Chapter 2

Justification of the aims, structure and sequence of the IPMP study

(IPMP: Interventions on the principle of Pulmonary Medication Profiles)
Introduction

The intention of performing the IPMP study (Interventions on the principle of Pulmonary Medication Profiles) is to improve patients’ drug use by providing pharmaceutical care to patients at risk of suboptimal pulmonary drug therapy and to investigate the long-term efficacy of these interventions administered to individual patients by their community pharmacists.

Aims and objectives of the study are:
1. To identify patients at risk of suboptimal pulmonary drug therapy
2. To develop a pharmaceutical care intervention strategy targeted at identifying all relevant existing additional drug-related problems and at solving them in patient consultations
3. To investigate the effects of increased knowledge and skills on adherence to agreed medication in a prospective observational study
4. To evaluate patients’ opinion of the intervention process in a satisfaction and evaluation survey
5. To investigate the effects of the intervention on patients’ medication in a randomized controlled study design
6. To search for consistency between the three research techniques
7. To investigate the feasibility in the Dutch community pharmacy

Identification of patients at risk of suboptimal pulmonary drug therapy

In the IPMP study it is assumed that the drug treatment recommended in evidence-based pulmonary guidelines should lead to optimal clinical outcomes for asthma and COPD patients (chronic obstructive pulmonary disease).

To start pharmaceutical care in the IPMP study patients at risk of suboptimal drug therapy are identified. In this way the pharmacist has an opportunity to provide pharmaceutical care to patients who probably most need this support.

Identification method
Patients were identified by the use of patient medication records registered in the community pharmacy computers covering twelve consecutive months. An algorithmic computer instrument has especially been developed for the IPMP study to select pulmonary patients having deviant drug therapy compared with the national guidelines or the registered dose of the medicine. Characteristic for the algorithm is the signal function of
beta-2 agonists relieving pulmonary symptoms. According to the asthma guidelines an average use of two inhalations a day should be combined with concomitant use of corticosteroids by inhalation. Only above a certain number of inhalations of beta-2 agonists in a one-year period patients were identified and the amount of corticosteroids in the same year indicated the specific selection profile.

The algorithm has led to ten different selection profiles. Each selection profile identifies a specific deviation from the guidelines and can be considered as an indicator of suboptimal drug therapy. Each profile will need a specific intervention approach.

Chapter 3 of this thesis is dedicated to the IPMP identification method including its validation.

**Setting and design of the IPMP study**

*Participating pharmacists*

The IPMP study focuses on pharmaceutical care provided by Dutch community pharmacists. Recruitment for voluntary participation in the study was done during three national pharmacists’ meetings. Three structured questionnaires were completed by the participating pharmacists before the start of the intervention. In this survey the characteristics of their computerized pharmacy information systems, the equipment of their pharmacies (i.e. separate consultation rooms), co-operation with physicians and their activities concerning pharmaceutical care and academic detailing were checked to assess that daily pharmacy practice was according to the Dutch pharmacy standard (NAN). Their pharmacy computer system should also possess the required technical features to transfer anonymized patients’ medication records to the researchers.

*Study population*

For the IPMP-study a maximum of 60 patients was selected per pharmacy not to exceed the reasonable workload for the participating pharmacists. This selection concerned patients who were between 13 and 60 years of age.

*Assignment of the patients*

The IPMP study is designed as a randomized controlled trial. Within each pharmacy selected patients were randomly divided and allocated to the intervention or reference group by the researchers. Because the unit of randomization is the patient, the study is structured in such a manner that
pharmacists were not informed which of their patients belonged to the reference group. Presumably these patients only received care as usual. No inquiries about these patients’ opinions were made by the researchers to avoid a research effect.

The sequence and structure of the IPMP study is shown in Figure 1.

![Figure 1](image)

**Figure 1  The sequence and structure of the IPMP study**

**Pharmaceutical care intervention strategy**

*Outline of the intervention strategy*

After a judgement of the drug use profile the patient was invited to a consultation with the pharmacist to identify additional drug-related problems. To solve these problems the pharmacist suggested an appropriate selection of the six pharmaceutical care modules. A common goal was agreed upon with the patient. Four weeks after the intervention was completed the pharmacist evaluated the agreed aim with the patient to conclude the intervention episode.

