Evaluating the implementation of pharmacists in Dutch primary care, a feasibility study

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List of abbreviations
CP: Clinical pharmacist
GP: General practitioner
GPIS: General practitioner information system
PN: Practice nurse

Artificial Intelligence usage disclaimer
This study was edited using an AI-powered rewrite command using ChatGPT to improve the quality and readability. The author remains fully responsible for its content.

ABSTRACT

Background: The introduction of the clinical pharmacist (CP) as an interprofessional collaboration model in general practices and health centres, has demonstrated potential benefits in medication safety and cost reduction. However, implementation in the Netherlands faced barriers. The POINT-i project aims to overcome these and implement this model. Implementation requires feasible and relevant evaluation. This pilot study assesses the feasibility and relevance of outcome parameters used for evaluation of implementation of the CP role across 12 primary care practices.

Methods: A prospective feasibility study was conducted in two health centres, focusing on five implementation outcomes: adoption, acceptability, fidelity, implementation costs and sustainability. Ten outcome parameters were constructed and assessed for feasibility and relevance. Quantitative and qualitative methods were used for collection and analysis of supporting data. Feasibility was evaluated based on data availability, quality, usability, collection process, and time investment. Relevance was determined based on expert opinion.

Results: Eight outcome parameters were found feasible and relevant. Challenges were identified in data collection due to missing data extraction tools and incomplete data. One parameter was irrelevant as required data were invalid. Another was concluded unfeasible for lack of available data. Involved experts raised concerns about required time investment.

Conclusion: Most outcome parameters proved suitable for evaluating implementation of the CP role using. Two parameters should be discontinued. Advice for adjustments to other parameters was given where needed. With these changes all implementation outcomes can be well evaluated. These findings will support the evaluation of implementation of the CP in primary care practices.

Introduction

Interprofessional collaboration is essential for delivering quality healthcare. One example of interprofessional collaboration in primary care is the concept of a clinical pharmacist (CP) working in general practices and health centres [1]. This interprofessional collaborative model can lead to improved medication safety and a reduction of healthcare costs [2-5]. Countries like the United Kingdom have successfully implemented the model nationwide [6]. The model was introduced in the Netherlands as part of a clinical study [7]. Stakeholders are supportive of interprofessional collaboration [8,9]. Despite this, implementation and scaling of this collaborative care model in the Netherlands has so far presented challenges [7,10]. Three major barriers were identified: lack of ownership amongst professional associations, absence of concrete and sustainable financing and the need for a structural training program including apprenticeships [7].

The POINT-i project aims to foster the implementation of this collaborative model by overcoming these challenges. This includes the roll-out of a post-graduate training program for CPs working in a general practice or health centre, which was started January 2025 [7]. In health centres, general practices, pharmacies and other healthcare providers are situated in one building. The CP performs four key activities: Conducting pharmacotherapeutic consultations for patients, offering interprofessional advice, managing quality projects about pharmacotherapy and providing in-house education for healthcare professionals. To ensure the successful adoption of the CP role, evaluation of its implementation is essential and aids in broader and sustainable implementation of this interprofessional collaborative care model.

This pilot study aimed to evaluate the feasibility and relevance of a set of implementation outcome parameters in two health centres. Findings of this study serve as a foundation for the implementation evaluation of the 12 general practices and health centres that started with a CP participating in the POINT-i project.

Methods

Study design and setting

This feasibility study involved a prospective evaluation of the CP implementation in two health centres testing a set of implementation outcome parameters, serving as a pilot for the 12 general practices and health centres. The first health centre was selected because it has had a CP in place for approximately one year, providing a full year of data. Aligning with the anticipated first-year performance of the 12 CPs, allowing for meaningful comparisons. This health centre uses a new General Practitioner Information System (GPIS) that is still under development. To address potential limitations in testing the full set of outcomes, a second health centre using the most common GPIS in the Netherlands was also available for the study. This centre's CP was part of the original POINT study that started in 2014 and has years of experience [2].

Implementation outcomes

The implementation is evaluated using five implementation outcomes [11]:

- Adoption: The extent to which the CP role and its key activities are integrated into the daily operations of general practices.

- Acceptability: The degree to which the CP role is perceived as valuable by patients and healthcare professionals.

- Fidelity: The consistency of CP activities with the predefined key activities, including patient consultations, interprofessional collaboration, quality improvement initiatives, and training sessions.

- Implementation costs: The financials required to introduce and sustain the CP role.

- Sustainability: Indicators demonstrating the potential for the CP role to become permanent in primary care settings.

Selection of outcome parameters

To evaluate the five implementation outcomes in practice, ten outcome parameters were put developed based on expert opinion of the researchers in the POINT-i project team. Each outcome parameter relates to one or more implementation outcomes (Table 1).

Outcome parameters:

1. Number of pharmaceutical consultations by the CP and type of consultation (short/long/home visit/medication review) from the past three months.
2. Content of the CP consultations from the past three months. Including the number of set and achieved patient goals and follow-up.
3. Degree of task reallocation (taking over care, reduction of workload for the general practitioner (GP), practise nurse (PN) or community pharmacist or creating new work) in the past three months.
4. Number of consultations by the GP regarding medication-related questions within the past year (pre- and post-assessment).
5. Number of referrals to the CP clinic hours, total and per referrer (GP, assistant, PN, community pharmacist, other) in the past three months.
6. Number and content of medication-related questions from colleagues and advice given in the past three months.
7. Patient satisfaction with pharmaceutical care services of the CP in the past two months.
8. Healthcare professional satisfaction, experienced challenges regarding implementation of the CP and perceived impact on workload.
9. Number and type of quality projects of the past year.
10. Number and content of internal and/or regional educational sessions of the past year.

Table 1: Breakdown of how implementation outcomes correspond to outcome parameters.

Implementation outcomes	**Outcome parameters**
Adoption	5, 7, 8
Acceptability	7, 8
Fidelity	1 to 6, 9, 10
Implementation costs	1 to 4
Sustainability	8

Selection of feasibility parameters

The feasibility of these parameters was validated in the pilot centres. No established method is present in literature regarding the feasibility of implementation within healthcare interventions. Therefore, existing feasibility parameters of a similar feasibility study were used as examples and adjusted to fit this study [12]. The parameters covered four domains: Data availability and willingness to share (A), data quality and usability (B), data organization and access (C) and time investment (D). A complete overview of the feasibility parameters and the associated domain is shown in appendix 1.

