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General practitioners-community pharmacists pharmacotherapy discussion groups: Analysis of their implementation through a series of case studies

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ABSTRACT

Background: The evolution of primary care practice has led to the implementation of pharmacotherapy discussion groups between general practitioners and community pharmacists (PPPDGs) in some countries. The aim of these groups is to improve drug prescribing practices and strengthen interprofessional relationships.
Objective: To gain more insight into factors involved in successful implementation of PPPDGs.
Methods: PPPDG implementation in three countries (Belgium, the Netherlands, Switzerland), was analyzed in a series of case studies. A grid describing different evaluation criteria was completed by stakeholders in their respective country. The data collection was followed by a literature review.
Results: Various models were used to implement PPPDGs within each country and different dynamics were encountered. PPPDGs lead to positive effects on the quality and cost-effectiveness of drug prescribing and on the collaboration between general practitioners (GPs) and community pharmacists (CPs). Factors involved in implementation were also identified, such as expectations of GPs and CPs, configuration of the implemented model, and the role of CPs in the healthcare organization.
Conclusions: This study provides insight into the factors involved in successful implementation of PPPDGs in Belgium, the Netherlands and Switzerland. The findings can be used by healthcare professionals to improve the safety, cost-effectiveness of drug prescriptions and systems in primary care. This study offers a starting point for further research in the field.

1. Introduction

Since the introduction of pharmaceutical care, the role of community pharmacists (CPs) has shifted from product to patient-oriented care.[1,2] Simultaneously, collaboration between CPs and other professionals such as general practitioners (GPs) has tended to increase in various ways to improve the quality of patient care and potentially associated drug prescribing safety.[3–7] In several countries, this practice evolution has led to the implementation of regularly organized and structured pharmacotherapeutic management discussions between GPs and CPs. These discussions are part of an interprofessional process based on medical and scientific data as well as the prescribing habits of GPs. In contrast to certain types of collaboration, such as medication reviews for the management of a given patient, this interprofessional practice aims to improve the overall pharmacotherapy practice among these professionals.[6,8–10] In this article, this interprofessional practice will be referred to as "Physicians-Pharmacists Pharmacotherapy Discussion Group" (PPPDG).

Given their organization of care and health policy priorities, different countries have implemented PPPDGs using specific models. Although the implementation of some of these national models has been published in small numbers,[9,11–14] no study has attempted to provide a more comprehensive analysis of the implementation of the PPPDGs.

In this study, a comparative analysis of PPPDG implementation was conducted in three countries (Switzerland, Belgium, and the Netherlands) using three case studies. The objectives were to analyze

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how PPPDGs have been implemented in these countries, what contributions they have made within each healthcare system, and to identify factors related to successful implementation. The results can help healthcare system stakeholders (professional associations and institutions) better understand the potential of PPPDGs and best methods for successful implementation to specific systems. Researchers can use this as an exploratory study for further research on the limitations and facilitators of PPPDG implementation.

2. Methods

2.1. Study design

Three case studies were used to describe and compare the PPPDGs among the three countries. This method was particularly useful to obtain a multidimensional understanding of the complex systems in a real-life context.[15]

An initial literature review identified Belgium,[9] the Netherlands,[6,11,16] Scotland,[17] Sweden,[18] Switzerland,[8,13,19] and New Zealand[10] as countries in which PPPDGs existed or appeared to exist in various forms. Belgium, the Netherlands, and Switzerland were chosen for comparison of PPPDG implementation based on their use of recognized and structured practice models that have been subjected to evaluation and scientific publications.

2.2. Data collection and analysis

The series of case studies is based on experience and data provided by four pharmacists who are researchers or work within organizations that have supported the implementation of PPPDGs in their country. These pharmacists, the co-authors of this article, completed a thematic grid describing the various dimensions to be analyzed and compared (establishment of the implemented model in the country, configuration of the model, development, etc.) (see Appendix). This step was completed by a relevant literature review, mainly from scientific journals. Other sources, such as professional journals, and regulatory and institutional data from each of the three countries were also reviewed. From each PPPDG model, data regarding methods of implementation, initial objectives, current level of implementation, challenges, and contributions observed within each healthcare system was collected. Successive exchanges with co-authors made it possible to validate the transcribed data and, more broadly, the analysis contained in this article.

3. Results

3.1. Establishment and objectives of PPPDGs

Among the three countries, the Netherlands was the first country to establish PPPDGs around 1986; it was initiated by pioneers then officially taken over by the government in 1992 under the name of “Pharmacotherapy Audit Meeting” (PTAM).[6] The practice was then introduced by Switzerland in 1997[19] and Belgium in 2000, with the designations “Physicians-Pharmacists Quality Circle” (PPQC) and “Medico-Pharmaceutical Concertation” (MPC), respectively.

