermore, although most members of the general public may regard

the pharmacist as a healthcare provider, many patients still prefer to discuss issues concerning medication with their physicians [29-31]. Non-dispensing pharmacists, based in the GP's office, were able to build their relationships with patients and gain trust [32,33]. Therefore, pharmacists within the community pharmacy setting are also expected to gain trust and build pharmacist-patient relationships as long as they are capable of providing CPS.

Earlier research has indicated that general practitioners do not fully address patients' information needs. This lack could present pharmacists with an opportunity [30]. A potential barrier here could be the lack of privacy that people experience within the community pharmacy setting to discuss healthcare-related matters [20,34,35]. Finally, some people may regard the community pharmacist predominantly as a commercially driven actor within the primary healthcare service and see CPS as an extra, but not essential, service from the community pharmacy [20,28].

As both professional bodies and policy makers envision a greater role for the community pharmacist as healthcare provider, the profession needs to consider increasing public awareness of CPS [5,6,20,28,36].

## Strengths and limitations

This study focuses on the general public's preferences and views on the importance of the availability of different services instead of focusing on patient satisfaction after contact with CPS. Therefore, this study can provide a better understanding on how pharmacists can address the needs of the general public.

Also, the Dutch healthcare consumer panel does not recruit participants via community pharmacies, therefore eliminating bias that only participants with a positive attitude towards community pharmacy practice were enrolled in this study. Participants within the panel are also anonymous, therefore minimizing the risk of social desirable answers.

However, there were also some limitations. Participants may not have actual experiences with CPS provided by the community pharmacist. This could be due to the lack of need for CPS, preferring the provision of CPS by another healthcare provider or being unaware that CPS is provided by community pharmacists. Therefore, participants may have had difficulties answering the questions regarding their preferences for CPS. Likewise, participants may have had actual experiences regarding convenience and would therefore prefer these above CPS. People with low educational levels were underrepresented in this study. Thus,

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the general public, which consists of a higher proportion of people with lower educational levels, may prefer more CPS than the study's sample. Furthermore, the proportion of participants with a migratory background was substantially lower than that of the general Dutch population (see supplementary material), and thus results cannot be generalized to the immigrant population [37]. It is expected that this group, most likely due to literacy problems, could benefit substantially from CPS and are underrepresented in this study. Furthermore, this study provides quantitative information on preferences for a limited number of services. Qualitative information may provide additional insights into the preferences of the general public.

Extrapolating these results to community pharmacy practice in other countries should be done with care. As the position and role of the community pharmacist in the Netherlands could predispose the general public into preferring certain services. Especially considering the fact that the general public in the Netherlands views the community pharmacist as a healthcare provider and community pharmacies are easily accessible [38]. In other countries, accessibility of community pharmacies could be less and pharmacists could primarily be viewed as shopkeepers. Also, the payment mechanisms in the Netherlands may influence perceptions of Dutch healthcare consumers compared to consumers in other countries. In the Netherlands, prescription medication and CPS need to be paid out of pocket for the first €385 (with some forms of CPS being exempted from this). After the €385 threshold has been surpassed, patients no longer have to pay for prescription medicines or CPS. This could impact preferences and perceived importance of CPS, most probably with patients passing the €385 threshold.

## Implications for daily practice

In this study convenience and CPS were juxtaposed. This may suggest that convenience and CPS somehow fall on opposite ends of a consumer preference spectrum. In reality, pharmacies offer a variety of services, with the type of service and convenience of that service both playing a role in the development of consumer preferences. For example, CPS will better serve the needs of more patients if it is offered in a manner which is convenient for them to obtain.

The pharmacy profession needs to focus on promoting the benefits of CPS identified in numerous papers [7-14] and show that this is a core competency of the community pharmacist. Studies have found that people do not use these services because they are unaware that the services are provided [20]. Once people become acquainted with these services, demand is expected to increase automatically.

Studies focusing on medical care indicate the implementation and effectiveness of additional care-related activities also depend on the amount of trust patients have in their physicians [39-41]. The same effect is probably true in community pharmacy practice. Patients predominantly prefer a community pharmacy that offers convenience and a convenient dispensing process [42]. Thus, community pharmacists unable to organize logistics may also reduce the amount of trust people have in their ability to provide CPS [43].

Community pharmacists should tailor their services to the needs of the population they serve. In general this implies focusing on the provision of convenience as this is preferred by the majority. But this should be done in tandem with the provision of CPS, as this is also perceived to be important. When addressing needs regarding convenience, this will probably provide a basis for the provision of CPS and address latent needs of patients.

## Conclusion

In contrast to current development within the community pharmacy profession, the general public still predominantly prefers convenience over CPS. However, the general public also realizes the importance of CPS and does regard the community pharmacist predominantly as a healthcare provider. Community pharmacists should therefore uphold convenience (e.g. opening hours and maintaining an efficient and convenient dispensing process) and concomitantly offer CPS and raise awareness of their role as healthcare providers.

## Data availability

The data used in this research is not available on request.

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## How does the general public balance convenience and cognitive pharmaceutical services

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## Supplementary material

Table 1: Background characteristics of the research population and the Dutch general public.

Background characteristic	Study group N = 516 % (n/N)	Starting study population N = 799 % (n/N)	NIVEL Consumer Panel N = 11,894 *	Dutch general public (%) **
Gender				
• Male	49.6 (256/516)	51.7 (413)	50.3 (5,983)	49.6 (8,527,041)
Age (average ± SD)	51.1 ± 13.7	53.6 ± 15.2	N.a.	N.a.
Educational level:				
• Low	7.7 (39/516)	10.7 (83)	20.4 (2,366)	31.2
• Middle	45.7 (231/516)	45.6 (355)	51.2 (5,944)	38.1
• High	46.6 (236/516)	43.7 (340)	28.4 (3,294)	29.3
Ethnicity:				
• Dutch	90.4 (461/516)	90.9 (721)	91.1 (10,825)	77.4
• Migratory background	9.6 (49/516)	9.1 (72)	8.9 (1,063)	22.6
Number of chronic diseases:				
• 0	30.7 (156/516)	31.1 (244)	N.a.	N.a.
• 1	28.3 (144/516)	29.6 (232)		
• 2	21.4 (109/516)	19.5 (153)		
• 3	10.6 (54/516)	11.2 (88)		
• More than 3	9.0 (46/516)	8.7 (68)		
Number of medicines in use:				
• 0	26.4 (136/516)	25.9 (190)	N.a.	N.a.
• 1	27.4 (141/516)	27.5 (202)		
• 2	16.1 (83/516)	15.4 (113)		
• 3	13.6 (70/516)	13.5 (99)		
• More than 3	16.5 (85/516)	17.8 (131)		
Patient perceives pharmacist as a healthcare provider				
• Fully agree	17.9 (87/516)	18.2 (116)	N.a.	N.a.
• Agree	55.3 (268/516)	55.6 (354)		
• Disagree	23.1 (112/516)	21.4 (136)		
• Fully disagree	3.7 (18/516)	4.9 (31)		

\* Brabers AEM, Reitsma M, De Jong J. Consumentenpanel Gezondheidszorg; Basisrapport met informatie over het panel (2015). ISBN 978-94-6122-303-6.

\*\* Central Bureau for Statistics. <https://opendata.cbs.nl/statline/#/CBS/nl/>. Visited on May 13<sup>th</sup> 2019.

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**Table 2: Convenience sample of studies used to develop questionnaire used in this study.**

Number	Reference
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**Table 3: Number of participants highly preferring or slightly preferring convenience over CPS and vice versa.**

	<b>Convenience →</b>	<b>Community pharmacy being close by (n)</b>	<b>Short waiting times (n)</b>	<b>Extended opening hours (n)</b>
CPS ↓				
Provision of extensive information regarding medication (n)	+2 Conv.: 170 +1 Conv.: 190 +1 CPS: 115 +2 CPS: 41	+2 Conv.: 170 +1 Conv.: 190 +1 CPS: 127 +2 CPS: 86	+2 Conv.: 142 +1 Conv.: 161 +1 CPS: 127 +2 CPS: 86	+2 Conv.: 109 +1 Conv.: 155 +1 CPS: 165 +2 CPS: 87
Possibility for a private consultation with the pharmacist (n)	+2 Conv.: 150 +1 Conv.: 184 +1 CPS: 124 +2 CPS: 58	+2 Conv.: 150 +1 Conv.: 184 +1 CPS: 146 +2 CPS: 69	+2 Conv.: 126 +1 Conv.: 175 +1 CPS: 146 +2 CPS: 69	+2 Conv.: 123 +1 Conv.: 157 +1 CPS: 161 +2 CPS: 75
Special services for patients with chronic diseases (n)	+2 Conv.: 234 +1 Conv.: 193 +1 CPS: 61 +2 CPS: 28	+2 Conv.: 234 +1 Conv.: 193 +1 CPS: 98 +2 CPS: 29	+2 Conv.: 161 +1 Conv.: 228 +1 CPS: 98 +2 CPS: 29	+2 Conv.: 150 +1 Conv.: 223 +1 CPS: 113 +2 CPS: 30

**Table 4: Number of participants deeming the importance of different CPS- and convenience related services.**

	<b>Service</b>	<b>Ranking provided by participants (n)</b>
CPS	Advice regarding medication	Very important: 127 Important: 313 Not important: 55 Absolutely not important: 21
	Possibility for a private consultation to discuss the medication	Very important: 35 Important: 233 Not important: 204 Absolutely not important: 44
	Organizing walk-in consultation hours to speak with a pharmacist	Very important: 22 Important: 229 Not important: 229 Absolutely not important: 36
	Possibility of offering individualized drug dispensing systems (e.g. multidose dispensing)	Very important: 42 Important: 246 Not important: 185 Absolutely not important: 43
	Pharmacy employees that have specific knowledge regarding certain chronic diseases	Very important: 28 Important: 268 Not important: 187 Absolutely not important: 33
	Special services for patients with chronic diseases (e.g. measuring blood pressure)	Very important: 45 Important: 273 Not important: 162 Absolutely not important: 36

## Chapter 5.1

	<b>Service</b>	<b>Ranking provided by participants (n)</b>
	A pharmacy employee to visit at home after a hospital discharge	Very important: 25 Important: 209 Not important: 233 Absolutely not important: 49
	A yearly clinical medication review led by the pharmacist	Very important: 82 Important: 276 Not important: 126 Absolutely not important: 32
Convenience	A reminder to repeat a prescription	Very important: 49 Important: 279 Not important: 164 Absolutely not important: 24
	A dispensing robot allowing for 24/7 collection of medication	Very important: 56 Important: 179 Not important: 233 Absolutely not important: 48
	Delivering medication at home	Very important: 59 Important: 252 Not important: 175 Absolutely not important: 30
	Providing a separate consultation room	Very important: 51 Important: 246 Not important: 187 Absolutely not important: 32

How does the general public balance convenience and cognitive pharmaceutical services



CPS

# CHAPTER 5.2

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Preferences of patients regarding  
community pharmacy services:  
A discrete choice experiment

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**Submitted**

## Abstract

### Background

The community pharmacy profession is in transition, with emphasis on the provision of cognitive pharmaceutical services (CPS). In contrast, previous research showed that the general public prefers more convenience related services. However, this was based on currently available services and not on innovative services.

### Objective

To identify patients' preferences regarding innovative pharmacy services and whether they tend towards convenience related or CPS .

### Design

Online survey using a discrete choice experiment (DCE).

### Participants

Participants were from the AMP pharmacy patient panel.

### Main outcome measures

Preferences (utility scores) and the identification of specific classes (latent class analysis).

### Results

In total 2462 panel members (27.3%) completed the online DCE questionnaire. The majority of participants were male (54.1%) with an average age of 65.3 years and used on average 4.6 medicines. Four different patient classes were distinguished based on preferences for services. Highly preferred were an online medication record, prescription drugs for minor ailments without a doctors' prescription and clinical testing with diagnosis by the pharmacist were highly preferred.

## Discussion and conclusion

The participants can be considered to have knowledge about community pharmacy services. The majority of participants tend towards services indicating a more CPS focused approach by the community pharmacist.

Patients visiting community pharmacies can have diverging reasons for visiting and therefore also a diverging set of preferences regarding services being provided. In daily practice, community pharmacists should provide both convenience and CPS related services to address this diverse set of preferences.

## Introduction

The community pharmacy profession is going through a reprofessionalization process developing a new role for the community pharmacist with more emphasis on the provision of cognitive pharmaceutical services (CPS). Policymakers are becoming increasingly aware that community pharmacists can play an important role by providing CPS [1]. Concurrently, the capacity of the healthcare system is challenged by the increasing needs of the ageing population and because of the introduction of new technologies including medicines [2]. In reaction to this development, policymakers and professional bodies increasingly use Value Based Healthcare (VBH) in the design of healthcare facilities. In the concept of VBH, the preferences and needs of the general public and patients have a prominent place. Therefore, insights in the perspectives of patients can contribute to the design, implementation, amount of usage and evaluation of new health services such as CPS [3,4].

The definition of CPS is *'the use of specialized knowledge by the pharmacist for the patient or health professionals for the purpose of promoting effective and safe drug therapy'* [5], with examples being health promotion, the role of self-medication regarding minor ailments and medication management such as the medication review and improving adherence. CPS is increasingly offered all over the world [6]. Examples of such services are the Minor Ailment Scheme In the United Kingdom, the Sixth Community Pharmacy Agreement (6CPA) in Australia which offers for example medical checks for diabetes and the possibility for community pharmacists to offer publicly funded immunization in the majority of Canadian provinces [7-9].

In a previous study we showed that the majority of the general public prefers convenience (e.g. short waiting times) over CPS (e.g. the possibility of a private consultation with a pharmacist) [10]. However, in this previous study we described currently available services from community pharmacies and did not present the possibility of more innovative services.

A community pharmacy serves a heterogeneous population regarding age, health state and the number of medicines in use. [11]. Thus it can be expected that each community pharmacy is confronted with different needs and preferences related to CPS and convenience for these different patients. Providing insights in preferences of patients and identifying certain classes of patients based on similar preferences, can provide guidance in further developing pharmacy services.

Therefore, the goal of this study is to identify patients' preferences for future services both regarding convenience and CPS that could be provided in Dutch community pharmacies and to identify classes of patients that share similar preferences.

## Methods

### Study design

A cross-sectional study design using an online questionnaire was used among members of the AMP pharmacy patient panel, with a choice based conjoint (CBC) task on potential future community pharmacies services. Conjoint analyses, such as CBC's, are increasingly used to elicit patients' preferences for different types of healthcare interventions and services [12-16]. With the help of CBC's, researchers are able to quantify for example the (relative) importance of different treatment option or (healthcare) service, by allowing respondents to make a number of trade-offs [17]. In CBC, characteristics of treatment options or services are called attributes (e.g. when going to a community pharmacy, waiting time can be an attribute) that can vary in level (e.g. 5, 15 or 30 minutes). Next to the choice task, the questionnaire contained questions on background characteristics of the participants such as age, gender and the number of medication in use.

### Development process of the choice based conjoint task

The development of the CBC task was done in accordance to guidelines described in the literature [3,18,19]. The first step of CBC development entails defining attributes and levels. To identify developments regarding potential future pharmacy services (attributes in this study), a search was conducted through the grey literature. A total of 15 different developments (see supplementary material) were identified. Subsequently, these were presented to 10 experts with knowledge of the pharmacy profession. The experts scored each development on 1) relevance for the patient, 2) relevance for the community pharmacy profession, 3) feasibility to implement in daily community pharmacy practice and 4) the innovative character of the development on a scale of 0-5.