Data collection
A single researcher (JdG), under supervision of senior researchers (AH and TK), collected data in a five-week period (December 2024-February 2025) in two health centres. Due to limited data collection options in health centre 1, health centre 2 was also included. Table 2 outlines which outcome parameter were tested in which health centre. After data collection, the feasibility parameters were assessed for every outcome parameter. During a meeting with involved experts the relevance of the outcome parameters was discussed and established.

Table 2. Overview of the researched health centres, the outcome parameters tested, workload of CP and the GPIS used.

Health centre	Tested outcome parameter	Workload CP (days/week)	General practitioner information System (GPIS)
Health centre 1	2, 3, 7, 8, 9, 10	2.5	Healthconnected
Health centre 2	1, 2, 4, 5, 6	2	Medicom

Quantitative data were extracted from the GPIS including metrics such as the number and type of CP consultations, changes in task distribution among healthcare professionals, interprofessional interactions. Qualitative data were gathered through surveys and evaluation forms completed by healthcare professionals and patients. Data collection and assessment per outcome parameter was done as follows and notes were made by the researcher about the feasibility of data collection and assessment per parameter:

1. **Number of pharmaceutical consultations by the CP and type of consultation (short/long/home visit/medication review) from the past three months:** Extracted from the GPIS.
2. **Content of the CP consultations from the past three months. Including the number of set and achieved patient goals and follow-up**: All consultations of the past three months were selected via the GPIS registration. For each patient, the identified healthcare needs, goals set, and goals achieved were analysed. A sample of five consultations was reviewed by the CP to assess the reliability of the researcher's conclusions.
3. **Degree of task reallocation (taking over care, reduction of workload for the GP, PN or community pharmacist or creating new work) from the past three months:** All consultations from the selection mentioned above were assessed, identifying which professional would have conducted the consultation without the presence of the CP. Five samples were reviewed by a GP to validate reliability of the researcher's judgement.
4. **Number of consultations by GPs regarding medication-related questions from the past year (pre-and post- assessment):** Extracted from the GPIS using ICPC codes for medication misuse, side effects, and concerns about medication.
5. **Referrals to the CP clinic hours, total and per referrer from the past three months:** Extracted from the GPIS. Noting the total and the referrer (GP, assistant, PN, community pharmacist or CP).
6. **Number and content of medication-related questions from colleagues and advice given from the past three months**: Retrieved from notes or consultations from the GPIS.
7. **Patient satisfaction with pharmaceutical care services of the past two months**: Assessed through a questionnaire (Appendix 2) sent by email.

8. **Healthcare professional satisfaction, experienced challenges regarding implementation of the CP and perceived workload impact**: Was evaluated using forms (Appendix 3). Existing forms from a similar study were used as examples and adjusted to fit this study [13]. These include a disturbance diary to identify and reflect on process issues [14]. Evaluation forms were completed by three GPs, one PN, one community pharmacist and the CP.
9. **Number and type of quality projects of the past year:** Were provided by the CP using an Excel template.
10. **Number and content of training sessions of the past year**: Were provided by the CP using an Excel template.

Data analysis and assessment

Issues regarding collection and analysis of data were noted and form the basis to the assessment of the feasibility parameters. Assessment of the feasibility parameters determined the scoring of feasibility of the outcome parameters. Feasibility was scored from not feasible ("-") to feasible ("+++"). Limited feasibility was indicated by ("+/-") and adjustment of the process is required. The researcher assessed the feasibility scoring based on their expertise and outcomes of feasibility parameters.

Besides feasibility, relevance of outcome parameters is of consideration. Relevance of each outcome parameter was assessed by a group of experts involved in the CP training as relevant (+) or irrelevant (-). The combination of feasibility and relevance determined to which extent the outcome parameters will be used in the evaluation of the 12 general practices and health centres.

<u>Supporting data analysis</u>

Supporting data were analysed using a combination of quantitative and qualitative methods. Quantitative data were analysed using descriptive statistics to calculate frequencies and percentages. Thematic analysis was used for qualitative data identify recurring themes, such as barriers to implementation, challenges, and the perceived value of the CP role. Supporting data are not presented as results as they only serve to assess the feasibility of the outcome parameters.

Ethical considerations

This study followed strict data protection guidelines. All patient data were anonymized to protect confidentiality. Identifiable data were exclusively utilized within the physical and digital boundaries of the involved health centres. No non-METc statement was required as it serves as a pilot study in the context of a research internship. The follow-up study regarding the full evaluation of implementation will apply for a non-METc statement.

Results

Outcomes of the feasibility parameters and relevance of outcome parameters is shown in table 3. Below, the feasibility and relevance of each outcome parameter is further elaborated on.

Table 3. Feasibility and relevance of outcome parameters. Feasibility parameters are divided in domains, indicated by letters A-F. A = availability of data and willingness to share. B = Quality and usability of data. C = Organisation of data collection and use of automated processes. D = required time investment. When a domain includes multiple feasibility parameters, they are indicated by A1, A2 etc.
GP = General practioner, GPIS = General Practioner Information System, CP = Clinical pharmacist.

Outcome parameters (and associated implementation outcomes)	**Summary of results per feasibility parameter and associated domain**	**Feasibility**	**Relevance**
1. Number of pharmaceutical consultations by the CP and type of consultation from the past three months. (Fidelity and implementation costs)	A: Data is available and healthcare professionals are willing to share it. B: Consult types are distinguishable. C1: Data collection is fully automatic. C2: Differences in GPIS are present. Data collection is not possible in Healthconnected. D: The required time investment is five minutes.	+++	+
2. Content of the CP consultations from the past three months. Including the number of set and achieved goals and follow-up. (Fidelity and implementation costs)	A: Data is available and healthcare professionals are willing to share it. B: Data is usable for the outcome parameter. C1: Data collection is not automatic. D: Time investment is 5 minutes per patient file, for a total of 140 minutes (together with parameter 3).	++	+
3. Degree of task reallocation (taking over care, reduction of workload for GP, practise nurse or community pharmacist) or creating new work in the past three months. (Fidelity and implementation costs)	A: Data is available and healthcare professionals are willing to share it. B: Data is usable for the outcome parameter. D: Time investment is 5 minutes per patient file, for a total of 140 minutes (together with parameter 3). In addition to this, a time investment of 15 minutes is required for the validity check by the GP.	++	+
4. Number of consultations by the GP regarding medication-related questions	A1: Data is available and healthcare professionals are willing to share it. A2: A13, A49, A84, A85, A86.02, P18.	++	-