*Examination of a drug use profile*

At the start of the study participating pharmacists received the codes of selected patients belonging to the intervention group of their pharmacy including their adjudged selection profiles.

To provide an individualized intervention as designed in the IPMP study the pharmacist should be sure about the current drug use of his patient. Besides, the selection profiles do not differentiate when or in how many portions the medication is dispensed.
By reviewing a patient’s drug use profile (DUP) the current drug use can be investigated and the pharmacist can assess whether this drug use is deviant from the guidelines or that the patient probably receives the recommended drug therapy at the time of the examination.

A protocol (shown in appendix 1) has been developed for the participating pharmacists to review DUPs and to notice relevant and concomitant drug use such as
- Aspirin or NSAIDs (non-steroid anti-inflammatory drugs)
- Beta blocking agents, also in eye drops
- Anti-allergic drugs such as antihistamines and nasal corticosteroids
- Dermatological corticosteroids
- Mucolytics
- Systemic corticosteroids
- Systemic antibiotics registered for and probably indicating respiratory tract infections.

Based on his judgement the pharmacist decided whether the patient would be invited to a consultation in the pharmacy or that patient’s medication records would be monitored in the next months to overview the future drug therapy. Simultaneously the pharmacist ascertained whether the adjudged selection profile was appropriate or another profile would be a better alternative considering patient’s current drug use to guide and to structure the later consultation.

Because each assessed profile defines the patient’s treatment exactly and identifies a specific deviation from the guidelines, it can be called a deviant-treatment profile (DTP). Especially the drug use of patients with selection profile X indicating disproportionately high use of any drug by inhalation has been assessed to indicate another appropriate profile.

*Invitation to a consultation*
Participating pharmacists invited the relevant patients by letter and then by telephone to a consultation in the pharmacy. In this letter informed consent was asked with the documentation of all anonymous details of the consultation, of further provided pharmaceutical care and of their drug use, and with being sent additional questionnaires. No informed consent was asked to provide pharmaceutical care as such because this is considered daily practice in The Netherlands.

When the patient was not able to come to the pharmacy, pharmacists were advised to visit the patient at home. Pharmacists sent a second invitation to
patients who could not be reached by phone. Patients who did not respond, could be labelled in the pharmacy computer to be contacted when they would visit the pharmacy.

Based on the ideas of Donabedian (1) the quality of pharmaceutical care provided in the IPMP study i.e. the intervention, has to be described completely to show the relation between the care process and the aimed outcomes.

Consultation
The consultation with a patient was guided by a protocol tailored to the assessed deviant-treatment profile (DTP). The ten consultation protocols were set up in such a way that all existing additional drug-related problems could be identified and specific drug use could be evaluated.

The consultation protocols (shown in appendix 2) are composed of questions about
- Reason for the prescribed medication
- Frequency of symptoms and course of the pulmonary disease
- Frequency of consultations of physician or pulmonologist
- Medical examinations such as peak expiratory flow (PEFR), FEV1
- Dosage and use of prescribed medication
- Experiences, feelings and satisfaction with the prescribed or formerly used medication,
- Adverse effects
- Knowledge of prescribed medication and the effects on the disease
- Knowledge of principles of self-management of asthma
- Knowledge and skills of handling the inhalers
- Smoking habits

During the consultation pharmacists completed the consultation protocols and after evaluation of the different subjects a tailored scheme for the modular approach of the intervention could be composed.

When there was no indication for existing drug-related problems, for insufficient adherence to prescribed medication or any lack of knowledge, and when the patient and his pharmacist were completely satisfied with the current drug use, there appeared to be no reason for a further intervention. For these patients the follow-up period in the IPMP study was started directly, in which the pharmacists reviewed patients’ drug use every three months.
Intervention
A modular approach to provide pharmaceutical care interventions was strongly recommended to the participating pharmacists. After evaluating the complete consultation protocol they started to solve identified drug-related problems in an individualized intervention and to improve adherence to prescribed drug therapy. Six different pharmaceutical care modules have been developed for the IPMP intervention supported by structured protocols and with forms to document activities, agreements, common individual aims and results. Pharmacists were obliged to use the protocols and to document the forms.