Based on the average scores provided by the experts on the 4 domains (with the emphasis on relevance for the patient), a total of 6 developments regarding community pharmacy services were purposely selected to be used as attributes in the CBC. Three of them were primarily aimed at convenience and three that could be described as a potential CPS (see supplementary material). Adding a cost attribute was not deemed relevant, as in the Netherlands, costs of healthcare services are usually reimbursed by healthcare insurance companies. Therefore, adding a cost attribute could be confusing and become the dominant attribute [20].

## Data collection

Sawtooth Software (Lighthouse Studio version 9.8.0) was used to create the CBC. In the CBC task in this study, participants had to respond to 10 random choice sets with two community pharmacies as options to choose. No opt-out option was made available (meaning participants were not able to choose none of the options presented). The options presented within the choice sets were full profile, showing all six attributes. All attributes had two levels that could be presented in the choice sets. A balanced overlap design (meaning attributes could present the same level within a choice set) was used to create the choice sets [18]. This also provides an efficient manner of gathering data. Ten questionnaire versions were generated that presented the participants the choice sets in a different order and showing different choice sets.

Participants started with a description of two fictitious community pharmacies that recently started in the same town and offered different types of convenience- and CPS related services. Participants were then provided with background information on the services that were part of the choice task. During the choice task, participants could always return to this informational page and also retrieve some information regarding attributes and levels using a *tooltip* within the choice set. See figure 1 for a translated (Dutch into English) example of a single choice set. The questionnaire was tested by ten laymen and modified based on the feedback provided.

If these were the two community pharmacies to choose from, which one would you choose?

	Community pharmacy 1	Community pharmacy 2
Drugs for minor ailments without a doctors' prescription	Also Rx Drugs	Only OTC drugs
Pharmacogenetics	No advice regarding pharmacogenetics	Advice regarding pharmacogenetics
Point-of-care-testing	Offers tests	Does not offer tests
Track & Trace	No track & trace	Provides track & trace
Ways of communicating with pharmacy team	Face-2-face, by telephone and online	Face-2-face, by telephone
Medication record	Only on paper	On paper and online
	Choose	Choose

**Figure 1: Example of a choice set for participants showing the two choice options, attributes, different levels and the tooltip.**

## Study sample

Participants were recruited from the AMP pharmacy patient panel. AMP Research & Consultation in healthcare (AMP Onderzoek & Advies in de zorg) [21] is a Dutch organization focusing predominantly on mystery shopping and provision of patient information leaflets in community pharmacy practice. The AMP patient panel holds about 40,000 individuals of whom 47.5% are male and 78% uses medication for chronic diseases. The panel was formed in 2015 and is comprised of individuals that visit a community pharmacy on a regular basis and consented to be contacted for research purposes.

Individuals from the patient panel were invited once by e-mail by AMP to participate in this research. They were provided with a link that led to the online questionnaire including the CBC. No reminders were sent.

## Sample size

General guidelines regarding CBC state that inclusion of 200 participants per subgroup is usually sufficient [3,18]. Other research utilizing a CBC for preferences of the general public or patients with regard to community pharmacy practice yielded response ranging from 194 to 9,202 individuals [14,20,22-24]. Our goal was to be able to distinguish 5 different groups, so a total of at least 1,000 individuals was deemed necessary.

## Data management

Only the fully completed questionnaires were included for further analysis. Participants that did not complete the questionnaire fully were compared to participants who did, based on age and gender. Participants were excluded from analysis if there were doubts on the reliability of their answers. Potential unreliability was based on the amount of time spent on the questionnaire and the consistency of answers (constantly choosing the left- or right option). Participants finishing the questionnaire under 3 minutes were excluded, as this was not deemed possible. Participants were also excluded when they finished the questionnaire between 3 and 5 minutes and showed poor consistency in answers provided within the choice task (Root Likelihood  $< 0.6$ ). Root likelihood is the mean of estimated probabilities associated with the different alternatives actually being chosen by participants (fit between utility estimates and choices made by participants). Lastly, participants were also excluded when choosing constantly the left- or right option in the choice task and provided poor consistency in answers provided (Root Likelihood  $< 0.6$ ).

## Data analysis

Data gathered with the CBC choice task were analyzed using Sawtooth Software (Lighthouse Studio version 9.8.0). This results in utilities which represent the relative attractiveness of an attribute and level. Positive values reflect a preference and higher values mean a greater attractiveness. Latent class analysis [25] was used to determine if subgroups (classes) were present based on preferences provided. With latent class analysis, one tries to identify an underlying (latent) variable by means of researching observable variables. The number of classes was based on the goodness-of-fit for the model. Multiple goodness-of-fit statistics are available within latent class analysis. The LogLikelihood, McFadden's pseudo  $p^2$ , Akaike and Bayesian information criteria [19,25] and were used to determine the number of classes present within the study sample. Participants were assigned to the class on which they had the highest probability.

Parametric (student T-test) and non-parametric tests (Mann-Whitney U and Kruskal-Wallis) were used, depending on the distribution of data, to determine differences between classes on background characteristics. For all analyses, p-values were considered statistically significant when  $< 0.05$ . Microsoft Excel 2016 and SPSS version 23.0 were used for descriptive analysis of basic characteristics.

## Results

### Respondents

In total, a random selection of 9,025 panel members were invited to participate in the study between November 2019 and February 2020. The questionnaire was accessed by 3,697 (41.0%) invited panel members. Of these, 2533 (28.1%) panel members completed the questionnaire (see supplementary material for information regarding drop-out rate per step of the total questionnaire). No statistical significant differences were found between participants who fully completed the questionnaire and those who did not with respect to gender and age ( $n = 1,067$ ).

After quality check of the data on potential unreliability, an additional 71 participants (0.8%) were excluded, resulting in a study population of 2462 (27.3%) participants, see figure 2. Table 1 shows participants' basic characteristics.

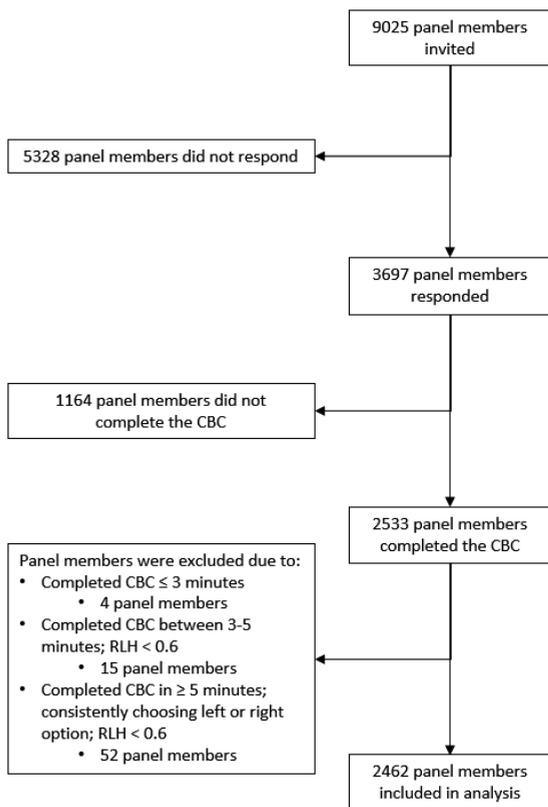


Figure 2: Data flowchart. RLH = Root likelihood and states the consistency of chosen preferences of a participant.

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Table 1: Basic characteristics of participants.

Characteristic	N=2,462 *
Gender (male), % (N)	54.1% (1,333)
Age, mean (SD)	65.3 (10.8)
Educational level, % (N)	
• Low (none, primary school or pre-vocational education)	21.4 (526)
• Middle (secondary or vocational education)	36.1 (888)
• High (professional higher education or university)	41.2 (1,015)
Ethnicity, % (N)	
• Migratory background	3.4 (85)
• Non-migratory background	95.8 (2,358)
Number of medicines in use, mean (SD)	4.6 (3.3)
Urbanization, % (N) **	
• (Strongly) urbanized	47.3 (1,145)
• Slightly urbanized	21.0 (509)
• (Strongly) rural	31.7 (770)

\* Percentages not cumulating to 100% and numbers not adding up to 2462 indicate missing values.

\*\* Urbanization was defined as: (strongly) urbanized as  $\geq 1,000$  inhabitants/km<sup>2</sup>; slightly urbanized as 500-999 inhabitants/km<sup>2</sup>; (strongly) rural as  $< 500$  inhabitants/km<sup>2</sup>.

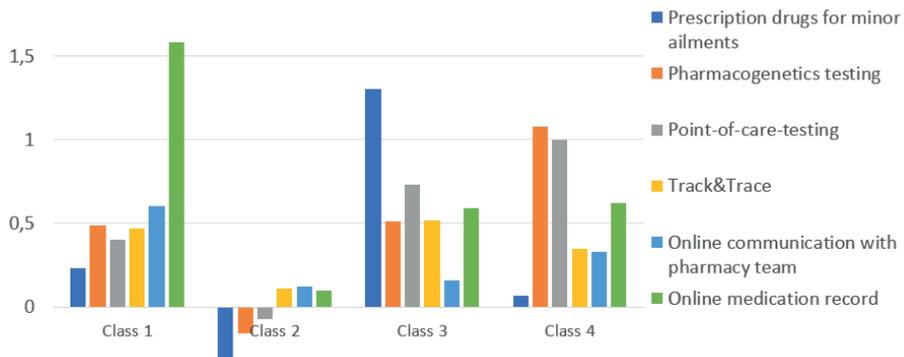
## Latent class analysis

The latent class analysis resulted in a four-class model showing a McFadden’s pseudo  $\rho^2$  of 0.25 (0.2 -0.4 indicates a good fit). With 5 classes or more, fit statistics improved only slightly and yielded smaller classes with unclear differentiation from other classes (see table 2). The average maximum membership probability was 83.5%. Part-worth utilities of each class per attribute level are shown in figure 3 and table 3.

**Table 2: Latent class results regarding number of classes and best fit.**

# Classes	Log-likelihood	McFadden’s pseudo $\rho^2$	AIC	BIC
2	-13721.9	0.20	27469.8	27575.3
3	-13193.3	0.23	26426.7	26588.9
4	-12814.8	0.25	25683.6	25902.6
5	-12666.6	0.26	25401.2	25677.0

**Figure 3: Part-worth utilities of each attribute only showing the extended service level per class.**



**Table 3: Latent class analysis results showing part-worth utilities and relative importance of attributes.**

Attribute	Level	Class 1 n=822		Class 2 n=351	
		Utility (SE)	RI	Utility (SE)	RI
Drugs for minor ailments	Also prescription drugs	0.23 (0.01)	6.1%	-0.31 (0.014)	35.6%
Pharmacogenetics	Advice regarding pharmacogenetics	0.49 (0.009)	13.0%	-0.16 (0.01)	18.4%
Point-of-care-testing	Offers tests	0.4 (0.008)	10.6%	-0.07 (0.011)	8.0%
Track & Trace	Provides track & trace	0.47 (0.004)	12.5%	0.11 (0.005)	12.6%
Medication record	On paper and online	0.59 (0.01)	15.5%	0.62 (0.01)	18.0%

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Attribute	Level	Class 1 n=822		Class 2 n=351	
		Utility (SE)	RI	Utility (SE)	RI
Communication with pharmacy team	Face-2-face, by telephone and online	0.6 (0.003)	15.9%	0.12 (0.005)	13.8%
Medication record	On paper and online	1.58 (0.007)	41.9%	0.1 (0.012)	11.5%
		Class 3 n=425		Class 4 n=864	
Drugs for minor ailments	Also prescription drugs	1.3 (0.008)	34.1%	0.07 (0.01)	2.0%
Pharmacogenetics	Advice regarding pharmacogenetics	0.51 (0.008)	13.4%	1.08 (0.008)	31.3%
Point-of-care-testing	Offers tests	0.73 (0.009)	19.2%	1.0 (0.009)	29.0%
Track & Trace	Provides track & trace	0.52 (0.005)	13.6%	0.35 (0.005)	10.1%
Communication with pharmacy team	Face-2-face, by telephone and online	0.16 (0.004)	4.2%	0.33 (0.005)	9.6%
Medication record	On paper and online	0.59 (0.01)	15.5%	0.62 (0.01)	18.0%

*For sake of readability, and the attributes always containing two levels, only the level with the additional service is showed. The level without the additional service is always the inverse compared to the level with the additional service.*

All attributes significantly contribute to the model. The results show that class 1 (n=822, 33.4%) predominantly prefers community pharmacies an online medication record (utility of 1.58 and RI of 41.9%). Class 2 disfavors predominantly community pharmacies offering prescription drugs for minor ailments (utility of -0.31 and RI of 35.6%). Class 3 predominantly prefers community pharmacies offering prescription drugs for minor ailments (utility of 1.3 and RI of 34.1%). Class 4 mostly prefers community pharmacies offering pharmacogenetic testing (utility of 1.08 and RI of 31.3%).

Background characteristics of participants in each class are presented in table 3, with class 3 containing more males compared to other classes and class 4 consisting of participants who more often regard the community pharmacist as a healthcare provider compared to other classes.

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**Table 4: Overview of background characteristics of each class. Percentages not cumulating to 100% indicate missing values. P-values calculated using the Kruskal-Wallis test.**

Background characteristic	Class 1 (N=840)	Class 2 (N=333)	Class 3 (N=404)	Class 4 (N=885)	p-value
Gender, % (N)					< 0.001
• Male	54.1 (454)	55.9 (186)	63.4 (256)	49.4 (437)	
• Female	45.7 (384)	44.1 (147)	36.1 (146)	50.3 (445)	
Age, mean (SD)	63.7 (11.3)	68.3 (9.3)	66.0 (11.2)	65.3 (10.4)	0.683
Number of drugs in use, mean (SD)	4.4 (3.1)	4.7 (3.0)	4.6 (3.8)	4.6 (3.3)	0.138
Educational level, % (N)					0.091
• Low	18.7 (156)	21.8 (72)	22.4 (89)	24.1 (209)	
• Middle	37.5 (312)	36.9 (122)	32.5 (129)	37.4 (325)	
• High	43.8 (365)	41.4 (137)	45.1 (179)	38.5 (334)	
Urbanization, % (N)					0.056
• (Strongly) urbanized	46.4 (388)	49.0 (160)	49.2 (194)	46.4 (403)	
• Slightly urbanized	24.0 (200)	20.9 (68)	17.8 (70)	19.7 (171)	
• (Strongly) rural	29.6 (247)	30.1 (98)	33.0 (130)	33.9 (295)	
Pharmacy visits frequency, % (N)					0.817
• Daily - weekly	5.2 (44)	6.0 (20)	4.5 (18)	4.3 (38)	
• Monthly - quarterly	90.8 (762)	89.8 (299)	90.4 (365)	91.7 (811)	
• Yearly - never	4.0 (34)	4.2 (14)	5.1 (21)	4.0 (36)	
Grade for current community pharmacy, mean (SD)	8.0 (1.1)	8.0 (1.1)	8.0 (1.3)	8.0 (1.2)	0.508
Views community pharmacist as healthcare provider, % (N)					0.022
• Agree	86.6 (727)	82.9 (276)	84.2 (340)	89.3 (790)	
• Disagree	13.4 (113)	17.1 (57)	15.8 (64)	10.7 (95)	

## Discussion

This study shows that differences regarding preferences for community pharmacy services exist within the population of chronic medication users. A total of four different patient classes can be distinguished, with some classes having a preference for convenience related services whereas others prefer CPS.

Class 1 (n=822, 33.4%) contains mostly participants that highly prefer convenience related services, predominantly access to online medication records and to a lesser degree online communication options with the community pharmacy team and track and trace of the dispensing process. This is in accordance with results from an earlier study, as it also found a large proportion of participants preferring convenience over CPS [10]. However, this study population differs from participants in the previous study [10] with this study including more elderly and a larger proportion of people with a lower educational level.