within the past year (pre- and post-assessment). (Fidelity and implementation costs)	A3: The list of ICPC codes is exhaustible. B: Collected data has limited validity. C1: Data collection is partly automated. C2: Data collection is impossible in Healthconnected. D: Time investment is 15 minutes.		
5. Number of referrals to the CP clinic hours, total and per referrer (GP, assistant, PN, community pharmacist, other) in the past three months. (Adoption and fidelity)	A1: Data is not available. A2: Can not be answered. B: Can not be answered. C1: Can not be answered. C2: No differences in GPIS. D: Can not be answered.	-	+
6. Number and content of medication-related questions from colleagues and advice given in the past three months. (Fidelity)	A: Data is limitedly available, healthcare professionals are willing to share it. B: The data is sufficient for the set parameter. C1: Data collection is not automatic. C2: There are no differences between GPIS. D: The time investment is three minutes per question.	-/+	+
7. Patient satisfaction with pharmaceutical care services of the CP (Adoption and acceptability)	A1: Patients can complete the survey. A2: 40% are willing to do so. B1: Patients deemed the questions clear. B2: Patients deemed the questions relevant. B3: Patients felt the list of questions was complete. C: Surveys can be distributed through Microsoft Forms or an equivalent program. D: Setting up the survey requires 30 minutes.	+++	+
8. Healthcare professional satisfaction, experienced challenges regarding implementation of the CP and perceived workload impact (Adoption, acceptability and sustainability)	A: Completed forms were available and healthcare professionals were willing to complete them. B1: Some questions were not or insufficiently answered. B2: Completed forms were insufficient to draw conclusions. C: Providing physical copies of forms is inconvenient. D1: Time investment for the researcher was two hours. D2: Time investment for healthcare professionals was 15 minutes.	-/+	+

9. Number and types of quality projects in the past year (Fidelity)	A: Data is available, and CPs are willing to share it. B: Provided data contained sufficient information. D: Time investment for the CP was 10 minutes.	+++	+
10. Number and contents of training sessions in the past year (Fidelity)	A: Data is available, and CPs are willing to share it. B: Provided data contained sufficient information. D: Time investment for the CP was 10 minutes.	+++	+

Outcome parameter 1. Number of pharmaceutical consultations by the CP and type of consultation (short/long/home visit/medication review) from the past three months.

Outcome results

Data from Medicom shows that in a period of three months 191 consults took place (Table 4). Of these, 41% were short, 28% long, 1.5% were home visits, 1.5% long home visits, 24% telephone consultations and 4% medication reviews.

Table 4: Total consults and consults types (short/long/home visit/long home visit/telephone/medication review) of the CP of three months. Shown in amount and percentages.

Consultations	Total	Short	Long	Home visit	Long home visit	Telephone	Medication review
Amount	191	78	53	3	3	46	8
% of total	100%	41%	28%	1.5%	1.5%	24%	4%

Feasibility

Data were available in the GPIS as it is required for every consult to be categorized (Table 3). Healthcare professionals were willing to share the data provided a confidentiality agreement is signed. The procedure of data collection is fully automated by use of a query built in Medicom. After collection the data were exported to Excel for further use. The process required a time investment of five minutes. The procedure is adjustable to collect data for one month instead.

A similar procedure was impossible in the other GPIS, Healthconnected. Although data could be provided by an IT specialist, data collection tools were not available within the GPIS for any user.

No issues were encountered in data collection within Medicom but was impossible in Healthconnected. In conclusion, collecting data on total number and consult types of three months is feasible within Medicom (+++).

Relevance

A team of experts involved in the CP training discussed the results and concluded that this outcome parameter is relevant (+).

Outcome parameter 2. Content of the CP consultations from the past three months. Including the number set and achieved goals and follow-up.

Outcome results

Analysis of 28 patient files from the last three months in Healthconnected shows: of these patients, nineteen (68%) consulted the CP for evaluation of medication, including tapering off. For six (21%) side effects were the reason for consultation. Three patients (11%) consulted the CP for practical reasons concerning medication. Goals were set in all cases and followed up in 93%, with 72% followed up by the CP and 21% by other healthcare professionals.

Table 5: Contents (including healthcare needs, goals set and followed up on) of CP consultations shown in percentages.

Contents of CP consultations	N (%) of consultations
Evaluation/tapering off medication	19 (68%)
Side-effects	6 (21%)
Practical medication issues	3 (11%)
Goals set	28 (100%)
Goals followed up	27 (93%) (72% by CP, 21% by other healthcare professionals)

Feasibility

Although all necessary data were present in the patient files and healthcare professionals were willing to share the data, collection proved troublesome because neither GPIS allows for filtering by which healthcare professional was visited (Table 3). Instead, the CP's agenda was used to provide a list of patients. The collected data were usable in the context of the outcome parameter. Oftentimes contents of multiple consults were needed to acquire the necessary data. Automatic data collection was impossible as examination of the contents was required to obtain this data. Time investment for this outcome parameter was five minutes per patient file, for a total of 140 minutes for this three-month period.
Although data collection proved difficult for lack of a proper patient selection, all necessary data were acquired. The time investment for this parameter is significant. Hence collection of content of CP consultations from the past three months is feasible (++), but patient selection needs improvement.

Relevance

A team of experts involved in the CP training discussed the results and concluded that this outcome parameter is relevant (+). However, the team is concerned with the time investment.

Outcome parameter 3. Degree of task reallocation (taking over care, reduction of workload for the GP, PN or community pharmacist or creating new work) in the past three months.

Outcome results

Analysis for task reallocation of the same 28 consultations showed: 75% was classified as task reallocation of the GP, 18% of the community pharmacist and 7% of the PN. Of the consultations usually executed by the GP contained evaluation or tapering off medication (81%) and medication side-effects (19%). Task reallocation of the community pharmacist included practical issues regarding medication (60%) and side-effects (40%). Task reallocation of the PN concerned evaluation and tapering off medication (100%).