Module I (Inhaler technique) checks the patient’s use of the inhaler and the knowledge of the properties of a device using the validated Dutch NODE protocols. This module also implicates improving incorrect use, education and suggestion to replace the device by a more appropriate one.

Module II (Dosage adjustment) involves the quantity of the used drugs: either daily use or rescue-medication and evaluation of the dose. The pharmacist may support the patient in proper usage of the prescribed medication or usage corresponding with the severity of the symptoms reported by patients.

Module III (Knowledge and adherence) checks the knowledge of used medication and comprises educational tools (information leaflets, artificial trachea) for the patient to improve the adherence, especially to the daily use of corticosteroids by asthma patients.

Module IV (Adapting inhaler) describes changing a device by the pharmacist himself or in co-operation with the prescribing physician, depending on the local agreements between GPs and pharmacists. Criteria may be observed improvement compared to the former device, preference of the patient, replacement by already familiar devices and withdrawing medicine.

Module V (Treatment change) describes a suggestion to change the dose of a drug or to add another drug to the treatment to relieve symptoms or to benefit drug use according to the Dutch guidelines of the treatment of asthma or COPD. This module implies consulting the physician or pulmonologist to propose this change, to ask for the diagnosis and to start the altered treatment.
Module VI (Supporting self-management) involves the principles of self-management of asthma. In the IPMP study the pharmacist does not start self-management but can support patients already familiar with this kind of drug use.

In the modular approach of the comprehensive intervention strategy observed problems concerning insufficient skills how to handle an inhaler and lack of knowledge about medication, dosage, disease and devices (modules I, II, III and VI) were solved before any changes in medicines or treatment were suggested to patients and their physicians (modules IV and V). The documentation form of each pharmaceutical care module ended with a common aim agreed upon by both the health care professional and the patient or with a reference to another module. The aim was checked in a following appointment or phone call.

On the basis of the literature and a pilot study carried out in four pharmacies before the start of the IPMP study these six different modules appear to be sufficient in pharmacy practice to solve existing problems with prescribed pulmonary medication and mentioned or observed insufficient treatment.

The IPMP intervention provided by community pharmacists is focused on outcomes obtainable in daily Dutch pharmacy practice, i.e. well-educated patients with prescribed drug treatment according to the pulmonary guidelines. In a pilot study it appeared that Dutch pulmonary patients did not monitor their condition on a regular basis by measuring their peak-flow. Moreover, they were not generally referred to pulmonologists to do lung function tests. Therefore we decided that no clinical outcomes should be measured in the IPMP study such as PEFR or FEV1.

Four weeks after the intervention was completed changes in coping behaviour or in drug use were evaluated together with the patient by telephone or in a second appointment. Insufficient improvement or unreached aims might be a reason for a new consultation or an additional counselling of the general practitioner (GP) or pulmonologist. The intervention episode was concluded when the agreed aim was reached.

Follow-up
After this first part the intervention was prolonged by monitoring patients’ drug treatment and the refill rate of the prescriptions by reviewing the medication records during a whole year. Irregularities in the predicted refill rate could be a reason to contact the patient again and to start a new
intervention episode. After a one-year period the patient was invited to a final consultation to evaluate the whole intervention and to finalize it when patient and pharmacist agreed upon the outcomes.

**Training and support of the participating pharmacists**

To inform and teach participating pharmacists in each step in the IPMP study five educational meetings were scheduled in the one-year study period. Complete background information was developed and a manual was distributed. The protocol of the study indicated that the participants should inform the researchers every three months about the progress of their activities. Structured documentation forms for each individual patient and per pharmacy were developed (Patient intervention Overview Form [POF] and Pharmacy Performance Form [PAF] both shown in appendices 3 and 4). Problems or limitations could be discussed with the researchers at any time.

The extensive education and the frequency of activities documented in the study protocol aimed at implementation of the complete intervention program in the pharmacies. Homogeneous conclusions of the participating pharmacists and good documentation of the process of the intervention are necessary to assess the outcomes of the randomized controlled trial.