Class 2 (n=351, 14.3%) is probably most notable among the 4 classes, as participants belonging to class 2 do not have a clear preference regarding services provided by community pharmacies. This could be due to the study not containing attributes that participants within class 2 highly prefer, or not prefer at all. But this may also suggest that participants belonging to class 2 are satisfied with current community pharmacy practice and do not prefer an expanded role for community pharmacists, or lack a clear preference due to indifference regarding community pharmacy practice. Class 2 consists of relatively old people with more medicines in use compared to the other classes. Also, class 2 has a relatively high proportion of lower educated people. Perhaps these can be considered more conservative and less prone to change. Also, earlier research found that consumers have concerns regarding pharmacist training and qualifications, as well as limited privacy and extra costs when it comes to an expanded role of community pharmacists [26].

Class 3 (n=425, 17.3%) favors CPS over convenience. Class 3 highly prefers the dispensing of prescription drugs after counselling for minor ailments by community pharmacists, without a doctor's prescription. This would give greater responsibility to the pharmacist, as he/she would also play a more prominent role in diagnosing as well as in choosing the adequate pharmacotherapy. In several countries such as the UK and Canada pharmacy prescribing for minor ailments is already possible under certain conditions [27] and was found that patients were positive towards a pharmacist prescribing. A review article studying the views and experiences of patients and the public regarding the prescribing pharmacist, shows that experiences of patients were generally positive [28].

Class 4 (n=864, 35.1%) also favors CPS over convenience but predominantly prefers community pharmacies that offer point-of-care-testing (POCT), as well as community pharmacies providing advice regarding pharmacogenetics. This could imply a preference of patients for a greater involvement of the community pharmacist in offering diagnosis material and consultation and thereby providing insights to patients themselves.

A previous study suggested that PGx testing in community pharmacy practice is feasible, because patients are interested and it consumes little additional time from the pharmacist [29].

A systematic literature review concluded that community pharmacies are well suited to deliver POCT and with satisfactory quality and effectiveness. It also showed that interventions coming from POCT were effective overall [30]. Another study showed that consumers are willing to pay for POCT from community pharmacies [31].

## Chapter 5.2

Both class 3 and class 4 prefer more services related to CPS, compared to class 1 and class 2. With class 1 preferring predominantly online services and class 2 even stating a negative preference for services related to CPS. Unfortunately this study provides only limited insights regarding the association between background characteristics and preferences regarding services to be provided by community pharmacies. Class 3 contains more male participants. Suggesting that especially males prefer the dispensing of prescription drugs without a doctors' prescription. Over all classes the great majority of patients perceive the community pharmacist as a healthcare provider. Within class 2 and 3 a relative large proportion of participants do not see the pharmacist as a health care provider. This seems a bit contradictory for class 3 as these patients want the pharmacist to counsel them on minor ailments. However, dispensing prescription medicines without a doctors' prescription could also be considered to improve convenience and therefore the predominant reason for participants to prefer this service.

Overall differences between the classes regarding background characteristics were relatively small. This suggests that despite the statistical significance of some of these differences, the background characteristics that were available may not reliably predict patients preferences for pharmacy services. Other background characteristics that were not recorded in this study, could be more important e.g. mobility, frailty and health literacy.

Attributes being the least preferred by patients were track & trace and online ways of communicating with the pharmacy team, both of which are currently being increasingly implemented in community pharmacies. This could be due to the study population consisting predominantly of elderly. Moreover, this study was performed before the COVID-19 pandemic. Within the Netherlands, both patients and healthcare professionals were forced to use digital ways of communicating due to the outbreak of COVID-19. This may increase the preference of people for these forms of communication. A study focused on the amount of provision of CPS from community pharmacies during the COVID-19 pandemic showed that only a small number of community pharmacists used telepharmacy such as video calling [32].

## Strengths and limitations

One of the major strengths of this study is the large amount of respondents. This allowed further subgroup analysis. Also, CBC is an efficient way to elicit preferences as it presents options in which participants have to make trade-offs. This can provide more valuable information compared to a Likert-scale questionnaire. Next to this, the study population was comprised of patients who frequently visit community pharmacies.

However, there are also some limitations. The conjoint task and especially the background information regarding the attributes and levels may have been difficult for some participants. This is probably also reflected in the relatively large number of participants with a medium or high educational level and could discourage some panel members to participate in this research. Also, the study population contains mostly elderly people using medicines. This is not a representative sample of the general population, however the respondents do reflect the chronic users of medication that most frequently visit a community pharmacy. Also, the number of participants in this study with a migratory background is low and therefore not reflecting Dutch society and therefore also does not fully reflect patient populations of community pharmacies.

## Recommendations for daily practice

This study shows that different preferences exist within patients and the general public regarding potential innovative services from community pharmacies. Community pharmacies serve a heterogeneous population, so pharmacists need to realize that patients may have different preferences and needs.

Based on the size of the different classes within this study, it can be stated that community pharmacist will predominantly serve patients that belong to either class 1 or class 4. Based on that, providing an online medication record will meet the needs of both classes. Next to this, community pharmacists should consider implementing pharmacogenetics- and POCT testing prior to minor ailment services. As the latter seems to be less appreciated than diagnostic services. However, the study population contained largely highly educated medicine using patients. Community pharmacies serving a different patient population should also consider other preferences.

## Conclusion

Overall, the majority of participants appreciate innovative services from community pharmacies. However, these preferences may vary between individuals. This study shows that different classes of patients can be identified based on these preferences. Two out of four classes especially prefer CPS and one class preferred convenience related services. One class did not show a clear preference for either CPS nor convenience related services.

## Acknowledgements

The authors thank AMP Research & Consultation in healthcare, especially Martijn Hendrix, for supporting the researchers in use of the patient panel.

## Funding

JvdP received an unconditional grant from Sawtooth Software for using Sawtooth Software Lighthouse Studio and Sawtooth Software Hosting.

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## Supplementary material

**Table 1: Information provided about the different attributes and levels.**

Attribute	Information screen (before the choice tasks)	Tooltip (during the choice tasks)
Drugs for minor ailments without a doctors' prescription	Minor ailments are for example a cough, eczema or a fungal nail. Do you want the pharmacist to only dispense OTC drugs? Or do you want the pharmacist to be able to dispense prescription drugs without a doctor's prescription?	<p>Attribute: Minor ailments are for example cough and eczema that can be treated fairly easy.</p> <p>Level: Only OTC drugs The pharmacist can only dispense an OTC drug without a doctor's prescription (e.g. cough syrup).</p> <p>Level: Also Rx drugs The pharmacist is trained to dispense prescription drugs without a doctor's prescription.</p>
Advice suitability drug regarding genetic heredity	How your body responds to a drug is also based on genetic heredity. If a pharmacist has access to this information, he/she is better able to assess if a drug will be suitable for you. Based on a simple test, the pharmacist can advise both you and your doctor.	<p>Attribute: Based on genetic information, the pharmacist can determine how you will respond to a drug. The pharmacist can advise you if a drug is suitable for you.</p> <p>Level: No advice regarding heredity The pharmacist will not use genetic information to provide advice.</p> <p>Level: Advice regarding heredity The pharmacist will use your genetic information to judge and advice regarding the suitability of drugs.</p>
Availability of point-of-care testing in the pharmacy	By using these tests, the pharmacist can show you for example if your cholesterol and blood sugar levels are in order.	<p>Attribute: The pharmacist offers tests to for example screen your blood sugar, cholesterol levels.</p> <p>Level: No tests The pharmacist does not offer these tests.</p> <p>Level: Offers tests The pharmacists offers tests and provides advice based on the outcome.</p>
Track & Trace of the dispensing process	With track & trace, you can see if your prescription has been filled and when it will be delivered or if you can pick it up.	<p>Attribute: With track &amp; trace, you can see if your prescription has been filled and when it will be delivered or if you can pick it up.</p> <p>Level: No track &amp; trace The pharmacist does not offer track and trace.</p> <p>Level: Offers track &amp; trace You are able to see what the current status is of your prescription.</p>

## Chapter 5.2

Attribute	Information screen (before the choice tasks)	Tooltip (during the choice tasks)
Ways of communicating with pharmacy team	You can visit or call the community pharmacy, but sometimes it is possible to come in contact online.	<p>Attribute: You can visit or call the community pharmacy, but sometimes it is possible to come in contact online.</p> <p>Level: Visiting or calling You can only visit or call the community pharmacy.</p> <p>Level: Visiting/calling and online You can also communicate with the pharmacist via e-mail or chat.</p>
Availability of patient's medication record	The medication record contains your medical data that is known at the pharmacy. You can apply for a paper copy at the pharmacy, but sometimes it is possible to open your medication record online.	<p>Attribute: The medication record contains your medical data that is known at the pharmacy. You can apply for a paper copy at the pharmacy, but sometimes it is possible to open your medication record online.</p> <p>Level: Only on paper You can get a printed version of your medication record at the pharmacy.</p> <p>Level: On paper and online You can also see your medication record online.</p>

**Table 2: Drop-out rate of participants within the questionnaire.**

Page #	Subject	Description	Accessed by # participants	Point of drop-out for # respondents
1	Welcome and introduction	Welcoming and thanking participants for participating. Giving a short introduction.	3,697	0
2	Question: Gender Question: Age		3,697	149
3	Introduction fictitious scenario	Introducing that a fictitious scenario will come up at the next screen.	3,548	76
4	Fictitious scenario	Providing a fictitious scenario of two new to settle community pharmacies within a town that has no community pharmacy yet. Participants want to subscribe to one of the two pharmacies and have to state a preference.	3,472	41

Preferences of patients regarding community pharmacy services: A discrete choice experiment

Page #	Subject	Description	Accessed by # participants	Point of drop-out for # respondents
4	Explanation of services	Providing an explanation regarding the services (attributes) that will be provided by the pharmacies and is part of the choice task.	3,431	114
5	Choice task Random		3,317	192
6	Choice task Random		3,125	123
7	Choice task Fixed		3,002	134
8	Choice task Random		2,868	102
9	Choice task Random		2,766	73
10	Choice task Random		2,693	43
11	Choice task Random		2,650	34
12	Choice task Random		2,616	19
13	Choice task Random		2,597	15
14	Choice task Random		2,582	11
15	Choice task Random		2,571	12
16	Gap page	Stating the end of the choice tasks and moving forth to some additional questions.	2,559	1
17	Question: Frequency pharmacy visits Question: Number of medicines in use Question: Grade current community pharmacy Question: Image of community pharmacist		2,558	7
18	Question: Educational level Question: Ethnicity Question: ZIP code Question: Remarks		2,551	17
19	Experienced difficulty		2,534	1
END			2,533	



# CHAPTER 6

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General discussion

Within the general discussion, we first address the different methodological approaches used in this thesis. Next, we present the results and review these findings in a broader perspective.

### Results found within this thesis

The provision of CPS by community pharmacist can have a positive impact on the outcomes of drug treatment, both on the individual patient level and on a societal level [4-12]. Furthermore, CPS may support general practitioners (GPs) who are increasingly expected to provide care that was previously delivered within the secondary care system. However, when community pharmacists are expected to devote more time to the provision of CPS, they also need to gain time by de-implementing other activities. This balance requires changes within and outside the profession.

Kotters' 8-step change model [13] was introduced in the general introduction of this thesis. The first steps of Kotters' model, (1) creating a sense of urgency, (2) building a guiding coalition, (3) forming a strategic vision and initiatives, (4) enlisting a volunteer army and, to some degree, (5) enabling action by removing barriers, have been made within the community pharmacy profession. The community pharmacy profession is currently on the fifth step of Kotters' model. Barriers are being identified and facilitators are in the transitional process of focusing more on CPS provision. Understanding these barriers and facilitators is the first step to overcome the barriers and enhance the facilitating factors.

This thesis collected insight into time-utilization and task-prioritization by community pharmacists, preferences of the general public and patients regarding potential services of community pharmacists and added value on a societal level based on the pharmacist-led clinical medication review (CMR).

**Chapter 2.1 and 2.2** describe community pharmacists' time-utilization by means of self-reported work sampling, using a smartphone application to register daily activities in the pharmacy. **Chapter 2.1** reports that community pharmacists spend 52% of their time on professional activities, such as the final checking of prescriptions, clinical risk management, and CPS, with the remainder mostly spent on semi-professional activities that could be delegated to other pharmacy staff members, such as logistics and the dispensing process. They spent a limited amount of time on CPS, such as clinical medication reviews and patient counseling after hospital discharge. **Chapter 2.2** presents associations between background characteristics of community pharmacists and time-utilization. We demonstrate that community pharmacists who are able to spend more time on CPS predominantly spend less time on managerial activities and tend to be more active as locum pharmacists.

**Chapter 3** describes a study on task-prioritization by community pharmacists using Q-methodology. This study reveals that participating community pharmacists regarded CPS and quality assurance (QA) as the most important activity groups. In contrast, participants regarded pharmacy management as less important than CPS and QA performed by community pharmacists. These results suggest that the majority of community pharmacists want to focus more on CPS and QA.

**Chapter 4** presents results from a cost-effectiveness and cost-utility analysis with data from an RCT with a pharmacist-led clinical medication review (CMR). This study indicates that a pharmacist-led CMR can lead to a reduction of €181 within a 6-months timeframe in healthcare costs from a societal perspective. Moreover, a pharmacist-led CMR leads to a slight increase in the quality of life measured with the EuroQoL – Visual Analogue Scale (EQ-VAS) and the number of complaints with (more) severe impact. Therefore, this study demonstrates that CPS provided by community pharmacists can be cost-effective and is worthwhile for community pharmacists to spend more time on.

In **Chapter 5.1**, we describe a study that focused on preferences and perceived importance of the general public. Data were collected via a consumer panel concerning current community pharmacy services, using an online questionnaire. We found that the majority of the general public prefers convenience-related services over CPS. However, a large proportion of the general public perceives community-pharmacist-provided CPS as important. This result likely occurred because they perceive that there may be other people in need of CPS.

**Chapter 5.2** further investigates preferences regarding community pharmacy services but focuses on more advanced services by chronic users of medication who probably had more experiences with community pharmacies than those discussed in chapter 5.1. For this research, a discrete choice experiment was used. This study identified four groups of patients. The first group preferred online services, the second did not have clear preferences for new services, and the third and fourth groups preferred different types of CPS. The third group had a preference for counselling with the provision of prescription drugs for minor ailments without a doctors' prescription, and the fourth group preferred point-of-care-testing (POCT) by the community pharmacist.

## Different methodological approaches within this thesis

To answer the research objectives, different research methods were used. These techniques are not yet common practice in pharmacy practice research and are innovative within this field. For each research question, we chose the most suitable research technique. The different techniques and potential future applications of these techniques are discussed next.

### Work sampling using a smartphone application

Work sampling is a technique to study time utilization as chapters 2.1 and 2.2 describe. This technique has been previously used within commercial environments, such as factories, to understand time-utilization by factory workers and seek ways to increase efficiency. Within this study, a self-reporting work sampling in which pharmacists had to register their own daily activities was used.

This type of methodology could be used by professional bodies to track whether a shift in time-utilization has occurred in community pharmacy practice (or other professions) over time or whether more has to be done to implement CPS in daily community pharmacy practice. This methodology can also provide insights into time-utilization regarding specific topics, such as the amount of time spent on handling medicine shortages and recalls. Insights into topics like these could provide a basis for discussion with different stakeholders on how to best support the profession in handling the workload accompanied by these topics. Furthermore, providing insights into one's own time-utilization to community pharmacists provides them with the first step to optimize their time-utilization. These insights allow pharmacists to reflect on their current time-utilization and question whether it adheres to desired time-utilization.