Table 6: Reallocation of consultations in percentages. Shown per healthcare professional and per consultation topic.

Task reallocation of:	N (%) of consultations	Consultation topics
General practitioner	21 (75%)	81% Evalutation/tapering off medication 19% Side-effects
Community pharmacist	5 (18%)	60% practical medication issues 40% Side-effects
Practice nurse	2 (7%)	100% Evalutation/tapering off medication

Feasibility

Required data were present in the patient files and healthcare professionals were willing to share it. Like outcome parameter 2, patient selection was problematic. Using the patient files to determine task reallocation requires manual reviewing of its contents. To ensure faithful assessment, five patient files were also examined by a GP. The GP agreed with the researcher on task reallocation in 100% of cases, reinforcing the validity of the results. The process cannot be automated, since it involves assessment by a professional. The time investment was five minutes per patient file. Additionally, the validity check took the GP 15 minutes.

Like outcome parameter 2, assessment of the degree of task allocation is feasible (++) when patient selection is resolved.

Relevance

A team of experts involved in the CP training discussed the results and concluded that this outcome parameter is relevant (+). However, the team is concerned with the time investment.

Outcome parameter 4. Number of consultations by the GP regarding medication-related questions within the past year (pre- and post-assessment).

Outcome results

Medicom showed 498 consultations marked with ICPC-codes relating to medication issues. Consultations on concerns about side-effects (A13) were registered 253 times (51%), side-effects (A85) 157 times (32%), medication reviews (A49,02) 32 times, (6%), medication misuse (P18) 36 times (7%) and medication intoxication (A84) 20 times (4%).

Table 7: Consultations by GP's registered with medication related ICPC-codes in total amounts and percentages.

ICPC Codes	Number of consultations	% of total
A13	253	51%
A85	157	32%
A49.02	32	6%
P18	36	7%
A84	20	4%
Total	498	100%

Feasibility

Data were available for collection and healthcare professionals were willing to share it. The process was partly automated by use of queries in the GPIS but required some effect as each ICPC code required its own query. The total process took 15 minutes and was completed in Medicom. It could not be replicated in Healthconnected. Healthcare professionals noted that many medication-related issues come up during other consultations or are registered under ICPC codes related to the diagnosis for which the medication is prescribed. This raised concerns about the validity of the data when answering the outcome parameter.

Regarding the limited validity of the data and the effort needed to acquire the data it needs to be concluded the feasibility is limited in Medicom and unfeasible in Healthconnected (++).

Relevance

A team of experts involved in the CP training discussed the results and concluded that this outcome parameter is not relevant as it does not reflect the actual number of consultations linked to medication issues (-).

Outcome parameter 5. Number of referrals to the CP clinic hours, total and per referrer (GP, assistant, PN, community pharmacist, other) in the past three months.

Outcome results

There were no results on the number of referrals to the CP consultation hours in the past three months.

Feasibility

No data were available in either Medicom or Healthconnected to reliably determine the number of referrals. New patients are referred by oral communication or simply planned into the agenda of the CP without notification who referred them. Any feasibility parameters regarding time investment and validity of data cannot be answered.
The outcome parameter is unfeasible in either GPIS for the lack of available data (-).

Relevance

Although data collection of the parameter is unfeasible while data is unavailable, the group of experts believe this parameter is relevant (+). However, making data available requires time, which the experts think is not plausible.

Outcome parameter 6. Number and content of medication-related questions from colleagues and advice given in the past three months.

Outcome results

A single week of medication-related questions and advice given by the CP were examined. In this week seven questions were asked and answered, leading to an approximation of 91 for the total of three months. 43% of the questions regarded side-effects, 29% regarded possibility of an alternative medication, 14% regarded possibility to combine medication and 14% regarded skipping a medication dose. In all cases the advice covered a suggestion in how to proceed, in 57% this included a change in medication.

Feasibility

Health professionals agree to share the data. Available data is limited as notation of medication-related questions and corresponding answers is not standardised. Therefore, there is no structural way to collect data of what is registered. To add to this, many questions are asked orally and not noted. Hence only a one-week sample was chosen to be reviewed. Examination of the questions and their respective answers required three minutes each. There were no fundamental differences between the two GPIS.
To conclude, collection of numbers and content of medication-related questions is limited and requires changes in collection process to be feasible (+/-).

Relevance

A team of experts involved in the CP training discussed the results and concluded that this outcome parameter is relevant (+). They expressed their concerns regarding to the required time investment.

Outcome parameter 7. Patient satisfaction with pharmaceutical care services of the CP in the past two months.

Outcome results

Six surveys were completed of the fifteen sent out to patients. 50% agreed, 50% strongly agreed that the consultation with the CP was valuable. 33% agreed, 66% agreed strongly that the CP listened to their questions and concerns. 33% agreed, 50% strongly agreed that the consultation strengthened their faith in the therapy, whilst 17% remained neutral. The claim that there was good cooperation between GP and CP had 66% agreeing strongly, whilst 17% agreed and 17% said it was N/A. Finally, 50% agreed that they would advise consultation to friend or family, whilst 50% strongly agreed.

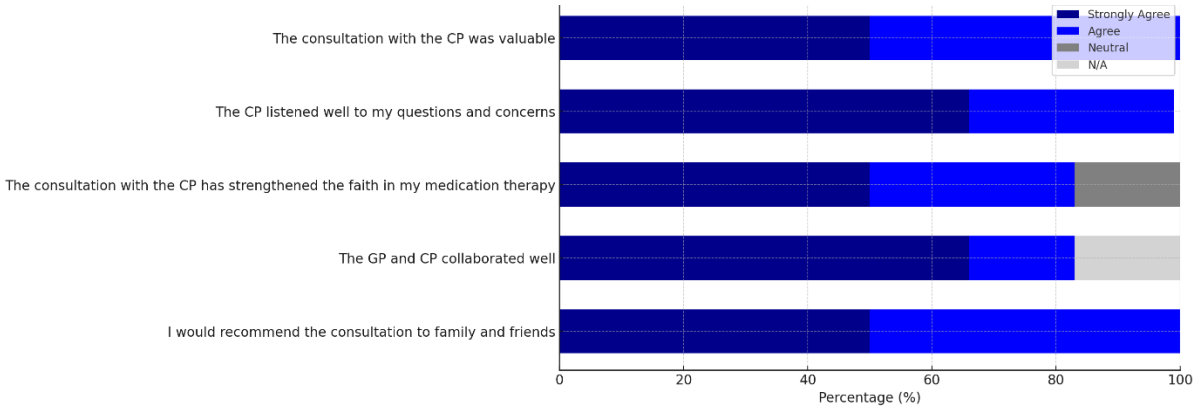

Figure 1: Visual representation of results of the patient satisfaction survey.