Various stakeholders were involved depending on the country. PTAMs and PPQCs were initially established by physician and pharmacist pioneers and then supported by public and professional organizations, respectively. PTAMs have been supported by the Dutch Institute for Rational Use of Medicine (IVM) that benefits from an institutional grant from the Dutch Ministry of Health,[20] while PPQCs were supported by the Swiss association of pharmacists, pharmaSuisse, the umbrella organization.[6,19] The implementation of PTAMs initially benefited from IVM advisors for support.[6] In Belgium, MPCs were set up by a joint initiative of several professional and institutional organizations, the Scientific Society of General Medicine (SSMG), Scientific Society of Francophone Pharmacists (SSPF), Belgian Center for Pharmacotherapeutic Information (CBIP), and Inspection of Pharmacy of the Federal Agency for Medicines and Health Products (FAMHP) without any initial involvement in health policy. Around 2012–2013, MPCs became overseen by the National Institute of Health and Disability Insurance (NIHDI), an institution responsible for the general management and control of Belgian healthcare systems, which contributed to their development.

The objective of these different models of PPPDGs was the same, namely, to integrate the expertise of both professions through the exchange of information and practices to optimize drug prescribing practices among GPs to improve quality, safety and cost-effectiveness.[6,19,21] Improving relationships between GPs and CPs at the local level was another explicit objective pursued by the three models.[19,21]

3.2. Configuration of the implemented PPPDG models

PPPDGs have been implemented in each country using a national model (PPQC, PTAM, or MPC) with similarities and variations. The general characteristics, methodology associated with the preparation and conduct of meetings, and related practical aspects of each PPPDG model are described in this section and summarized in Table 1.

3.2.1. General characteristics of PPPDGs

PPPDGs are generally characterized by the organization of regular, pre-defined discussions between GPs and CPs from local practice regions. During these interprofessional discussions, the scientific, clinical, pharmacotherapeutic, and economic aspects of disease management are discussed, adapted to their daily practice setting and drug prescription habits of the group.[6,8,19,21,22]

Groups are made up of 1 to 3 CPs and 5 to 15 GPs who meet, on average, 3 to 6 times per year.[6,8,16] Among the professionals involved in PPPDGs, some contribute to the preparation and conduct of meetings, while others generally limit their contribution to participation in meetings. In this article, these two profiles of professionals involved in PPPDGs will be referred to as “facilitators” and “participants.” In addition, depending on the model (MPC, PPQC, or PTAM) and the topics discussed, other health professionals, such as hospitalists,[16] pediatricians,[22] geriatricians, hospital pharmacists,[21] and practise nurses are sometimes integrated.

The support to professionals provided by an organization is another general characteristic of PPPDGs. As already mentioned, this support can be institutional, such as IVM for PTAMs and NIHDI for MPCs, or professional with pharmaSuisse for PPQCs. Depending on the model, this support involves financing, provision of prescribing data, facilitator training, and/or provision of programs or supporting materials for meetings.[6,8,21]

3.2.2. Preparation and conduct of meetings

The three PPPDG models differ in the way sessions are prepared and meetings are conducted.

While the preparation and facilitation of PPQCs is exclusively done by one or more CPs in Switzerland, joint preparation by a GP and a CP is carried out in the PTAM and MPC models to make the meetings more focused on the practical aspects of both professions.[6,8,21] In addition, CPs who participate in PPQCs are always involved as facilitators, never as participants.

The three models also differ in terms of the autonomy and freedom that facilitators have for preparing and conducting meetings. In Switzerland, the framework for the preparation and conduct of meetings aims to ensure that groups are homogeneous and have identical quality objectives, whereas in the Netherlands and Belgium, groups are allowed to adapt more to the context in terms of meeting organization and quality objectives.[8,14,21] For example, in the Netherlands, the quality level of PTAMs is classified into four levels and assessed by IVM using sixteen criteria, number of meetings performed, average time of

Table 1
Characteristics of the three PPPDG models studied.