### Q-methodology

Q-methodology elicits priorities of different types of participants within a variety of subjects. Due to the exact number of statements (or for this study, activities), when matching the number of cells within the Q-grid, participants have to carefully consider each activity's priority. Because of this consideration, we believe that Q-methodology provides more insightful data than Likert scale questionnaires as the latter do not force participants to make trade-offs.

Eliciting priorities within community pharmacy practice should be regularly performed by professional bodies. Community pharmacists priorities include time

utilization, as well as on which cognitive pharmaceutical services (CPS) related activities professional bodies need to first focus on developing and piloting, as described according to Kotters' 8-step change model.

Pharmacy technicians should not be forgotten in this regard. These technicians are most often the first point of contact for patients and provide most of the basic CPS. However, determining what type of CPS (if any) is considered important to be performed by pharmacy technicians is beneficial.

In addition, Q-methodology can be used with other stakeholders regarding how they view task prioritization within community pharmacy practice. For example, research has already been conducted regarding the integration of a clinical pharmacist within the GPs office [1]. For example, the activities other healthcare professionals view as important to be performed by Dutch community pharmacists, as well as what activities are considered less important, such as in [2], may generate insights. Furthermore, services that need to be provided within the premises of a community pharmacy and services that can be provided outside the community pharmacy may also supply insights. These insights could offer community pharmacy professional bodies useful information on how to further improve collaboration with other healthcare providers.

## Conjoint-based choice

Similar to Q-methodology, conjoint-based choice (CBC) techniques are used to study preferences that people may have regarding a subject's attributes (e.g., the color of a car) and different levels of those attributes (e.g., red or yellow are levels for the attribute color). The CBC technique differs from Q-methodology in that CBC participants rate a product or services on multiple attributes, whilst with Q-methodology participants rate individual attributes. Thus, CBC better reflects daily life than Q-methodology regarding making trade-offs.

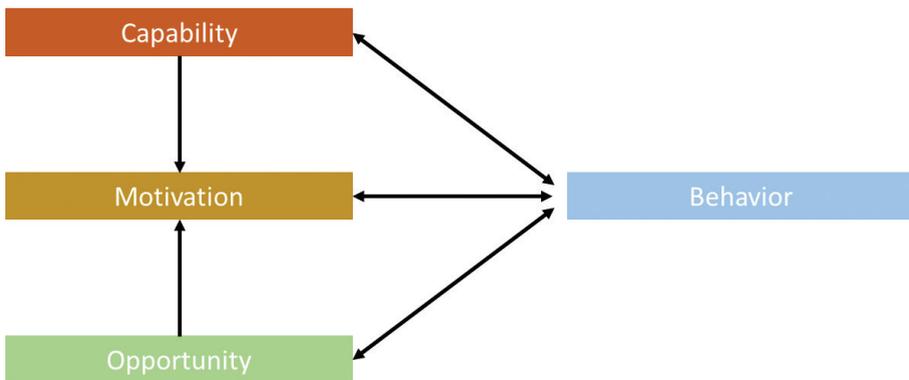
Within this research, CBC was used to elicit patient preferences on more advanced services provided by community pharmacists.

CBC can be put to broader use within pharmacy practice research, rather than being limited to services provided to patients, such as in [3]. However, more in-depth insights regarding patient preferences for different healthcare conditions could prove beneficial for community pharmacy practice. Better adjusting healthcare services to different type of patients will likely result in an increase in the successful implementation of new and innovative healthcare services.

In addition, CBC can be used for both patients and other healthcare providers to research preferences regarding new community pharmacy operating models. So CBC can aid in the further investigation of preferences that different stakeholders may have regarding the separation of CPS and dispensing and online community pharmacies.

## Results of this thesis within a broader perspective

To achieve an increased focus of community pharmacists on the provision of CPS, behavioral change is required. Therefore, the results are discussed in a broader perspective, according to the COM-B model on behavioral change. This model describes the relationship between three necessary conditions to change behavior: capability, opportunity, and motivation [14]. Opportunity and capability may influence motivation, and all three can influence behavior. Furthermore, behavior can influence capability, motivation, and opportunities (see Figure 1).



**Figure 1: COM-B model for understanding behavior [14].**

Capability is the individuals' capacity to engage in a certain activity. With respect to this study's topic, capability focuses especially on the knowledge and skills of community pharmacists [14]. Community pharmacists may experience a lack of knowledge (e.g., regarding pathophysiology or interpretation of lab results) and skills, such as clinical reasoning and consulting techniques. Such a lack of capabilities can independently and through decreased motivation affect the provision of CPS [15-17].

Opportunity includes factors that facilitate an individual's behavior. For community pharmacist, such factors may be the availability of time and resources and the expectation of society regarding their role [14]. Similar to a lack of capabilities, a

lack of opportunity can independently and through decreased motivation affect the provision of CPS. This finding implies that community pharmacists are motivated to focus on CPS when they are both capable enough (based on knowledge and skills) and are provided enough opportunity (adequate resources and societal expectations) to enhance motivation. Motivation, however, also includes habits and intrinsic factors. Growing accustomed to certain habits may hamper behavioral change, and intrinsic motivation [18] is important as it can determine an individual's will to obtain new capabilities and create opportunities through behavior [14].

Mitigating potential barriers and simultaneously enhance facilitating factors is key. The COM-B model can, therefore, be seen as a suitable tool to work on step 5 of Kotters' 8-step change model (enable action by removing barriers).

## Capability

Community pharmacists' capabilities affect the success of the transition to focusing on the provision CPS [17, 19]. However, in addition to the community pharmacist's skills and knowledge (such as clinical reasoning and consulting techniques) [15-17], those of pharmacy technicians are important, especially in the Netherlands where pharmacy technicians fulfill an important role within community pharmacy practice.

## Organization of the community pharmacy and the dispensing process

The dispensing of medicines is still considered a core function of community pharmacies by both patients and those pharmacists [16, 20-24]. For the majority of patients, filling a prescription is the primary reason to visit a community pharmacy [25, 26]. Therefore, community pharmacy teams (technicians and pharmacists) should professionally and efficiently organize the dispensing process, accompanied with appropriate counselling. This step is a starting point for future CPS [26]. Inefficient dispensing can even be regarded as a missed opportunity to convince patients of the added value of CPS.

An efficient organization and dispensing process consists of several patient-centered aspects, such as adequate hours of operation, easy accessibility to the community pharmacy, short wait times, and availability of medicines [27-29]. The importance of these aspects was also discussed in chapter 5.1 as convenience (e.g., short wait times) was highly preferred by the general public. An efficiently organized community pharmacy most likely provides a basis to build on the pharmacist-patient relationship and, therefore, facilitates the community pharmacist's provision of CPS [23, 26, 30-32].

## Skills and knowledge of community pharmacists

As described, community pharmacists sometimes experience a lack of confidence regarding the provision of CPS. Community pharmacists need to possess a wide variety of knowledge and skills, such as in the field of pharmacotherapy and clinical reasoning, as well as communication and consultation skills. This lack of confidence may be related to a lack of appropriate skills and knowledge [16, 17]. In addition, by adopting these skills, community pharmacists share the language of physicians, which can boost interprofessional collaboration. A lack of collaboration can seriously hamper the community pharmacist's focus on CPS provision.

Previous research has found that patient-centered communication is key within community pharmacy practice, especially with respect to the provision of CPS [16]. Historically, pharmacists received little academic training in patient-centered communication. Although this lack has been improved in the past decade, patient communication needs continuous training among both pre- and postgraduates [33, 34]. Communication is not just important for patient education and counseling; community pharmacists also need consultation skills to identify underlying health problems and facilitate shared decision making with patients [15]. Clinical reasoning as a skill also plays an important part in this regard. Therefore, fully implementing clinical reasoning in both pre- and postgraduate education and training is essential.

Furthermore, education of community pharmacists must focus on topics such as (preventing) chronic illnesses and minor ailments [35, 36]. To achieve this focus, community pharmacists also need to be trained in clinical reasoning [15], similar to physicians.

Curricula from the three universities in the Netherlands that provide pharmaceutical sciences education has been changed to focus more on the provision of CPS. The CanMEDS model has been used especially for the redesign of internships [37, 38]. Some examples of the developments within the curricula are experiential learning, offering internships earlier to students [37], and serious gaming [39]. These developments contribute to improving capabilities of future community pharmacists and, therefore, increase motivation to provide CPS. However, postgraduate education and training should also be offered to community pharmacists because they should be able to teach pharmacy students how to act like professional community pharmacists. In the end, experiential learning loses its effect when the tutor is unable to fulfill the need for quality CPS provision.

Moreover, further steps can be made regarding joint education between pharmacy and medical students. Through these steps, pharmacy and medical students

can learn from each other and be trained in (future) collaboration. Similarly, after obtaining a university degree, community pharmacists must be educated and trained together with future GPs within post-academic education. This joint training will increase the frequency of interprofessional collaboration and the awareness within both professions of how further collaboration can improve the quality of each other's work [40-42].

## Skills and knowledge of pharmacy technicians

Pharmacy technicians' skills and knowledge should be complementary to the ambition of the community pharmacy profession. In the current setting, pharmacy technicians predominantly focus on the dispensing process and less on other activities in which they can support the community pharmacist. Examples of such support are office management, quality management, and specific CPS (such as patient counselling at first dispensing and instruction on medical devices). Currently, pharmacy technicians undertake a mid-level vocational education. Counseling is a part of this training, amongst several other topics, such as basic pharmacology and pharmacotherapy, quality assurance, and compounding. For community pharmacy practice, one may question whether the focus on the provision of CPS in this vocational education should be further increased [43, 44]. In addition, aspects such as managerial skills and interdisciplinary collaboration may need more attention and may aid pharmacy technicians in supporting community pharmacists' focus on CPS [44]. Community pharmacists currently lack this form of support (for example, delegating certain managerial activities) from pharmacy technicians, resulting in community pharmacists performing these activities themselves (See chapter 2.1 and 2.2). A competency framework for pharmacy technicians has been developed for pharmacy technician education and should be fully implemented to ensure the supporting capabilities of pharmacy technicians in daily practice [44]. However, expecting pharmacy technicians to be capable of providing full support with regard to both CPS and managerial activities may be unreasonable. Therefore, pharmacy technicians should be given the opportunity to differentiate during education. Finally, sufficient postgraduate education and training should be available and, to some degree, mandatory for pharmacy technicians (as for community pharmacists). Currently, pharmacy technicians can be registered in a "license register" and/or a "quality register". The latter lists pharmacy technicians who have participated sufficiently in additional postgraduate education and training. However, being listed only in the "license register" has no influence on daily practice. Therefore, being registered in the quality register should preferably become mandatory for pharmacy technicians.

## Opportunity

Opportunity as part of the COM-B model entails factors that make certain behavior possible. For the community pharmacy profession, three topics are relevant: the availability of time, the current reimbursement model, and alternative business models separating CPS and dispensing.

### Available time

Overall, based on the results presented in chapter 2.1 and 2.2, community pharmacists have a diverse and demanding set of daily recurring activities that consume much of their available time and may hamper them from focusing on the provision of CPS. Previous studies have also indicated that the amount of available time is one of the most-mentioned constraints when implementing and providing CPS [19, 45-47]. However, not spending time on activities other than CPS is impossible, as certain managerial activities or activities related to quality assurance are core to the community pharmacy profession and are preconditions for an efficient dispensing process and CPS provision. Similarly, GPs and medical consultants are also not capable of spending all their available time in direct patient contact, as activities such as patient administration and certain managerial activities are also necessary in daily practice [48].

Compared to physicians, however, community pharmacists spend a larger amount of time on activities without direct patient contact, such as the dispensing process and managerial activities (see chapter 2.1 and 2.2). The large proportion of time spent on the dispensing process could be a sign of understaffing [49] and, consequently, of the need for community pharmacists to partake in the dispensing process. Thus, pharmacy technicians are crucial to enabling community pharmacists to focus on CPS [47, 50]. Understaffing has multiple causes. On the one hand, community pharmacists increasingly lack sufficient reimbursement to hire additional staff [51, 52], and on the other hand, the pharmacy technicians' role lacks attractiveness on the job market. Therefore, community pharmacy professional bodies need to focus on ensuring sufficient pharmacy technicians for staffing in community pharmacies. This can be pursued by facilitating sufficient education and promoting the attractiveness of the profession of pharmacy technicians regarding job profiles, career possibilities, and remuneration.

When community pharmacists actively take part in the dispensing process (whether forced by personnel shortages or by their own choice), they should use these moments to be visible to patients and to come into contact with patients working on the pharmacist-patient relationship, so patients can view the community pharmacist as easily accessible. Staying in the back-office and working on logistical- or administrative tasks is not preferred.

## Managerial organization

Task differentiation in pharmacies can also benefit from local joint ownership of several community pharmacies. Joint ownership enables community pharmacists to share managerial tasks and to reshuffle tasks to allow the individual community pharmacist to focus on specific tasks (e.g., management, logistics, patient care). Community pharmacy chains support community pharmacists in a similar way, potentially enabling pharmacists employed by them to spend more time on CPS (e.g. by supporting the community pharmacist with managerial tasks regarding finances and logistics). However, larger pharmacy chains have a caveat because the introduction of multiple layers of management may reduce flexibility and the ability to innovate [53].

The added value to the quality of the pharmacotherapy of some tasks performed by community pharmacists is subject to discussion. The final prescription check, which is mandatorily performed by community pharmacists, originates from a time when prescriptions were handwritten and compounding - including complex calculations written on the prescription - was common. However, currently, most prescriptions are electronic and the dispensing process contains several in-process controls, such as barcode scanning, which effectively identify potential erroneous dispensing. In addition, pharmacy information systems increasingly contain sophisticated clinical risk management tools. These safeguards lead to community pharmacists rarely identifying erroneous dispensing with the final check [54], suggesting this time consuming activity may be superfluous. Therefore, this activity seems a candidate for de-implementation or at least adaptations to render it more efficient, such as risk prioritization of prescriptions (with only the medium-to-high-risk prescriptions requiring a final check). By limiting this activity to the medium-to-high-risk prescriptions, the low risk prescription (which account for the vast majority) no longer have to undergo final checking. This adjustment would better balance the amount of time being invested into this activity and the actual benefit it provides to the dispensing process as a whole.

## Reimbursement

Lack of reimbursement is frequently mentioned as a major barrier for the implementation of CPS [15, 19, 45, 55-62]. Reimbursement is an opportunity to change behavior according to the COM-B model [14, 63, 64]. Therefore, altering the community pharmacy reimbursement model can be expected to motivate community pharmacists to focus more on the provision of CPS and less on the dispensing of medicines if reimbursement is more attractive for CPS than for dispensing.

The current community pharmacy reimbursement model is based primarily on the dispensing of medicines [60]. This foundation probably also (partly) explains current time-utilization, as discussed in chapter 2.1 and 2.2. Based on data from 2019, only 1% of community pharmacy revenues were generated by providing CPS [65]. This result has two possible reasons: community pharmacists rarely perform CPS-related activities or community pharmacists are not (sufficiently) reimbursed for CPS. Chapter 2.1 suggests that community pharmacists spend 15% of their time on CPS but only receive 1% of their funding for these services, suggesting the latter is true. A lack of (sufficient) reimbursement has also been stated as the primary reason for the lack of CPS focus by the Royal Dutch Pharmacists Association [66]. This result was also found in a report revealing that CPS provided by community pharmacists received lower reimbursement than other healthcare professionals offering similar services [52].