Feasibility

Data were accessible after surveys were completed. The amount of completed surveys shows that 40% of patients are willing to participate. Completing the survey, participants were asked if the survey was clear enough. Three patients answered it was clear, others did not respond. No participants answered the question if the questions were relevant to them or if they thought anything was missing. Considering the use of identifying data, it is preferable if GP practices contact participants themselves. “Microsoft Forms” was used to set up the survey. This platform automatically creates an excel file with data. Creating the survey requires 30 minutes, inviting participants takes five more.

Considering response rate, it is feasible to survey patient satisfaction among patients of the CP of the past two months (+++).

Relevance

Experts involved in the CP training discussed the results and concluded that the outcome parameter is relevant (+).

Outcome parameter 8. Healthcare professional satisfaction, experienced challenges regarding implementation of the CP and perceived impact on workload.

Outcome results

Thematic analysis shows positive attitudes towards the role of the CP, the cooperation with them and the additional knowledge on medication. It also shows integration of the CP role needs work. All agree that the CP role should be continued.

Feasibility

Six forms were completed. Three by GPs, one by the PN, one by a community pharmacist and one by the CP. One question about how frequent healthcare professionals use the consult function was not clear and therefor left unanswered in some cases. This is due to inadequate use of the Likert scale in this case. Open ended questions about workload reduction and the disturbance diary were left unanswered or provided little explanation. A workload reduction was mentioned by a few professionals, but only a few provided an estimation in hours. Because of this it is harder to interpreted results. Time investment of collecting forms and interpreting is two hours. The time investment to complete a form is 15 minutes when answering all questions. Concluding it is not feasible yet and requires adjustment (+/-).

Relevance

Experts involved in the CP training discussed the results and concluded that the outcome parameter is relevant (+).

Outcome parameter 9. Number and types of quality projects in the past year.

Outcome results

The CP realized three quality projects in the past year. Subjects were evaluation of antidepressants, safety of anticoagulants and safety of risky medication.

Feasibility

The CP completed an Excel to provide data, which was sufficient for the outcome parameter. Time investment of the CP was 10 minutes. The parameter is deemed feasible (+++).

Relevance

Experts involved in the CP training discussed the outcome results and concluded that the outcome parameter is relevant (+).

Outcome parameter 10. Number and content of training sessions in the past year.

Outcome results

Three training sessions were completed by the CP in the past year. Subjects encompassed atrial fibrillation, allergic rhinitis and urinary tract infections.

Feasibility

The CP provided an Excel with data including numbers and content. The required time investment for the CP was ten minutes. To conclude, this parameter is feasible (+++).

Relevance

Involved experts discussed the results and concluded that the outcome parameter is relevant (+).

Discussion

This study evaluated feasibility and relevance of outcome parameters to aid the evaluation of implementation of the CP role. Feasibility was assessed using feasibility parameters based on five domains after collection of data regarding the outcome parameters. Relevance was based on expert opinion. The outcome parameters on referrals to the CP (no. 5) was deemed unfeasible. The parameter on the number of consultations by the GP regarding medication-related questions (no. 4) was concluded to be irrelevant.

Findings

Assessing the content in patient files requires significant time investment. The same is true for data collection on referrals and interprofessional consultations. Involved experts raised concerns about this as GPs have little time to spare, affecting quality care [16,17]. Similar studies established lack of time as a significant barrier to process evaluation of implementation [18,19]. Structured practice of the procedures is a known facilitator to implementation [19]. Considering this, a set of instructions regarding outcome parameters will be helpful (appendix 4). Discussion among involved experts concluded that assessment by a separate researcher, possibly an intern, solves the issue of time restraint.

Number of medication-related consultations by GPs (no. 4) was concluded to be feasible but not relevant as GPs usually code consultations by diagnoses instead of specific medication-related codes. Meaning data were insufficient to draw meaningful conclusions about the implementation of CP-led clinics. Scrapping this parameter means the implementation outcomes fidelity and implementation costs lose measurements. Increasing the importance of parameters 1-3 in measuring implementation costs.

Similarly numbers of referrals and referrers (no. 5) should be discontinued due to being unfeasible. This parameter is pivotal to measuring adoption, especially since evaluation forms used for parameter 8 show us healthcare professionals think the integration of the CP role needs work. One solution could be introduction of a designated week in which the data is collected instead of doing so continuously, reducing workload [20,21]. Another possibility is intergrading more questions covering the topic into forms used for parameter 8.

Perspectives of healthcare professionals (no. 8) was relevant but requires revised forms as feasibility is limited. Open-ended questions were often unanswered. Participants disagreed the CP role was integrated but did not elaborate. More information on this is critical as complete integration requires a distinct role to be developed [19]. Interviewing could be another approach to gather missing information, but this requires a significant amount of time and effort [21-23]. A follow-up study regarding improved forms and interviews will be conducted.

Strengths and limitations

Strengths included the selection of the first health centre in which the CP was employed for one year. So, closely representing the expected outcomes in terms of key activities. Another strength is the inclusion of Medicom, as it is the most widely used GPIS in the Netherlands.

It is important to note that the limited scale of this study might affect the feasibility. For example, only six patients and six healthcare professionals completed the surveys. Posing potential feasibility issues in larger samples. Another limitation is the amount of GPIS examined. Only two out of almost a dozen possible GPIS in the Netherlands were explored. New challenges might be encountered in other GPIS. Task reallocation proved challenging for the researcher. His background as a medicine student provided knowledge of tasks belonging to the GP but lacked in task belonging to pharmacists. A solution to this would be to let CPs assess the degree of task reallocation as their role provides knowledge of both positions. Lastly, assessment of feasibility was based on carefully constructed parameters to provide a more objective foundation. However, the conclusions regarding feasibility and relevance derived from expert opinion were ultimately subjective.