In chapter 4 of this thesis the process of the IPMP intervention strategy is described.

**Evaluation of the intervention strategy**

**Patients’ opinions**

After concluding the first episode of the intervention satisfaction and evaluation questionnaires (shown in appendix 5) were sent by the researchers to patients who had consented with a written explanation of the purpose of the study. Patients were asked to return the anonymous but coded questionnaires directly to the researchers by using the enclosed reply envelopes. In this way their reports were biased as little as possible by socially desirable answers.

Not only patients’ satisfaction with the intervention was investigated but also their coping behaviour towards their medication and their current symptoms.
Pharmacists’ observations
Pharmacists recorded patients’ reported experiences and feelings, and their own observations concerning drug use, knowledge and drug-related problems of the patients during the first consultation on the consultation protocol. Copies of the protocols of patients who consented were sent to the researchers.

At the end of the study period the same patients were questioned by the pharmacists about the same items in the final consultation. This final consultation was also guided by a protocol corresponding to the questions of the first consultation and was documented by the pharmacists to investigate reported or observed differences and improvements after the one-year intervention period.

In chapter 5 of this thesis pharmacists’ observations and patients’ opinion of the provided pharmaceutical care are described.

Investigation of the effects of the intervention on patients’ medication

In the IPMP study the outcomes of pharmaceutical care interventions are determined by investigating changes in drug therapy.

Outcome of the randomized controlled trial
Main outcome measure of the randomized controlled trial was a change in the pulmonary medication before and after the intervention utilizing the IPMP algorithmic computer instrument. By measuring the change in deviant-treatment profiles per patient indicating the change in summed dispensed medication and patients’ adherence to prescribed medication, an objective marker has been introduced for changes in drug treatment or drug use. A profile change algorithm has been developed which values changes in profiles as improvement, equality or deterioration.

In the IPMP study the principle is endorsed that pulmonary treatment according to evidence-based guidelines will lead to optimal clinical outcomes and that the suboptimal drug use can result in the worsening of symptoms and in a poor long-term prognosis. Therefore improved drug treatment achieving optimal pharmacotherapy would be the most important (theoretical) result of an effective intervention towards patients at risk of suboptimal pulmonary drug therapy.
By comparing the changes in DTPs of patients of the intervention group with those of the reference group the efficacy of the pharmaceutical care strategy could be investigated.

Chapter 6 of this thesis is dedicated to the results of the randomized controlled trial.

**Investigation of the feasibility of the IPMP strategy in Dutch community pharmacies**

*Opinion of non-respondents to the invitation by the pharmacist*

To investigate the opinion of non-respondents to the invitation by the pharmacist a questionnaire about the patients’ satisfaction with common pharmacy services and about possible motives for declining pharmaceutical care was developed. Participating pharmacists sent these questionnaires to patients concerned. Patients were asked to return the completed forms directly to the researchers.

In chapter 7 of this thesis the results of the non-respondents survey are described.

*Pharmacists’ opinions and surveys about the feasibility of the intervention strategy in Dutch community pharmacies*

Four weeks after the start of the IPMP study the DUPS review procedure was investigated to ensure agreement between the participating pharmacists.

Halfway the IPMP study all participating pharmacists received a questionnaire (shown in appendix 6) to investigate their satisfaction with the IPMP intervention strategy and possible problems, limitations or successes in performing this kind of patient care.

Pharmacists' opinions, experiences and observed barriers concerning the intervention strategy were investigated in a discussion meeting at the end of the intervention period.

Chapter 8 of this thesis is dedicated to the results of the pharmacists’ surveys, the mentioned barriers for the intervention and discussed solutions.

Chapter 9 focuses on the general discussion and the overall conclusions drawn from the IPMP study.
Appendices
appendix 1: Medication review protocol
appendix 2: Consultation protocol, e.g. A
appendix 3: Patient intervention Overview Form [POF]
appendix 4: Pharmacy Performance Form [PAF]
appendix 5: Patients’ satisfaction and evaluation questionnaire
appendix 6: Pharmacists’ satisfaction questionnaire

Reference:
1. Donabedian A.
An Introduction to Quality Assurance in Health Care.