In addition to the reimbursement barrier, other financial factors may hinder implementation of CPS [66]. First, by paying the community pharmacy primarily to dispense medication, the general public views the community pharmacist mostly as a dispenser and is less receptive to CPS provision by community pharmacists. This perception affects the opportunity for community pharmacists to focus on CPS provision. Secondary, healthcare insurers are primarily focused on paying for dispensing because dispensing (i.e., accessibility to medicines for the general public) is the only Dutch government requirement they have to meet. Thirdly, the current reimbursement model is volume driven and not focused on adding value to healthcare. However, for the patient's benefit, it is sometimes desirable to stop certain medication and thereby reduce volume. In the current system, pharmacists who help patients discontinue treatment are not reimbursed for their help and concomitantly miss their dispensing fee. Thus, this reimbursement model does not stimulate large-scale deprescribing of medication. The current volume driven reimbursement model can act as a barrier regarding collaboration with GPs and other healthcare professionals (as they can also see the community pharmacists as volume driven healthcare providers) [67]. Also, the current reimbursement model stimulates dispensing and not the provision of CPS, motivating community pharmacists to increase dispensing and organize it more efficiently (e.g., automated medicine dispensing machines instead of a pharmacy technician at the counter). This practice may render the profession less attractive for recently graduated pharmacy students who have actually been trained to focus predominantly on CPS and lead to shortages in the community pharmacy workforce.

The GP reimbursement model could provide inspiration for a revised reimbursement model for community pharmacy practice. This model consists predominantly of two elements: capitation (standard fee per patient per time period) and a fee per activity performed. In addition, a smaller amount of revenue can be generated via integrated

care programs, innovation, and health outcome parameters. Changing GPs' reimbursement model from solely a capitation system to a mix of capitation and fee per service indicates that GPs are performing more services within a mixed model and improving the continuity of care [68]. Thus, changing the reimbursement model for a healthcare professional can alter his or her behavior and improve the quality of healthcare. This effect can also be expected for community pharmacy practice [69]. A reimbursed continuous medication monitoring program implemented in community pharmacies had a decrease in costs of care and an improvement regarding medication adherence [70].

We, therefore, suggest changing the current reimbursement model of community pharmacy practice in the Netherlands to a capitation system mixed with fee per service for CPS. The capitation should be adequate to cover the current dispensing costs. This change will make the current volume-driven fee for dispensing superfluous. Community pharmacists can further increase their revenue by providing CPS. This reimbursement model will also be more compatible with task prioritization of community pharmacists, as chapter 3 describes. The reimbursement model can be finalized by adding a pay for health outcome system in addition to the capitation and a fee per service, using validated outcome indicators [71]. This type of reimbursement model will most likely also stimulate collaboration between community pharmacists and GPs. Furthermore, this form of reimbursement needs to be adjusted yearly for factors such as inflation and increasing personnel costs. Otherwise, financial deficits may be introduced within community pharmacies, as is currently the case within the United Kingdom [52].

## Separating CPS from dispensing

The hub-and-spoke model is likely to contribute to a shift toward CPS [72]. This model consists of a central hub located in a large city and spokes within residential areas and smaller nearby towns. This model will stimulate collaboration between community pharmacists. In the hub-and-spoke model, a central hub primarily focuses on dispensing medicines mostly staffed with pharmacy technicians and a small team of pharmacists who focus on managerial activities and QA and manage ad-hoc situations, such as medicine shortages [73]. By centralizing the dispensing process within the hub, more efficiency can be gained due to the increased scale. Thus, more time becomes available for CPS within the spokes. This approach is different than current models of cooperating community pharmacies, as the current model maintains dispensing in all affiliated community pharmacies. Whether the hub is accessible to patients depends on its physical location. The hub can be positioned within a business park, probably reducing costs of real estate but also reducing patient accessibility. Medicines could either be dispensed through the spokes or directly delivered to a patient's home. The spokes within this

model act as accessible locations within healthcare centers to retrieve medicines and OTC products, but above all, these spokes are places in which CPS is provided close to people's homes. This model is possible because activities considered part of CPS are not necessarily bound to the dispensing of medicines. Instead, these activities can be viewed separately from each other. However, this model keeps the community pharmacy profession integral with expertise of both distribution and CPS. The challenges regarding medicines shortages highlight the importance of the integrity of the community pharmacy profession [73].

Medicine shortages increasingly hamper continuity of treatment. Within the Netherlands, medicine shortages increased from 769 medicines in 2018 to 1,492 in 2019; the low pricing of medicines in the Netherlands was a major contributor [73]. These shortages will most likely continue for several years, thereby increasing the necessity of community pharmacists for therapy continuation. Due to the outbreak of Covid-19, medicine shortages are expected to increase in the upcoming period [74]. Shortages pose new challenges for community pharmacists and require both pharmaceutical and logistical expertise. For now, community pharmacists have been able to find solutions for 99% of shortages [75]. Separating this expertise may reduce the quality and efficiency of dispensing. Therefore, current (and future) medicine shortages should remind professional bodies and policymakers to be careful when considering the separation of CPS and dispensing. As mentioned before, the hub-and-spoke model could be a viable option to efficiently manage medicine shortages.

Separate provisions for CPS and dispensing in community pharmacy practice could also be established by embedding clinical pharmacists in GP practices. The benefits of such a collaboration between pharmacists and GPs have been proposed [76]. However, debate still remains regarding the exact design of such a model [1]. An important issue is the independent role of the community pharmacist as the person responsible for the safe and effective use of medication. Embedding a pharmacist in a GP practice could potentially introduce dependency of the clinical pharmacist on the GP. The combination of the community pharmacist working within the premises of a GP practice with the previously introduced hub-and-spoke model may be of interest. This combination would reinforce collaboration between the two professions while maintaining the independent role of the community pharmacist and a direct link with the hub, for example, regarding solutions for logistical issues, such as shortages.

## Motivation

Motivation can be intrinsic or extrinsic. Examples of intrinsic motivation are curiosity and a desire to change, whereas extrinsic motivation is regarded as a reward (such as financial rewards or recognition from peers) after displaying certain behavior. Both intrinsic and extrinsic motivation can create a sense of urgency according to Kotters' 8-step change model [13].

This study has demonstrated that the majority of community pharmacists highly prioritize CPS within their daily recurring activities (chapter 3). This result suggests intrinsic motivation is more connected to CPS provision. The discrepancy between perceived priority and actual time-utilization can, however, hamper motivation. This finding can also be interpreted as an indication that current extrinsic factors motivate community pharmacists to focus their available time on activities other than CPS.

Several studies have revealed that community pharmacists are motivated to take roles as healthcare providers. Community pharmacists, for example, pursue more active roles that challenge their current skill mix within the healthcare system [22]. Studies have indicated that community pharmacists' motivation for CPS provision increased when they worked in multidisciplinary teams and received positive appraisal by other healthcare professionals (e.g., in smoking cessation programs) [77, 78]. Results from these studies suggest the importance of positive feedback. As the majority of community pharmacists already prioritize CPS (chapter 3), the opportunity to actually focus on CPS provision will likely further increase motivation. This is also expected to increase community pharmacists' job satisfaction. It is, therefore, paramount that policymakers and professional bodies facilitate community pharmacists in focusing on CPS provision and interprofessional collaboration. Interprofessional collaboration can be stimulated by addressing it within professional guidelines.

## Patient needs

As chapter 5.1 explains, the general public predominantly prefers convenience-related services from the pharmacy. One reason is most likely that patients predominantly visit a GP for healthcare-related matters, even if a community pharmacist is also capable of helping the patient [79]. Possibly more importantly, the results presented in chapter 5.1 suggest that the majority of the general public was healthy and not (yet) in need of CPS. Chapter 5.1 also indicates that with increasing age, preference for CPS increases. As stated, patients who had experience with CPS provided by community pharmacists were highly satisfied [26, 30, 80-84]. Furthermore, patients with positive previous experiences utilized

these services more often [26]. Thus, providing CPS now leads to an increase in future demand of CPS provided by community pharmacists. An increase in CPS provision by community pharmacists can probably improve the reputation of the community pharmacy profession and create a trusting relationship, in turn increasing the perceived accessibility of the community pharmacy [23]. An increase in CPS provision may also increase the profession's attractiveness for students currently trained to provide CPS and may reduce the number of community pharmacists leaving the profession because they are unable to provide the CPS for which they are trained. This benefit is especially relevant given the shortages that the profession faces in the (near) future [85].

### **Proving the added value of CPS to GPs and patients**

Close collaboration of community pharmacists with GPs seems to yield better healthcare outcomes than usual care provided by community pharmacists alone [86-89]. Furthermore, GPs who had experience with CPS provided by community pharmacists were predominantly positive [90]. It is, therefore, paramount to increase collaboration with the GP when providing CPS, instead of perceiving the community pharmacist as a competitor for the GP.

CPS provided by community pharmacists can alleviate GPs' increasing workloads. The shift from secondary care to primary care currently predominantly burdens GPs, who already experience time constraints. The POINT study provides an example of how pharmacists decreased GPs workload and concurrently improved the quality and outcomes of drug therapy [1, 76]. Both GPs and community pharmacists need to see each other as partners instead of competitors [91]. GPs tend to prefer technical support (such as insurance approvals) from community pharmacists over CPS [92]. However, they are expected to increasingly endorse CPS provided by community pharmacists to patients if this endorsement leads to reduced time constraints for themselves. One helpful way to achieve this goal is to align the reimbursement models for both GPs and community pharmacists. GPs' positive attitude toward CPS provided by community pharmacists will facilitate implementation of CPS provision in community pharmacy practice [22, 47, 55].

In chapter 4, we explained that a clinical medication review (CMR) by community pharmacists not only improves the quality of care but may even decrease health care costs. Many studies have provided similar insights into the added value of CPS provided by community pharmacists [4-10]. Chapter 5.2 describes the variation in patient preferences regarding more advanced pharmacy services. Therefore, community pharmacists need to offer a wide spectrum of services addressing both needs of (frail) patients with polypharmacy (focus on CPS), but also people without chronic diseases but maybe an incidental minor ailment (focus on convenience).

Alleviation of minor ailments by pharmacists would give GPs the opportunity to focus on patients with more complex complaints.

Patients and healthcare professionals (including GPs) are (mostly) unaware of community pharmacists' knowledge and skills as well as the extent to which community pharmacists can offer CPS [25, 47, 79, 90, 93, 94] and, therefore, also lack knowledge of the added value of CPS provided by community pharmacists. Pharmacists' professional bodies should thus also explore the possibilities of promoting the general public's awareness of the role of community pharmacists regarding CPS provision [25, 55, 95]. However, further development of the profession and continuously increasing the quality of services provided by community pharmacists should have the greatest impact on awareness. Moreover, this information must be shared parallel to a promotion campaign. Otherwise, a promotion strategy may be counterproductive. In addition, other healthcare professionals (predominantly GPs) must endorse CPS provided by community pharmacists. Community pharmacists, therefore, need to discuss with GPs how CPS can address the needs of GPs and patients.

## Moving on: implications for daily practice

According to Kotters' 8-step change model, after barriers have been removed, short-term wins need to be generated. The acceleration these short-term wins produce must be sustained to achieve the end goal of actually instituting change [13]. A proposal on how to move on per step is provided in the next sections.

## Generate short-term wins

Short term wins need to be recognized, collected, and communicated as early and often as possible to keep motivating the frontrunners among community pharmacists to implement CPS in daily practice [13]. Organizing small implementation pilots (consisting of around five participating community pharmacies) is the most appropriate way to generate short-term wins.

These pilots have to focus on the following:

1. The identification of best practices of CPS implementation
2. Evaluating the added value of CPS
  - a. On the individual patient level
  - b. On a societal level
  - c. On the GP practice level.
3. Alternate reimbursement models favoring CPS provision.

Regarding the first point, frontrunners' successful implementation of CPS will identify best practices that can help other community pharmacists implement CPS in daily practice. These frontrunners may play a pivotal role in smaller pilot groups of community pharmacies when implementing (new) CPS services. Frontrunners who have implemented CPS successfully in the past will most likely uncover best practices that other community pharmacists can build on. In addition, these frontrunners should preferentially be positioned in different contextual situations (such as varieties in urbanization and demographics). By doing so, barriers and facilitators accompanying each contextual situation can also be uncovered. Furthermore, these pilots need to be organized over at least an entire year to identify time-bound factors influencing the implementation of CPS. Eventually, these pilots need to lead to CPS services no longer being project-based, but continuously provided to patients. Within these pilots, the role of pharmacy technicians in the implementation of CPS should receive ample attention.

The added value of CPS should be investigated in multiple ways within these pilot settings. This investigation can best be accomplished through continuous monitoring. Monitoring will provide stakeholders with insights into the added value of CPS as well as developments over time. The results will have to be communicated to different stakeholders. When trying to motivate more community pharmacists to participate in these pilot settings, frontrunners among community pharmacists should be involved as ambassadors, such as the community pharmacists that participated in the DREAMer trial. This involvement could inspire other community pharmacists to participate.

Within these pilots, special attention should be given to alternate reimbursement models. Such models can have major implications for both healthcare insurance companies and community pharmacists. It is, therefore, essential that different stakeholders are provided with insights into how a different reimbursement model affects revenues. Without these insights, different stakeholders may be hesitant to support the implementation of a new reimbursement model (due to a fear of the unknown). Therefore, within the pilot setting, agreements should be made about participating community pharmacists' revenues. These agreements will likely provide sufficient trust from both community pharmacists and healthcare insurance companies to encourage participation and should provide professional bodies and policymakers with the knowledge to assess the impact of an altered reimbursement model.

### **Sustain acceleration**

After the first successful implementation and positive results of CPS services in pilot settings that underpin the added value of CPS, subsequent steps should be made toward the normalization of specific CPS provision [96]. These steps should first include implementing the specific CPS in other community pharmacies around the country to normalize it within the profession. This step also reduces the amount of practice variation within the profession and further enables professional bodies to strengthen CPS in daily practice by developing professional guidelines and creating quality indicators. This will create a situation in which CPS becomes increasingly normalized within the community pharmacy profession, instead of being considered add-on for dispensing. Responsibility in sustaining acceleration predominantly lies with the pharmacy profession and thus the Royal Dutch Pharmacists Association.

## Institute change

Instituting change in this regard means normalizing CPS in daily practice [96] and preventing acceleration from diminishing over time. This is a joint responsibility of professional bodies and other stakeholders:

1. Professional bodies should adopt change within professional guidelines
  - a. Continuous development of pre- and postgraduate training both for pharmacists and pharmacy technicians
  - b. Development of quality indicators
2. Policy makers and regulatory bodies should adopt change within rules and regulation
3. Healthcare insurance companies should adopt community pharmacist reimbursement schemes focusing on CPS

Regarding the first point, the amount and quality of CPS provision is determined early in education and training. Therefore, this point should focus predominantly on topics that are considered desirable during community pharmacists' professional careers. However, demand and preferences from patients and other healthcare providers can shift over time, so education and training needs to be continuously developed to align with these preferences and demands. Furthermore, the professional body determines the content and desired quality of services that all community pharmacies should provide, including CPS. This determination is achieved by developing professional guidelines. Some aspects of CPS are already described in these guidelines. However, additional services that have been implemented in daily community pharmacy practice should also be described. By doing so, the Royal Dutch Pharmacists Association can continuously move the profession forward. Progress is accomplished by first supporting the development and implementation of CPS and, when CPS has become normalized, adopting it into professional guidelines and developing quality indicators to turn it into a minimum requirement. Community pharmacists who fully comply with these professional guidelines may be provided with certification, so they can present this certification to patients, other healthcare providers, regulatory bodies, and healthcare insurance companies. In addition, community pharmacists who do not adhere to these professional guidelines should be held accountable.

With regard to the second point, stakeholders outside the community pharmacy profession, such as regulatory bodies and healthcare insurance companies, should create the conditions needed for community pharmacists to adhere to these newly developed professional guidelines. The Dutch Healthcare Authority

should oblige healthcare insurance companies to reimburse CPS instead of limiting reimbursement to dispensing. Moreover, the Dutch Healthcare Authority should start assessing whether reimbursement within the community pharmacy profession is sufficient to enable community pharmacists to adhere to newly developed guidelines and intervene if they do not.