Implications and advice

Relevant implications and advice is discussed per outcome parameter:

1. **Number of pharmaceutical consultations by the CP and type of consultation from the past three months.** For data collection in Medicom it is advised to use the query to collect data on amount and types of consultations by the CP. In Healthconnected help of an IT professional is required.
2. **Contents of the CP consultations from the past three months. Including the number of set and achieved patient goals and follow-up.** Regarding the assessment of content of the consults a proper patient selection is required. This is achieved by marking (Medicom = Ruiter. Healthconnected = Label) patients that were seen by the CP. A selection with this mark can be generated. To cut down on time investment, limiting the amount of patient files evaluated to ten patients is advised. Additionally, CPs should specifically note the patients' healthcare goals in the consultation, easing assessment of the files.
3. **Degree of task reallocation from the past three months.** The advice regarding patient selection applies here too. At this point it is unclear whether the CPs themselves or a separate researcher will be collecting the data going forward. As the CP position sits between the community pharmacist and the GP, they might be the ideal candidates to assess task reallocation. This could fit as an assignment as part of the training where two CPs assess each other's work.
4. **Number of consultations by GP regarding medication-related questions from the past year.** This outcome parameter should be scrapped because data were insufficient, and it was concluded irrelevant.
5. **Number of referrals to the CP clinic hours from the past three months.** Not feasible as no data is available. Although deeming it relevant, experts expressed concern that keeping side records to track referrals is unfeasible. Another way to gain insight is by incorporating more specific questions regarding referrals in the forms used for outcome parameter 8.
6. **Number and content of medication-related questions from colleagues and advice given from the past three months.** Reporting for questions and advice between professionals is limited. Requiring documentation of all questions would be inconvenient. Instead, a designated weeklong period every three months, in which the CP notes all questions asked and advice given, provides an estimate of the overall amount.

7. **Patient satisfaction with pharmaceutical care services of the past two months.** Patient satisfaction can be surveyed using Microsoft Forms or other ways the general practice or health centre is used to. Preferably shortly following the appointment with the CP.
8. **Healthcare professional satisfaction, experienced challenges regarding implementation of the CP and workload impact.** An overhaul of the forms is necessary to adequately collect data. Clear instruction is needed to gain rich data. The disturbance diary should be dropped as it was not utilised, it can instead be applied during CP training days. Questions regarding workload reduction should be changed to a different format such as multiple choice. Answering the question about the usage of the interprofessional consultation should not utilise the Likert scale. To bridge the gap created by scrapping outcome parameter 5, questions about number of referrals and the referrer in question could be added. Additionally, creating the forms online with mandatory responses prevents participants from leaving questions unanswered.
9. **Number and type of quality projects of the past year.** No changes required.
10. **Number and content of internal and/or regional educational sessions of the past year.** No changes required.

Conclusion

All outcome parameters were piloted. Most were deemed feasible and relevant. While one was deemed unfeasible and another irrelevant. Those two parameters should be discarded. By employing the eight remaining parameters and making the recommended changes all five implementation outcomes are measured to adequate extent, ensuring complete evaluation in the 12 CP-led clinics.

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Appendix 1. Feasibility parameters (showing original document in Dutch)

Uitkomstparameter en uitkomstmaten	Haalbaarheidsparameters en bijbehorende domeinen
1. Aantal en type farmaceutische consulten van de AB (Fidelity en implementatiekosten)	- In hoeverre zijn de gegevens uit het HIS of anderszins te verkrijgen? (A) - In hoeverre zijn zorgverleners bereid om de gegevens te delen? (A) - Hoe zijn de verschillende soorten consulten te onderscheiden? (B) - In hoeverre kan gegevensverzameling automatisch verlopen? (C) - In hoeverre verschillen HIS'en hierin? (C) - Welke tijdsinvestering is hiervoor nodig? (D)
2. Inhoud van de consulten van de AB (Fidelity en implementatiekosten)	- In hoeverre zijn de gegevens uit het HIS of anderszins te verkrijgen? (A) - In hoeverre zijn zorgverleners bereid om de gegevens te delen? (A) - In hoeverre zijn de gegevens bruikbaar voor de gezette parameters? (B) - In hoeverre kan gegevensverzameling automatisch verlopen? (C) - In hoeverre verschillen HIS'en hierin? (C) - Welke tijdsinvestering is hiervoor nodig? (D)
3. Mate van taakherschikking (Fidelity en implementatiekosten)	- In hoeverre zijn de gegevens uit het HIS of anderszins te verkrijgen? (A) - In hoeverre zijn zorgverleners bereid om de gegevens te delen? (A) - Hoe zijn de verschillende soorten consulten te onderscheiden? (B) - In hoeverre zijn de gegevens bruikbaar voor de gezette parameters? (C) - Welke tijdsinvestering is hiervoor nodig? (D)
4. Aantal consulten van huisarts mbt medicatie-gerelateerde vragen (Fidelity en implementatiekosten)	- In hoeverre zijn de gegevens uit het HIS of anderszins te verkrijgen? (A) - Welke ICPC-codes worden gebruikt? (A) o Is deze lijst uitputbaar? (A) - In hoeverre zijn zorgverleners bereid om de gegevens te delen? (A) - In hoeverre zijn de gegevens bruikbaar voor de gezette parameters? (B) - In hoeverre kan gegevensverzameling automatisch verlopen? (C) - In hoeverre verschillen HIS'en hierin? (C) - Welke tijdsinvestering is hiervoor nodig? (D)
5. Aantal verwijzingen naar AB-spreekuur (Adoptie en fidelity)	- In hoeverre zijn de gegevens uit het HIS of anderszins te verkrijgen? (A) - In hoeverre zijn zorgverleners bereid om de gegevens te delen? (A) - In hoeverre zijn de gegevens bruikbaar voor de gezette parameters? (B) - In hoeverre kan gegevensverzameling automatisch verlopen? (C) - In hoeverre verschillen HIS'en hierin? (C)

	- Welke tijdsinvestering is hiervoor nodig? (D)
6. Aantal en inhoud medicatie gerelateerde vragen van collega's en adviezen (Fidelity)	- In hoeverre zijn de gegevens uit het HIS of anderszins te verkrijgen? (A) - In hoeverre zijn zorgverleners bereid om de gegevens te delen? (A) - In hoeverre zijn de gegevens bruikbaar voor de gezette parameters? (B) - In hoeverre kan gegevensverzameling automatisch verlopen? (C) - In hoeverre verschillen HIS'en hierin? (C) - Welke tijdsinvestering is hiervoor nodig? (D)
7. Patiënttevredenheid (Adoptie en aanvaardbaarheid)	- Krijgen patiënten de gelegenheid om een tevredenheidsenquête in te vullen? (A) - Zijn patiënten bereid dit te doen? (A) - Zijn de vragen op de enquête voldoende duidelijk voor de patiënt? (B) - Zijn alle vragen relevant volgens de patiënten? (B) - Zijn er aspecten die volgens patiënten ontbreken in de vragenlijst? (B) - Binnen welke structuur kunnen periodiek voldoende tevredenheidsenquêtes ingevuld worden? (C) - Welke tijdsinvestering van de onderzoeker is nodig om deze gegevens te verzamelen? (D)
8. Tevredenheid, uitdagingen over implementatie barrières en mate van werkdrukverlichting van betrokken zorgprofessionals (Adoptie, aanvaardbaarheid en duurzaamheid)	- Zijn er ingevulde evaluatieformulieren beschikbaar? (A) - In hoeverre zijn zorgverleners bereid de evaluatieformulieren in te vullen? (A) - Zijn evaluatieformulieren voldoende bruikbaar om conclusies uit te trekken? (B) - Welke tijdsinvestering van de onderzoeker is nodig om deze gegevens te verzamelen? (D) - Welke tijdsinvestering wordt van de zorgprofessional gevraagd? (D)
9. Aantal en type kwaliteitsprojecten (Fidelity)	- In hoeverre is informatie over aantallen en typen kwaliteitsprojecten beschikbaar? (A) - In hoeverre zijn apothekers bereid om de gegevens te delen?(A) - Bieden de aangeleverde gegevens voldoende duidelijkheid over de uitgevoerde kwaliteitsprojecten?(B) - Welke tijdsinvestering van de onderzoeker is nodig om deze gegevens te verzamelen? (D) - Welke tijdsinvestering wordt van de zorgprofessional gevraagd? (D)
10. Aantal en inhoud van nascholingsmomenten (Fidelity)	- In hoeverre is informatie over aantallen en inhoud van nascholingsmomenten beschikbaar? (A) - In hoeverre zijn apothekers bereid om de gegevens te delen? (A) - Bieden de aangeleverde gegevens voldoende duidelijkheid over de uitgevoerde nascholingsmomenten?(B) - Welke tijdsinvestering van de onderzoeker is nodig om deze gegevens te verzamelen? (D) - Welke tijdsinvestering wordt van de zorgprofessional gevraagd? (D)

Appendix 2. Patient satisfaction survey (showing original document in Dutch)

1 = zeer oneens, 2 = oneens, 3 = neutraal , 4 = mee eens, 5 = zeer mee eens, NVT = niet van toepassing.

	1	2	3	4	5	NVT
Het consult met de apotheker was waardevol						
De apotheker luisterde goed naar mijn vragen en zorgen						
Het consult met de apotheker heeft het vertrouwen in mijn behandeling met geneesmiddelen vergroot						
De samenwerking tussen huisarts en apotheker was goed						
Ik zou het consult met de apotheker aanraden aan vrienden of familie						
Heeft u nog suggesties of verbeterpunten?						

Appendix 3. Evaluation Forms (showing original documents in Dutch)

1 = zeer oneens, 2 = oneens, 3 = neutraal , 4 = mee eens, 5 = zeer mee eens.

Evaluatieformulier voor de AB	1	2	3	4	5
De samenwerking met de huisartsen is goed					
De taakverdeling tussen AB, huisarts en openbaar apotheker is helder					
De verschillende zorgprofessionals weten het AB-spreekuur te vinden en ernaar te verwijzen met de juiste vraagstelling					
Er worden doelen gesteld en behaald binnen de patiënt consulten					
De verschillende zorgprofessionals zijn goed te betrekken bij de kwaliteitsprojecten en naschoolingsmomenten.					
Het HIS biedt voldoende mogelijkheden om de werkzaamheden uit te voeren					
De rol van de AB is duidelijk voor patiënten					
De opleiding biedt een goede basis voor het werk als AB					

Maak een inschatting van de mate van taakherschikking. De werkzaamheden binnen de rol als AB dragen bij aan: (in uren/week)
- Werkdrukverlichting van de huisarts: ...
- Werkdrukverlichting van de openbaar apotheker: ...
- Bieden van extra zorg: ...
- Anders: ...

Indien u in de samenwerking met de AB problemen of onduidelijkheden bent tegengekomen, kunt u dit hier invullen. Denk na over welke mogelijkheden er waren om de situatie op te lossen en welke ideeën u heeft om het proces te verbeteren.

Onderwerp	Probleemstelling	Mogelijkheden	Verbetering

Ruimte voor commentaar

1 = zeer oneens, 2 = oneens, 3 = neutraal , 4 = mee eens, 5 = zeer mee eens.

Evaluatieformulier voor de huisarts / POH	1	2	3	4	5
De samenwerking met de AB is goed					
De taakverdeling tussen AB, huisarts en openbaar apotheker is helder					
De farmaceutische kennis van de AB is van toegevoegde waarde					
De kwaliteit van farmaceutische zorg is toegenomen door bijdrage van de AB					
Kwaliteitsprojecten van de AB zijn van toegevoegde waarde					
Naschoolingsmomenten van de AB zijn van toegevoegde waarde					
Patiënten zijn positief over de bijdrage van de AB					
Het werkplezier is toegenomen door de bijdrage van de AB					
De AB neemt consulten over die anders door de u waren uitgevoerd					
De AB biedt zorg die anders door niemand geleverd zou worden					

Inschatting van de werkdrukvermindering te wijten aan de AB in uren/week:

Waaruit blijkt deze werkdrukvermindering / waar bent u minder tijd aan kwijt?

Hoe kunt u deze extra tijd nu besteden?

Indien u in de samenwerking met de AB problemen of onduidelijkheden bent tegengekomen, kunt u dit hier invullen. Denk na over welke mogelijkheden er waren om de situatie op te lossen en welke ideeën u heeft om het proces te verbeteren.