For the third point, CPS provided by community pharmacists to patients should preferably not be paid (partly) out of pocket by patients. Medicines, however, can be part of a capped out-of-pocket scheme to reduce national spending. Including CPS within out-of-pocket payments will seriously hamper patients' desire to actively seek CPS provided by community pharmacists, especially considering that services provided by GPs are fully reimbursed with no out-of-pocket expenses for patients. Keeping medicine reimbursement part of a capped out-of-pocket cost will stimulate patients to seek deprescribing or to look for cheaper alternatives.

## General conclusion

Community pharmacists hold great potential both on a societal level, by improving the effectiveness and safety of pharmacotherapy and containing healthcare costs, and on the individual level in improving the outcomes of pharmacotherapy and subsequently quality of life for individual patients. Currently, community pharmacists are not utilized to their full potential. This thesis has identified both barriers and facilitators for community pharmacists to redirect their main focus toward CPS provision. Now, the professional bodies, regulators, policymakers, and payers must fully facilitate and enable community pharmacists to focus on CPS provision. This thesis can also be considered a call to community pharmacists to fully demonstrate their potential and to seize the challenge to help the profession into the next phase.

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## Chapter 6

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## Chapter 6

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# APPENDICES

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Summary

Samenvatting

Woord van dank

List of co-authors

About the author

## Summary

Community pharmacists in the Netherlands have a unique position within the healthcare system. It is where two responsibilities meet: the safe and responsible dispensing of medicines to patients and counseling patients on ensuring safe and effective use of the medicines. A number of activities can be directly or indirectly attributed to this responsibility that can be very diverse in nature, like managing finances and personnel management, but also providing medication reviews and home visits after hospital discharge to patients. These last two are considered to be part of an activity group called cognitive pharmaceutical services (CPS).

Currently, community pharmacy practice is undergoing a transitional phase in which focus is being shifted towards the provision of CPS. The role of the community pharmacist is gradually changing by which traditional tasks, such as compounding and dispensing, are becoming less dominant. This is considered a major change for the profession, rendering change management an important concept within the profession. Kotters' 8-step change model can provide support in this change process. This model describes eight different steps that eventually lead to change. These steps are (1) creating a sense of urgency; (2) building a guiding coalition; (3) forming a strategic vision; (4) enlisting a volunteer army; (5) enabling action by removing barriers; (6) generating short term wins; (7) sustaining acceleration; (8) instituting change.

The HARM-report published in 2006 stating that half of alle hospital admissions related to medicines could have been prevented can be regarded as a sense of urgency. Next to the personal suffering that could have been prevented, costs could have been saved mounting to an annual sum of €85 million. Different policymakers are convinced that community pharmacists can have a positive impact on these preventable hospital admissions. Also, rising healthcare costs are motivating healthcare policymakers to shift healthcare provision from the more expensive hospital care towards the better affordable primary care system. This increases pressure on the primary care system and also increases complexity of care that needs to be provided within the primary care system. General practitioners (GPs) play an important part in handling this shift in care provision, but are currently already experiencing a significant workload. Community pharmacist can play an important part by utilizing their expertise. By doing so, community pharmacists can further support a shift from hospital care to primary care, without reducing the quality of treatment the patient receives.

Community pharmacists can therefore play an important part within healthcare. However, community pharmacists are currently being under-utilized. The Royal Dutch Pharmacists Association is aware of this situation. Several steps have been

taken to address the possibilities that community pharmacists can offer. The most important being the publication of a position paper on the future of community pharmacy practice. In this position paper, emphasis is put on the community pharmacist focusing on CPS. However, realizing this vision is accompanied with changes both within and outside the community pharmacy. Community pharmacies differ in the amount of CPS that is firmly implemented in daily practice. This suggests that different factors are at play when implementing CPS in daily practice, acting as barriers or facilitators. An important step within Kotters' 8-step change model is identifying and understanding these factors. And subsequently overcoming these barriers and enhancing facilitating factors.

Therefore, the aim of this thesis was to get more insight into current community pharmacy practice and to identify barriers and facilitators that either support or hamper the community pharmacy profession to shift focus on the provision of more CPS.

**Chapter 2.1 and 2.2** describe community pharmacists' time-utilization by means of self-reported work sampling, using a smartphone application to register daily activities in the community pharmacy. Participating community pharmacists were asked to register their activities during six consecutive weeks for a total of five times per working day. **Chapter 2.1** reports that a total of 91 community pharmacists participated and provided 7,848 registered activities. Analysis of these activities showed that community pharmacists spend 51,5% of their time on professional activities, such as the final checking of prescriptions, clinical risk management, and CPS, with the remainder mostly spent on semi-professional activities that could be delegated to other pharmacy staff members, such as logistics and the dispensing process. They spent a limited amount of time on CPS, such as clinical medication reviews and patient counseling after hospital discharge. This chapter shows that it is feasible to collect work-sampling data using smartphone technology and that community pharmacists are most likely being hampered in their transition towards better focus on CPS due to competing nature of traditional tasks with CPS. This prevents community pharmacists in profiling themselves as pharmaceutical experts in daily practice. **Chapter 2.2** presents associations between background characteristics of participants and time-utilization of the aforementioned ninety-one community pharmacists and also provided first insights into trade-offs regarding time-utilization. This chapter reports that community pharmacists who are able to spend more time on CPS, predominantly spend less time on managerial activities. Also, community pharmacists who state that they want to spend more time on direct patient contact, are already the community pharmacists spending a relative large amount of time on CPS. This could indicate that intrinsic motivation plays an important part in the amount of time being spent on CPS.

**Chapter 3** describes a study on task-prioritization by community pharmacists using Q-methodology. Participating community pharmacists were asked to rank a total of 48 different daily recurring activities. A total of 166 community pharmacists participated in this study and revealed that three groups can be distinguished based on task-prioritization. Overall, activities belonging to CPS were ranked as important by all three groups. The group containing the largest number of participants ranked CPS as the most important. Quality assurance was also ranked important and on the other side, logistics and pharmacy management were ranked as unimportant overall. So this study reveals that task-prioritization can be seen as a facilitator in the shift towards CPS in daily community pharmacy practice. To increase the available time that community pharmacists have to focus on CPS, activities belonging to logistics and pharmacy management need to be delegated to other pharmacy staff members as much as possible.

**Chapter 4** presents results from a cost-effectiveness and cost-utility analysis with data from an RCT with a pharmacist-led clinical medication review (CMR). A total of 588 patients were included with exactly 294 patients within the intervention group and 294 patients within the control group. After a 6-month period, average healthcare associated costs per patient within the control group were €4,189 ± 6,596 and €4,008 ± 6,678 within the intervention group (including the cost of the pharmacist-led CMR). The pharmacist-led CMR was estimated to cost around €199 ± 67, which leads to an average incremental cost saving of €181 for the intervention group compared to the control group. Next to this, the pharmacist-led CMR leads to a slight increase in the quality of life measured with the EuroQoL – Visual Analogue Scale (EQ-VAS) and the number of complaints with (more) severe impact. Quality of life was slightly reduced over a 6-month period within the intervention group measured with the EQ-5D-5L. There was a likelihood of > 90% that the pharmacist-led CMR was cost saving. This chapter therefore shows that the results of the pharmacist-led CMR on quality of life of patients is inconsistent, but it can be cost-saving from a societal perspective. Therefore, this study demonstrates that CPS provided by community pharmacists is worthwhile for society to stimulate community pharmacists in spending more time on in daily community pharmacy practice.

In **Chapter 5.1**, we describe a study that focused on preferences and perceived importance of the general public regarding services provided by community pharmacies. This was done via an online survey among 1,500 members of the Dutch Healthcare Consumer Panel. For this study, we specifically focused on questions regarding preferences and importance regarding community pharmacy services. A total of 516 panel members completed all questions regarding preferences and importance. Analysis of the results showed that the majority preferred convenience over CPS with respect to community pharmacy services.

However, participants did find it important that community pharmacists offer CPS. This is most likely from a societal viewpoint in which participants consider the needs of others or their own future need. Participants who did prefer CPS over convenience were generally older of age and used more medicines. This means that it is necessary for community pharmacists to address the needs of patients regarding convenience of services their offering, but at the same time should also offer appropriate CPS. Also, community pharmacists dealing with a patient population consisting of largely elderly that are using multiple medicines, more focus needs to be put on CPS.

**Chapter 5.2** further investigates preferences regarding community pharmacy services but focuses on more advanced services by chronic users of medication who probably had more experiences with community pharmacies than those discussed in chapter 5.1. For this research, a discrete choice experiment was used focusing on latent class analysis. The questionnaire containing the DCE was completed by 2,462 panel members. This study identified four groups of patients. The first group preferred online services, the second did not have clear preferences for new services, and the third and fourth groups preferred different types of CPS. The third group had a preference for counselling with the provision of prescription drugs for minor ailments without a doctors' prescription, and the fourth group preferred point-of-care-testing (POCT) by the community pharmacist. Patients visiting community pharmacies can have a diverging set of preferences regarding services being provided. In daily practice, community pharmacists should provide both convenience and CPS related services to address this diverse set of preferences.

The results found within this thesis are put in a broader perspective and based on this, advice is being provided for both community pharmacists and the profession as a whole and also to different policymakers. The different factors identified within this thesis are further discussed using the COM-B model. The COM-B model is useful in getting insights into what conditions need to change to realize behavioral change. These encompass capability, opportunity and motivation. Thereafter, suggestions are being made regarding next steps to be undertaken in this change process according to Kotters' 8-step change model.

Community pharmacists need to ensure an efficient dispensing process accompanied with patient-centered counseling. Preferences of patients regarding short waiting times and extended opening hours should play a leading role in this regard. This is seen as a necessity for the future implementation of CPS. Next to this, community pharmacists need to be fully capable and competent in providing CPS. This requires multiple skills and knowledge, such as communication techniques and clinical reasoning. These topics are more prominent in current

## Appendices

curricula of schools of pharmacy and therefore pharmacy students are currently already being better educated to provide CPS. However, community pharmacists that received more traditional education, should gain these skills and knowledge via postgraduate training and education. Also, more focus should be put on the joint education of pharmacy- and medical students. This will also most likely increase future collaboration between the two professions. The knowledge level of pharmacy technicians should be complementary to the ambitions of the community pharmacy profession, where current pharmacy technicians are predominantly focused on the dispensing process. Therefore, pharmacy technicians should be more capable in offering CPS, but also on activities that can alleviate the community pharmacist such as managerial activities. By doing so, pharmacy technicians will be capable of supporting community pharmacists fully in implementing CPS in daily practice.

In daily practice, it will be sheer impossible to spend all available time on activities that are considered CPS. However, community pharmacists spend more time on activities that do not include direct patient contact compared to GPs. Especially activity groups like the dispensing process and pharmacy management consume a large amount of time. The amount of time being spent on the dispensing process could be an indicator that community pharmacists are faced with personnel shortages. Next to this, each activity performed by community pharmacists should be evaluated if the amount of spent time by the community pharmacists is necessary. The current reimbursement model is volume driven, based on the amount of medicines being dispensed to patients. This reimbursement model is therefore considered not to facilitate community pharmacists in focusing on CPS. This calls for a revision of the reimbursement system. A reimbursement model with elements of a capitation system and a fee per performed CPS seems to be most obvious. Next to this, adding an element rewarding community pharmacists for health outcome can be considered to add. The current business model of community pharmacies has been unchanged for the past years. To enable the community pharmacist to better delegate and divide tasks, partnerships between different community pharmacies offers possibilities. By doing so, community pharmacists are capable of upscaling activities and divide among participating community pharmacists. It is expected that community pharmacists will subsequently be able to manage the available time more efficiently and focus more on certain activities, also increasing the quality of the work performed. Community pharmacists can also consider the *hub-and-spoke* model in which the dispensing process and activities related to distribution are being centralized at the *hub*. At the same time, the provision of CPS can be performed at the spokes that can be positioned in a wide variety of places including a GPs practice. Another possibility is the separation of CPS and dispensing (including related distributary activities), where CPS is being provided by pharmacists employed by GPs within the

premises of a GPs practice. It is expected these pharmacists will be better capable of spending more time on CPS, but questions can be raised regarding the quality of entire healthcare system. After all, this will lead to a further fragmentation of the healthcare system and society as a whole is less able to benefit from the combination of knowledge of the community pharmacist, combining knowledge on CPS and distribution.

Preferences of patients can act as a strong motivator for community pharmacists. Patients with hands-on experience with CPS provided by community pharmacist are highly satisfied regarding these services. Patients with previous positive experiences are more likely to call on community pharmacists in the future to provide CPS. This can create a positive feedback loop that can act as a strong motivator for community pharmacists. At the same time, community pharmacists need to continuously prove the added value that CPS can offer and communicate this with both patients and other healthcare professionals. It is expected that the demand for CPS provided by community pharmacists will increase by doing so and especially the support from GPs will enable community pharmacists to fully implement CPS in daily practice.

Concluding, community pharmacists hold great potential on a societal level and on the individual patient level. Currently, community pharmacists are not utilized to their full potential. This thesis has identified both barriers and facilitators for community pharmacists to redirect their main focus toward CPS provision. Now, the professional bodies, regulators, policymakers, and payers must fully facilitate and enable community pharmacists to focus on CPS provision. Also, this can be considered a call to community pharmacists to fully demonstrate their potential and to seize the challenge to help the profession into the next phase.

A

## Samenvatting

De openbaar apotheker in Nederland heeft een unieke positie in de gezondheidszorg. In deze positie komen twee verantwoordelijkheden samen, namelijk het verantwoord ter hand stellen van geneesmiddelen aan patiënten en patiënten begeleiden bij het veilig en effectief gebruik van geneesmiddelen. De activiteiten van de openbaar apotheker zijn uiteenlopend en dragen hier direct of indirect aan bij. Hierbij moet men denken aan het financieel beheer van de apotheek en personeelsmanagement, maar ook het uitvoeren van medicatiebeoordelingen en het uitvoeren van huisbezoeken na ziekenhuisontslag van de patiënt. De laatste twee taken zijn voorbeelden van farmaceutische patiëntenzorg (FPZ), in het Engels ook bekend onder de term *cognitive pharmaceutical services (CPS)*.

Op dit moment ondergaat de openbare farmacie een transitiefase waarin de focus van de werkzaamheden van de openbaar apotheker verschuift richting FPZ. Hiermee ondergaat de apotheker een rolsverandering waarbij klassieke taken als het bereiden- en ter hand stellen van geneesmiddelen minder dominant worden. Voor het beroep van openbaar apotheker behelst dit een behoorlijke verandering. Hierdoor is verandermanagement binnen de sector een belangrijk begrip en behelst deze verandering een stevige uitdaging. Om hierin te ondersteunen kan het 8-stappen verandermodel van Kotter houvast bieden. In dit model worden acht stappen onderscheiden van elkaar die uiteindelijk leiden tot een verandering. Deze stappen zijn (1) verhoog het urgentiebesef; (2) vorm een leidend team; (3) ontwikkel visie en strategie; (4) communiceer verandervisie; (5) creëer breed draagvlak; (6) realiseer korte termijn resultaten; (7) consolideer en ga door; (8) veranker het nieuwe systeem.