Onderwerp	Probleemstelling	Mogelijkheden	Verbetering

Ruimte voor commentaar

1 = zeer oneens, 2 = oneens, 3 = neutraal , 4 = mee eens, 5 = zeer mee eens.

Evaluatieformulier voor de openbaar apotheker	1	2	3	4	5
De samenwerking met de AB is goed					
De taakverdeling tussen AB, huisarts en openbaar apotheker is helder					
De kwaliteit van farmaceutische zorg is toegenomen door aanwezigheid van de AB					
Patiënten hebben minder vragen m.b.t. hun medicatie					
Resultaten van kwaliteitsprojecten van de AB zijn merkbaar voor de openbaar apotheek					
Resultaten van naschoolingsmomenten van de AB zijn merkbaar voor de openbaar apotheek					
De rol van de AB is duidelijk voor patiënten					
Het werkplezier is toegenomen door de bijdrage van de AB					

Inschatting van de werkdrukvermindering te wijten aan de AB in uren/week:

Waaruit blijkt deze werkdrukvermindering / waar bent u minder tijd aan kwijt?

Hoe kunt u deze extra tijd nu besteden?

Indien u in de samenwerking met de AB problemen of onduidelijkheden bent tegengekomen, kunt u dit hier invullen. Denk na over welke mogelijkheden er waren om de situatie op te lossen en welke ideeën u heeft om het proces te verbeteren.

Onderwerp	Probleemstelling	Mogelijkheden	Verbetering

Ruimte voor commentaar

Appendix 4. Instructions data collection (Showing original document in Dutch)

Uitkomstparameter 1. – niet mogelijk in healthconnected, vraag data via ICT op -
Dataverzameling aantal consulten en type consulten van de AB verloopt als volgt:
Resultaten zijn verkregen in Medicom via de “nieuwe Q-module”. De query "Verrichtingen per medewerker, arts” kan worden uitgevoerd met de selectiecriteria ingesteld op “Maanden [-3 .. -1]”, hiermee wordt van de afgelopen drie maanden verkregen. De optie “Resultaat definiëren” behoeft geen aanpassingen. Het resultaat kan gedownload worden als Html bestand. Dit bestand kan in Excel worden geplakt door bovenin op “gegevens” en “van andere bronnen” te klikken. Kies vervolgens voor de “Van XML-gegevens import” optie, selecteer het bestand, kies voor “importeren” en “OK”.

Uitkomstparameter 2. + 3.
Healthconnected werkt per episode, hierdoor wordt de weergave beperkt tot het probleem waarin we geïnteresseerd zijn. Soms wordt binnen meerdere episodes gerapporteerd. Door te beginnen bij het eerste consult van de AB met de patiënt kan de zorgvraag en gestelde doel worden achterhaald. Indien latere consulten beschikbaar zijn kan bepaald worden of het doel (deels) is behaald. In het bijgeleverde Excel bestand worden voor ieder consult genoteerd: De hulpvraag (bijvoorbeeld “afbouw pijnmedicatie”), het gestelde doel (bijvoorbeeld: ‘’verhelpen duizeligheid”), doel opgevolgd (bijvoorbeeld “ja, inmiddels 10mg afgebouwd) en taakherschikking (keuze uit HA/POH/openbaar apotheker/extra zorg)

Uitkomstparameter 4. – niet mogelijk in healthconnected, vraag data via ICT op -
In Medicom kan de query “actieve episodes per arts, per ICPC” worden uitgevoerd. Bij het uitvoeren van de query kan uit een lijst een ICPC-code geselecteerd worden. Als er meerdere worden gekozen wordt er slechts 1 getoond en komen de anderen onder het kopje “overige ICPCs” te staan. Hierom moet het per ICPC worden uitgevoerd. Het resultaat kan gedownload worden als Html bestand. Dit bestand kan in Excel worden geplakt door bovenin op “gegevens” en “van andere bronnen” te klikken. Kies vervolgens voor de “Van XML-gegevens import” optie, selecteer het bestand, kies voor “importeren” en “OK”.
Dit is gedeeltelijk automatisch omdat het per ICPC apart gedaan moet worden en vervolgens worden samengevoegd.

Uitkomstparameter 5.
Er wordt een week lang bijgehouden via welke route patienten bij de AB terechtkomen. In het bijgeleverde Excel bestand is een kolom met getallen voor het aantal verwijzingen en een kolom voor de verwijzende partij (keuze uit HA/POH/openbaar apotheker/HA assistente/AB/overig)

Uitkomstparameter 6.
Er wordt een week lang bijgehouden welke vragen er van collega zorgverleners binnenkomen voor de AB. Houdt in het bijgeleverde Excel bestand voor iedere vraag bij: Het onderwerp (bijvoorbeeld “bijwerking” of “overslaan medicatie”), de vraag (bijvoorbeeld “kan X met Y gecombineerd worden?’’) en het antwoord/advies (bijvoorbeeld “Omzetting naar retard geeft minder bijwerkingen”)

Uitkomstparameter 7. – voorbeeld microsoft forms -
- Bij openen van microsoft forms kan “nieuw formulier” aangeklikt worden.

- Kies daarna voor “likert”.

- Vervang optie 1 t/m door zeer oneens, oneens, neutraal , mee eens, zeer mee eens en NVT en de vragen door:

“Het consult met de apotheker was waardevol”

“De apotheker luisterde goed naar mijn vragen en zorgen”

“Het consult met de apotheker heeft het vertrouwen in mijn behandeling met geneesmiddelen vergroot”

“De samenwerking tussen huisarts en apotheker was goed”

“Ik zou het consult met de apotheker aanraden aan vrienden of familie”

- Zet de optie “vereist” rechtsonderin aan.

- Klik onderaan op “nieuwe vraag toevoegen” en kies voor “tekst”. Vul hier de volgende vraag in:

“Heeft u nog suggesties of verbeterpunten?”

- Klik bovenaan op “antwoorden verzamelen” en selecteer de gewenste manier van contact (bijvoorbeeld outlook).

Uitkomstparameter 8. – wordt aangepast in vervolgonderzoek –

Uitkomstparameter 9 + 10
In het bijgeleverde Excel bestand kan ingevuld worden hoeveel en welke type kwaliteitsproject/nascholingsmoment (bijvoorbeeld evaluatie antidepressiva) is uitgevoerd.