Het HARM-rapport uit 2006 stelt dat ongeveer de helft van alle ziekenhuisopnames die zijn gerelateerd aan medicijngebruik voorkomen konden worden. Naast het persoonlijk leed dat voorkomen kan worden, zitten hier tevens kosten aan van €85 miljoen die mogelijk bespaard kunnen worden. Verschillende beleidsmakers zijn overtuigd dat openbaar apothekers hier een positieve invloed op kunnen uitoefenen. Tevens leeft bij beleidsmakers het besef dat de kosten van de Nederlandse gezondheidszorg almaar stijgen. Eén van de maatregelen die wordt genomen is om zorg te verplaatsen van de relatief dure tweedelijns zorg naar de beter betaalbare eerstelijns zorg. Hiermee neemt de druk op de eerstelijns zorg toe en wordt de zorgvraag in de eerste lijn tevens complexer. Huisartsen spelen een belangrijke rol in deze verschuiving van zorg, maar ervaren tegelijkertijd al veel werkdruk vanuit het huidige werkaanbod. Openbaar apothekers kunnen een belangrijke rol spelen door hun expertise in te zetten bij de behandeling en begeleiding van patiënten in het kader van (complexe) farmacotherapie. Hiermee kan een verschuiving van de tweedelijns naar de eerstelijns zorg beter georganiseerd worden en soepeler verlopen, zonder afbreuk te doen aan de kwaliteit van de behandeling van de patiënt.

Openbaar apothekers kunnen daarmee een belangrijke rol spelen binnen de zorg. Maar op dit moment worden openbaar apothekers onvoldoende benut. De Koninklijke Nederlandse Maatschappij ter bevordering der Pharmacie (KNMP) is zich bewust van deze situatie. Zij heeft al stappen ondernomen, waarbij de belangrijkste de publicatie van een visiedocument op de farmaceutische zorg en de rol van de openbaar apotheker hierin is. In dit visiedocument wordt de nadruk gelegd op de openbaar apotheker als zorgverlener met de focus op het bieden van FPZ. Echter, het realiseren van deze visie gaat gepaard met veranderingen zowel binnen- als buiten de apotheek. In de dagelijkse praktijk zijn verschillen zichtbaar tussen openbaar apotheken onderling in de mate waarin zij FPZ geïmplementeerd krijgen in de dagelijkse praktijk. Dit suggereert dat verschillende factoren van invloed zijn op de implementatie van FPZ, die implementatie bevorderen of belemmeren. Hierbij is volgens Kotter het identificeren en wegnemen van barrières en het creëren van draagvlak belangrijke voorwaarden voor succes bij verandering.

Daarom is het doel van dit proefschrift om meer inzicht te krijgen in de huidige apotheekpraktijk en factoren die implementatie van FPZ in de dagelijkse apotheekpraktijk belemmeren of faciliteren.

**Hoofdstuk 2.1 en 2.2** geven meer inzicht in de huidige tijdsbesteding van openbaar apothekers door gebruik te maken van een smartphone applicatie waarmee openbaar apothekers activiteiten konden registreren. Van deelnemende openbaar apothekers werd gevraagd om hun activiteiten vijf maal per werkdag, gedurende zes aaneengesloten weken te registreren. **Hoofdstuk 2.1** beschrijft dat 91 openbaar apothekers hebben deelgenomen en in totaal 7848 activiteiten hebben geregistreerd. Analyse van deze resultaten toont dat openbaar apothekers 51,5% van de beschikbare tijd besteden aan professionele activiteiten, zoals de eindcontrole van recepten en het controleren van medicatiesignalen. De overige tijd wordt besteed aan semiprofessionele- en non-professionele activiteiten. Deze konden mogelijk ook worden uitbesteed aan ondersteunend personeel in de apotheek. Een beperkte hoeveelheid tijd werd besteed aan het verrichten van FPZ, zoals het uitvoeren van medicatiebeoordelingen. Dit hoofdstuk toont aan dat het mogelijk is om tijdbestedingsdata te achterhalen middels een smartphone applicatie en dat openbaar apothekers mogelijk belemmerd worden in de transitie naar FPZ door andere traditionele taken. Dit voorkomt dat openbaar apothekers zich kunnen profileren als geneesmiddelenexpert in de dagelijkse praktijk. In **Hoofdstuk 2.2** wordt ingegaan op verbanden tussen kenmerken van openbaar apothekers en de tijdsbesteding in de dagelijkse praktijk, alsook de onderlinge uitwisseling van taken. Hieruit is naar voren gekomen dat openbaar apothekers die meer tijd besteden aan FPZ, minder tijd besteden aan managementactiviteiten. Daarnaast is gevonden dat openbaar apothekers die aangeven meer tijd te willen besteden aan direct patiënten contact, al een relatief groot deel van de tijd

besteden aan FPZ. Dit zou een indicatie kunnen zijn dat intrinsieke motivatie een belangrijke rol speelt bij de transitie naar FPZ.

**Hoofdstuk 3** beschrijft een onderzoek dat ingaat op taakprioritering door openbaar apothekers met behulp van Q-methodologie. Van deelnemende openbaar apothekers werd gevraagd om een rangorde aan te brengen binnen 48 dagelijks terugkerende activiteiten. In totaal hebben 166 openbaar apothekers meegedaan aan dit onderzoek en werden drie onderscheidende groepen aangetroffen op basis van taakprioritering. Activiteiten behorende tot FPZ werden met name als hoge prioriteit gekenmerkt. De grootste groep openbaar apothekers kenmerkte FPZ als het belangrijkste. Kwaliteitsmanagement werd ook belangrijk geacht. In tegenstelling werden logistiek en apotheekmanagement door alle groepen als relatief onbelangrijk ervaren. Dit onderzoek toont aan dat taakprioritering door openbaar apothekers gezien kan worden als een faciliterende factor om de transitie te maken richting FPZ. Om de hoeveelheid beschikbare tijd voor FPZ voor openbaar apothekers te vergroten, moeten activiteiten behorende tot logistiek en apotheekmanagement zoveel mogelijk gedelegeerd worden naar ondersteunend personeel.

In **Hoofdstuk 4** worden resultaten van een kosteneffectiviteit- en kosten-utiliteitsstudie studie getoond met data afkomstig van een gerandomiseerde klinische trial betreffende de medicatiebeoordeling (MBO) uitgevoerd door openbare apothekers. In totaal hebben 588 patiënten meegedaan aan dit onderzoek met 294 patiënten in de interventiegroep en 294 in de controlegroep. Na een periode van zes maanden waren de gemiddelde zorgkosten per patiënt in de controlegroep €4189 ± 6596 en €4008 ± 6678 binnen de interventiegroep (inclusief de kosten van de MBO uitgevoerd door een openbaar apotheker). De kosten van een MBO waren rond de €199 ± 67, dat leidt tot een gemiddelde incrementele kostenbesparing van €181 in de interventiegroep vergeleken met de controlegroep. Daarnaast is gevonden dat de MBO leidt tot een lichte verbetering van de kwaliteit van leven gemeten middels de *EuroQoL - Visual Analogue Scale (EQ-VAS)* en een daling van het aantal klachten met impact op het dagelijks functioneren van de patiënt. Kwaliteit van leven liep wel terug na een periode van zes maanden in de interventiegroep gemeten middels de EQ-5D-5L. De waarschijnlijkheid dat de MBO kostenbesparend is, is > 90%. Dit hoofdstuk toont daarom aan dat het effect van de MBO op de kwaliteit van leven van patiënten inconsistente resultaten toont, maar dat het wel kostenbesparend is vanuit een maatschappelijk perspectief. Daarom toont dit onderzoek aan dat FPZ uitgevoerd door openbaar apothekers de moeite waard kan zijn om te stimuleren vanuit een maatschappelijk perspectief.

In **Hoofdstuk 5.1** beschrijven we een studie dat de focus legt op voorkeuren en ervaren belangrijkheid van het grote publiek voor diensten vanuit de openbare apotheek. Dit onderzoek werd verricht middels een online enquête onder 1500 leden van het Consumentenpanel Gezondheidszorg. Voor dit onderzoek hebben we ons speciaal gericht op de vragen die betrekking hadden op voorkeuren en ervaren belangrijkheid van openbare apotheekdiensten. In totaal hebben 516 panelleden de vragen rondom deze twee onderwerpen volledig beantwoord. Analyse van de resultaten toont aan dat de meerderheid een voorkeur heeft voor gemak boven FPZ bij openbare apotheekdiensten. Echter, deelnemers vonden het wel belangrijk dat openbaar apothekers FPZ aanbieden. Dit is hoogstwaarschijnlijk afkomstig vanuit een maatschappelijke beredenering, waarbij deelnemers de behoeften van anderen of mogelijk hun eigen toekomstige behoefte mee in overweging nemen. Deelnemers met een sterkere voorkeur voor FPZ dan gemak waren over het algemeen ouder en gebruikte meer medicijnen. Dit betekent dat het noodzakelijk is voor openbaar apothekers om zowel in de behoeften betreffende gemak te voorzien, maar tegelijkertijd ook FPZ moeten aanbieden. Openbaar apothekers met een relatief oudere patiëntenpopulatie met relatief veel geneesmiddelgebruik moeten meer FPZ aanbieden om aan de behoeften te voldoen.

**Hoofdstuk 5.2** gaat dieper in op de voorkeuren betreffende openbaar apotheekservices, maar legt de nadruk op voorkeuren voor meer geavanceerde services door chronische geneesmiddelgebruikers. Deze hebben mogelijk ook meer ervaringen met openbaar apotheken dan de onderzoekspopulatie van **hoofdstuk 5.1**. Voor dit onderzoek is gebruik gemaakt van een *discrete choice experiment (DCE)* met de nadruk op de latente klasse analyse. De vragenlijst waar de DCE onderdeel van is, is afgerond door 2462 panelleden. Het onderzoek identificeerde in totaal vier verschillende groepen op basis van voorkeuren. De eerste groep had een sterke voorkeur voor online dienstverlening, de tweede groep had niet een duidelijke voorkeur voor nieuwe diensten, de derde en vierde groep hadden een voorkeur voor verschillende FPZ gerelateerde diensten. De derde groep had een voorkeur voor het ter hand stellen van receptgeneesmiddelen voor kleine kwalen, zonder een recept van een arts. De vierde groep had een voorkeur voor *point-of-care-testing (POCT)* door de openbaar apotheker. Patiënten die apotheken bezoeken kunnen hiervoor uiteenlopende redenen hebben. In de dagelijkse praktijk zullen openbaar apothekers daarom zowel gemak- als FPZ-diensten moeten aanbieden.

De gevonden resultaten vanuit de verschillende hoofdstukken worden geplaatst binnen een breder perspectief. Hieruit voortvloeiend worden adviezen gegeven voor zowel openbaar apothekers en de beroepsgroep, alsook aan verschillende beleidsmakers. Dit komt voort uit verschillende factoren die van invloed zijn op de implementatie van FPZ in de dagelijkse praktijk. Deze worden besproken volgens het COM-B model. Het COM-B model is bruikbaar in het verkrijgen van inzichten in

randvoorwaarden die noodzakelijk zijn om gedragsverandering te realiseren. Deze omvatten *capability*, *opportunity* en *motivation*. Daarnaast wordt aan de hand van het verandermodel van Kotter een aantal suggesties gedaan voor vervolgstappen in het verandertraject van openbaar apothekers.

Openbaar apothekers moeten erop toezien dat de receptengang efficiënt is ingericht en gepaard gaat met goede voorlichting aan de balie. De voorkeuren van de patiënt voor korte wachttijden en ruime openingstijden zijn hierin leidend. Dit is een noodzaak voor het implementeren van FPZ in de toekomst. Daarnaast moeten openbaar apothekers bekwaam worden in de uitvoering van FPZ. Hiervoor zijn meerdere vaardigheden en kennis noodzakelijk. Hiervoor moet men onder andere denken aan communicatietechnieken, maar ook aan klinisch redeneren. In de huidige curricula is meer aandacht voor dergelijke aspecten en worden huidige studenten farmacie beter opgeleid om FPZ uit te voeren. Echter, openbaar apothekers die dit niet in de opleiding hebben meegekregen moeten deze kennis en vaardigheden middels nascholing vergaren. Tevens moet er meer aandacht uitgaan naar gezamenlijk onderwijs tussen farmacie- en geneeskundestudenten. Hiermee zal ook toekomstige samenwerking tussen beide disciplines worden gefaciliteerd. Het kennisniveau van apothekersassistenten moet complementair zijn aan de ambities van de apothekersprofessie, waarbij apothekersassistenten nu meer gefocust zijn op de receptengang. Apothekersassistenten moet daarom meer kennis krijgen van FPZ, maar bijvoorbeeld ook verschillende activiteiten rondom apotheekmanagement. Op deze manier kunnen zij de openbaar apotheker zo goed mogelijk ondersteunen bij de implementatie en uitvoering van FPZ.

In de dagelijkse praktijk zal het niet mogelijk zijn om alle tijd te besteden aan activiteiten die te maken hebben met FPZ. Echter, vergeleken met huisartsen besteden apothekers meer tijd aan activiteiten waarbij geen sprake is van direct patiëntcontact. Met name taakgebieden als de receptengang en apotheekmanagement eisen veel tijd op. Met name de hoeveelheid tijd die besteed wordt aan de receptengang door openbaar apothekers kan duiden op een tekort aan apothekersassistenten. Daarnaast moet kritisch gekeken worden naar iedere activiteit of deze de hoeveelheid besteedde tijd waard is. Het huidige bekostigingsmodel is volume gedreven en gebaseerd op de hoeveelheid recepteregels die worden ter hand gesteld aan patiënten. Een dergelijk bekostigingsmodel is daarom niet stimulerend om de nadruk te leggen op de uitvoering van FPZ. Het huidige bekostigingsmodel is daarom aan herziening toe waarbij de openbaar apotheker gehonoreerd wordt voor het verrichten van FPZ en de toegevoegde waarde die daarmee gepaard gaat voor de maatschappij. Een model waarbij de openbaar apotheker wordt gehonoreerd middels een mix van een beschikbaarheidstarief en een vergoeding per FPZ-prestatie lijkt hierin het meest voor de hand liggend. Daarnaast kan men overwegen om een component

hieraan toe te voegen waarin de apotheker extra verdiensten kan halen uit behaalde resultaten van geleverd FPZ.

Het huidige bedrijfsmodel van de openbare apotheek is al enige jaren onveranderd. Om de openbaar apotheker in staat te stellen de taken beter te verdelen, bieden samenwerkingsverbanden en eigenaarschap van verschillende openbaar apotheken een mogelijkheid. Door deze vorm van opschalen kunnen openbaar apothekers tijd besparen door een bepaalde herverdeling door te voeren. Daarnaast kan verwacht worden dat openbaar apothekers tijdsefficiënter zullen worden in de aan hen toebedeelde taakgebieden en de kwaliteit hiervan toeneemt. Daarnaast kunnen openbaar apothekers het *hub-and-spoke* model overwegen, waarbij ook de receptengang en distributie wordt gecentraliseerd en opgeschaald in de hub. Tegelijkertijd blijft het zorgaanbod dichtbij de patiënt middels de *spokes*. De *spokes* kunnen fysiek op verschillende plekken worden geplaatst, zoals huisartspraktijken. Een andere mogelijkheid is het scheiden van distributie en FPZ, waarbij FPZ volledig vanuit de huisartsenpraktijk wordt aangeboden door apothekers die daar in loondienst zijn. De verwachting is dat deze apothekers substantieel meer tijd aan FPZ kunnen besteden, maar de kwaliteit van het zorgstelsel niet toeneemt. Immers leidt een dergelijke inrichting van de zorg tot ongewenste fragmentatie en geniet het zorgstelsel dan minder van de combinatie van expertises van de openbaar apotheker, waarbij distributie en FPZ samenkomen.

De behoefte van de patiënt is een sterke motivator voor openbaar apothekers. Patiënten die ervaring hebben met FPZ uitgevoerd door openbaar apothekers zijn tevreden. Daarnaast zijn patiënten die een positieve ervaring hebben, eerder geneigd in de toekomst een beroep te doen op FPZ aangeboden door een openbaar apotheker. Hiermee kan een positieve feedbackloop tot stand komen dat openbaar apothekers sterk kan motiveren. Tegelijkertijd moeten openbaar apothekers continue de meerwaarde van FPZ communiceren met patiënten, maar ook met andere zorgprofessionals. De verwachting is dat hiermee de vraag naar FPZ zal stijgen, maar ondersteuning vanuit huisartsen zal de openbaar apotheker beter in staat stellen FPZ in de praktijk te implementeren.

Concluderend, bij de openbaar apotheker ligt een groot potentieel om zowel op individueel- alsook op maatschappelijk niveau van grote betekenis te zijn als hij zich meer kan richten op FPZ. Tegelijkertijd zien we dat deze potentie niet ten volste wordt benut. Met dit proefschrift zijn een aantal factoren verder onderzocht die mogelijk belemmerend of faciliterend werken bij het verder positioneren van de openbaar apotheker. Het is nu tijd om openbaar apothekers in de gelegenheid te brengen deze rol te vervullen, maar tegelijkertijd ook aan openbaar apothekers om deze rol actief op te pakken.

## Woord van dank

Afgerond! Vanaf nu gaat mijn eigen tijdsbesteding er ook weer wat anders uit zien. Met het schrijven van dit dankwoord sluit ik een periode af waarin ik veel heb geleerd en mijzelf verder heb ontwikkeld. Nooit gedacht dat ik dit traject zou ondernemen. Toen ik farmacie studeerde aan de Universiteit Utrecht kwam ik natuurlijk veel in contact met wetenschappelijk onderzoek. Eén van de primaire conclusies uit mijn eigen onderzoeksstage bijvoorbeeld was dan ook: "Ik ga nooit promotieonderzoek doen!" Destijds bestond wetenschappelijk onderzoek doen voor mij uit *nitty-gritty*, stroperig en moeizaam werken, hopende dat er aan het eind van de rit een interessant resultaat uit komt. Hoewel deze aspecten wel degelijk horen bij wetenschappelijk onderzoek, ben ik gaandeweg ook steeds meer de positieve aspecten gaan zien en begrijpen. Zo is het een perfecte manier om een bijdrage te leveren aan een onderwerp dat je aan het hart gaat. Daarnaast biedt promoveren nog zoveel meer in het kader van zelfontwikkeling en het leren kennen van leuke en interessante mensen.

Het eerstgenoemde punt is daarom ook voor mij een primaire reden om te starten met dit promotietraject. Toen ik bezig was met de studie farmacie leerde ik hoe je als openbaar apotheker een patiëntgerichte zorgrol kon oppakken. Echter, tijdens de stages en vakantiewerk in de openbare farmacie zag ik dat de praktijk weerbarstiger is. Vanwege verschillende, allemaal valide, redenen zag ik de apotheker niet als de zorgprofessional, zoals dat tijdens de studie farmacie geleerd werd. Dit vond (en vind ik nog steeds) erg jammer. Daar wilde ik wat aan doen en dan niet alleen proberen het zelf anders te doen in de praktijk, maar ook de beroepsgroep proberen te helpen verder te komen.

Toen kwam jij in beeld **Marcel Bouvy**. Begin 2013, ongeveer een half jaar voor mijn afstuderen, had ik een afspraak met jou gemaakt om dit alles te bespreken. Hetgeen ik je vertelde, herkende jij ook direct. We belandde direct al in een gesprek waarmee we de diepte in gingen betreffende het vakgebied en de stip aan de horizon. Waar moet de apotheker nou staan over een aantal jaar? Uiteraard komen dan ook de uitdagingen waar apothekers voor staan aan bod. Uitdagingen zijn er genoeg, zowel op macro- alsook op microniveau. We moeten meer te weten komen van deze uitdagingen en, belangrijker nog, hoe we deze het beste aan kunnen pakken. Op een gegeven moment keek jij mij aan en vroeg je aan mij of ik dit niet middels onderzoek, mogelijk zelfs promotieonderzoek, verder zou willen oppakken? Na een nachtje slapen (of twee), heb ik besloten dit avontuur aan te gaan. Er lag geen onderzoeksvoorstel klaar, dus deze moest eerst nog geschreven worden. Uiteindelijk is dit voorstel geschreven met een aantal onderliggende onderzoeksvragen. Toen begon ik al te merken, zeker omdat het onderwerp mij zo aangaat, dat onderzoek doen best leuk is. Vele gesprekken zouden nog volgen

en deze heb ik altijd als zeer prettig, leerzaam en leuk ervaren. Jij hebt me altijd geprikkeld om door te blijven gaan en ik heb de samenwerking als ontzettend goed ervaren. Marcel heel erg bedankt!

Het schrijven van een onderzoeksvoorstel en interessante onderzoeksvragen is een begin, maar dan ben je er nog niet. Onderzoek doen kost geld, dus we hebben een financier nodig. In november van 2013 ben ik begonnen als flex-apotheker bij **Mediq Apotheken**, onder het toezicht van **Sandra Hobbelt**. Mediq Apotheken, als één van de grote spelers in de markt, zou wellicht interesse hebben om mijn onderzoek te financieren. Dit hebben we een paar keer besproken. Sandra en jouw oprechte interesse en de ruimte die jij vervolgens hebt geboden, hebben mij verder geholpen. Hiervoor ben ik jou ontzettend dankbaar.

Wie je dan ook zeker moet ontmoeten is **Eduard Lip**. Dus ik op een dag naar het toenmalig Mediq pand aan de A2 om Eduard te ontmoeten. Dit bleek een erg interessante ontmoeting waarin ik zowel jouw visie op de farmacie, mede onderbouwd met cijfers uit de markt leerde kennen. Een visie waar ik nu nog steeds vaak op terugval. Daarnaast heb ik dankzij jou Eduard, ook een voorliefde gekregen voor whiteboards en zaken zoveel mogelijk visueel te maken. Na deze eerste ontmoeting zouden wij elkaar nog vaker spreken tot we op een gegeven moment besloten dit maandelijks terug te laten komen. Onderzoeksvoorstellen, vraagstellingen en uiteraard ook de resultaten heb ik altijd graag met jou gedeeld, gezien dit vaak ook tot nieuwe en bruikbare inzichten leidde. Op een gegeven moment heb ik besloten dat ik meer op beleidsmatig niveau wilde werken en wist jij ook een plek voor mij te creëren op het hoofdkantoor van Brocacef/BENU, dat inmiddels Mediq Apotheken had overgenomen. Op die manier heb jij voor mij op meerdere fronten een belangrijke rol gespeeld. Eduard, van harte bedankt voor al jouw goede zorgen!

Daarbij wil ik uiteraard **BENU Apotheken** als financier gedurende het grootste deel van mijn promotieonderzoek bedanken. **BENU Apotheken** is de grootste apotheekketen van Nederland. Als marktleider is het de taak om de ontwikkelingen in de sector en beroepsgroep vorm te geven. Ik ben dankbaar voor het feit dat **BENU Apotheken** dit ook middels mijn promotieonderzoek wilt doen.

Daarnaast wil ik tegelijkertijd de **KNMP** bedanken voor het overnemen van de rol van financier in de laatste fase van het promotietraject. Met name **Anoushka Schut** wil ik persoonlijk bedanken voor het bieden van de ruimte die ik nodig had om mijn promotietraject af te ronden.

Een dankwoord is niet compleet zonder mijn copromotor te benoemen. **Ellen Koster**, met jouw komst als copromotor was ik zo ontzettend blij. Jouw ervaring met praktijkonderzoek in de openbare farmacie is groot en hierover sparren met

jou heb ik daarom als erg prettig en leerzaam ervaren. Ik ben blij dat jij onderdeel bent geweest van dit traject. Daarom, Ellen bedankt!

**Anke Hövels** kan niet ontbreken van mijn dankwoord. Nadat het promotietraject serieuze vormen begon te krijgen, was het tijd om een copromotor te zoeken. Die rol wilde jij graag op je nemen. Ik kende je al van de studie farmacie waarin je me ooit het principe van verdisconteren in “Jip-en-Janneke-taal” hebt proberen uit te leggen. Je bent een enorm toegankelijk en prettig persoon om mee samen te werken en ik ben jou ontzettend dankbaar voor de rol die jij in het begin gespeeld hebt. Na jouw vertrek bij de Universiteit Utrecht ben je meer op afstand betrokken geweest bij mijn proefschrift. Ik wens je het allerbeste en hopelijk komen we elkaar nog eens tegen.

**Roland Wybrands**, jij kan niet ontbreken van dit dankwoord. Na een jaar als flex-apotheker te hebben gewerkt, kreeg ik de mogelijkheid om de vervolgopleiding tot openbaar apotheker specialist te volgen. Dit moet je echter wel doen onder het toezicht van een apotheker opleider en zo kwam ik bij jou in Alpen a/d Rijn terecht in BENU Apotheek Kerk en Zanen. Jouw sterke kant zit in het procesmatig denken in de apotheek en ik heb daar ontzettend veel van geleerd. Dit kwam ook erg goed van pas met het onderzoek dat ik deed. Naast de serieuze kant hebben we ook vaak genoeg met elkaar gelachen. Ik kijk terug op een erg leuke tijd in de apotheek bij jou en ben je dankbaar voor alles dat ik heb geleerd van je en de leuke momenten die we samen hebben beleefd.

Het eerste onderzoek, zoals u ongetwijfeld hebt gelezen, heb ik uitgevoerd met de hulp van een smartphone applicatie. Ik ben niet een digibeet, maar een app maken is toch wat anders. Na wat zoeken ben ik uiteindelijk terecht gekomen bij **Umenz**, in de kundige handen van **Piet van der Wal**. Piet, de samenwerking met jou is enorm goed bevallen! Wat hebben we toch enorm geworsteld met het “*Android probleem*”, maar uiteindelijk een goed product geleverd dat zeker zijn meerwaarde heeft getoond!

In dit kader verdient nog een persoon de nodige erkenning. Namelijk **Rogier Hofman**. Hoewel de app aan de voorkant werd gebouwd, moet aan de achterkant daadwerkelijk alle data binnenstromen op een server en op een juiste manier gearhiveerd worden, anders heb je uiteindelijk niets om te onderzoeken. Rogier, in dit kader leerde ik jou kennen en het heeft me, tot op de dag van vandaag, altijd verbaasd hoeveel kennis en inzicht jij hebt. Daarom ben ik jou ook ontzettend dankbaar voor jouw hulp en meedenken.

Gedurende het promotietraject heb ik tijdens een periode van negen maanden **Jurjen Geljon** als onderzoeksstagiair mogen begeleiden. De samenwerking met

jou is goed bevallen. Toen je begon had je een beperkt beeld van de openbare apotheek, maar in korte tijd had je de materie eigen gemaakt. Een knappe prestatie! Daarnaast heb je ook tijdens een van de PRISMA symposia gepresenteerd en kreeg ik daar vele positieve reacties van. Jurjen, ik wens je al het goeds in jouw professionele leven en bij deze wil ik jou ook bedanken voor al jouw toewijding aan mijn onderzoek.

Bij deze wil ik ook alle leden van de leescommissie, **Toine Egberts, Liset van Dijk, Roger Damoiseaux, Bart van den Bemt** en **Aukje Mantel** hartelijk bedanken voor het lezen en goedkeuren van mijn proefschrift. Ik ben ervan overtuigd dat de commissie een mooie afspiegeling is van waar de openbare farmacie voor staat en wat deze in de toekomst kan bereiken.

**Christiaan Vos** mag niet ontbreken van mijn proefschrift. Op de basisschool hebben we elkaar leren kennen, samen de middelbare school doorlopen, vervolgens samen een jaar HBO en samen farmacie gestudeerd. En moet je ons nu zien, twee van die volwassen mannen! Maar we blijven lol maken alsof we nooit ouder zijn geworden. Chris, je bent een vriend voor het leven! Ik kan altijd op je rekenen en altijd op je terugvallen. Tijdens de verdediging van dit proefschrift zul je mij als paranimf bijstaan, wat ben ik blij dat jij er bent.

Nu we het toch over paranimfen hebben, moet ik ook mijn bloedeigen broertje **Stefan van de Pol** noemen. Toen ik vroeg of jij paranimf wilde zijn, vond je dit toch spannend. Toch ben je geknipt voor deze rol! We zijn natuurlijk samen opgegroeid en gelukkig hebben we altijd onwijs goed contact gehouden en zoeken we elkaar nog steeds met regelmaat op. Nu ben jij sinds kort vader geworden van mijn allerliefste nichtje Féline. Samen met Denise Veltman zijn jullie een echt gezin! Ik ben trots op jou en vind het mooi wat je allemaal hebt bereikt.

Speciaal wil ik mijn ouders, **Gerrit** en **Annie van de Pol** bedanken. Dankzij jullie ben ik geworden wie ik ben en kan ik terugkijken op een fantastische jeugd. Jullie staan altijd voor me klaar. In goede tijden hebben we samen ontzettend genoten. En in zware tijden hebben we ook veel steun aan elkaar. Je hebt je ouders niet voor het kiezen, maar als dat wel zo zou zijn, kies ik direct weer voor jullie!

De allerlaatste woorden van dit dankwoord gaan naar mijn lieve vriendin. Lieve **Ilse Mouws**. Mijn allerliefste **Olakabola!** Wat ben ik toch ontzettend blij dat jij in mijn leven bent gekomen. We wonen nu al een tijdje samen in Rotterdam en hebben de sprong gewaagd om samen een huis te kopen! Vanaf juli 2021 zijn we de trotse eigenaars van ons huisje aan de Azaleastraat in Rotterdam. Ik heb ontzettend veel zin in ons avontuur samen. Ik kan me geen beter persoon voorstellen die ik liever aan mijn zijde wil hebben. Op ons! En op de toekomst! Op naar het avontuur!

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## About the author

Jeroen van de Pol was born on the 17th of October 1988 in Veenendaal, the Netherlands. He attended secondary school at the Christelijk Lyceum Veenendaal from 2001 to 2006. He attended Life Sciences and Chemistry at the Hogeschool Utrecht; University of applied sciences for one year and then switched to Pharmacy at Utrecht University and attended between 2007 and 2013. In 2013, he obtained his Master of Science in Pharmacy. In his last year at the Utrecht University, he also began working on his PhD research and he officially started as a PhD candidate at Utrecht University in 2015.

After obtaining his Pharmacy degree, he started working as a community pharmacist for Mediq Apotheken. He worked in several community pharmacies owned by Mediq Apotheken during a year. After that, he started the post-academic advanced community pharmacist education program in BENU Apotheek Kerk en Zanen in Alphen a/d Rijn in the Netherlands. He worked in the community pharmacy setting till 2017, when he was presented with an opportunity to work at the headquarters of BENU Apotheken in Maarssen, the Netherlands. There, he took on the role of performance & compliance manager. During this period, he focused predominantly on negotiations with healthcare insurance companies and monitoring business performance and compliance within BENU pharmacies on agreements made with healthcare insurance companies. After a couple of years he decided that he wanted to focus more on promoting the interests of the pharmaceutical sector and community pharmacists in general. In 2020, he was presented with the opportunity to work for the Royal Dutch Pharmacists Association (KNMP), where he is currently working.



After completion of this PhD thesis, he aims to continue promoting the interests of the pharmaceutical sector and the position of community pharmacists in the Netherlands. In the upcoming years, he aims to combine the knowledge obtained from this PhD thesis with his work at the KNMP and his personal goal of achieving the recognition that community pharmacists deserve as full-fledged healthcare providers.

Jeroen currently lives in Rotterdam, the Netherlands. Together with Ilse Mouws and their two cats, Fien and Bowie.

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