Studied models	Belgium Medico-Pharmaceutical Concertation (MPC)	Netherlands PharmacoTherapy Audit Meeting (PTAM)	Switzerland Physicians Pharmacists Quality Circle (PPQC)
Profession of facilitators	General Practitioners (GP), Community Pharmacists (CP)	GPs, CPs	CPs
Profession of participants	GPs, CPs and also sometimes hospital physicians and pharmacists	GPs, CPs and also sometimes hospital practitioners Depending on the subject, participants can be for instance also practice nurses, specialists in geriatric medicine, district nurses	GPs, and also sometimes specialist physicians in internal medicine and pediatricians
Average number of participants	We do not have precise data but we can suggest 2–3 CPs and 5–15 GPs	2–3 CPs and 7–10 GPs	1–3 CPs and 5–15 GPs
Supporting organization	NIHDI	IVM	pharmaSuisse
Topics discussed	Topics based on "quality promotion programs" validated by the NIHDI	Free choice of topics, although most PTAM groups choose topics that are related to new/updated guidelines of the profession	Topics covering the majority of pathologies encountered by GPs in their practice
Average frequency of meetings	No fixed frequency	4–6 per year	3–4 per year
Duration of meetings	2 h on average	1,5–2 h on average	2 h on average
Practical aspects of preparation and facilitation of meetings	Joint preparation by a GP and a CP but possible contribution of other trained facilitators	Joint preparation by a GP and a CP	Preparation by one or several CPs
Provision of drug prescribing data	Possible but not systematic, at the request of facilitators	This depends on the quality level of the PTAM (mainly levels 3 and 4)	For every PPQC

CP: Community pharmacist, GP: General Practitioner, IVM: Dutch Institute for Rational Use of Medicine, MPC: Medico-Pharmaceutical Concertation, NHIDI: National Institute of Health and Disability Insurance, PPQC: Physicians-Pharmacists Quality Circle, PTAM: Pharmacotherapy Audit Meeting.

meetings, joint preparation by a GP and CP, use of drug prescribing data, drafting of agreements on the choice of drugs, and verification of compliance decisions made with drug prescribing data.[14,23] Furthermore, although the provision of drug prescribing data from participating GPs is a common feature of PPPDGs, it is not systematic across all models.[6,8,14,24] Indeed, this provision of drug prescribing data is systematically made available within PPQCs while it is not within MPCs and PTAMs, depending on the quality level of the latter.[14,21]

Owing to these differences, the practical aspects of the preparation and conduct of meetings also differ between PPPDG models, depending on the provisions and tools available for each model. For the preparation of PPQCs, facilitators have training modules developed by pharmaSuisse at their disposal. These training models incorporate a broad review of the international literature, guidelines, pharmaceutical profiles of prescribed drugs, and their place in therapy, including advantages, disadvantages, and proposals for the implementation of practice consensus for facilitators to draw inspiration to address more specific topics.[8] Within this model, facilitators must follow a specific continuing education program which includes basic training (50 h) followed by continuous training (updates of 16 h / year) covering, among the 13 courses offered, approximately 80% of the different pathologies seen in a GP's current practice, such as cardiovascular diseases, infectious diseases, gastroenterological diseases, diabetes, etc. The facilitator chooses the topics to cover during each session, and uses annually updated data from pharmaSuisse to allow GPs to adhere to up-to-date and evidence based practices.

In Belgium and the Netherlands, different supporting materials are proposed for meeting preparation (training for facilitators, practical manuals for the collection and local analysis of data) and their conduct (methods to facilitate meetings, examples of clinical cases, etc.). Supporting materials are specific to each topic. The topics vary, ranging from atrial fibrillation to diarrhea for PTAMs or from pharmacovigilance to the proper use of antibiotics and NSAIDs for MPCs. Approximately 100 topics are offered on the IVM platform and 33 topics (of which 17 are available in Dutch, 7 in French, and 9 in both languages) are accredited by the NIHDI for MPCs.[20,21] These topics are provided by various stakeholders (professional organizations, universities, scientific societies) whose programs can be developed with IVM for PTAMs or must be previously validated by NIHDI as a "quality promotion program" for MPCs. In the Netherlands, to gain accreditation points, a PTAM group must have a quality coordinator. This is a specially trained GP who follows a basic training, then 10 h training spread over 5 years.[25] In Belgium, certain professional organizations such as the Scientific Society of Francophone Pharmacists (SSPF) provide facilitators to help health professionals prepare and facilitate meetings.[26] The provisions associated with these two models suggest a greater disparity and flexibility for the preparation and conduct of PPPDGs in Belgium and the Netherlands.

For facilitators, the time needed to prepare a meeting depends on the topic and methods used to prepare the meeting (provision of drug prescribing data, supporting materials, etc.). However, the different time investments of facilitators varies depending on the PPPDG model. According to pharmaSuisse, it takes between 30 and 40 h to fully prepare for a PPQC meeting because the facilitator must prepare information based on their training and the prescriptions of the GPs. For PTAMs, a recent survey conducted by IVM in 2019 reported that the average preparation times were: 1–2 h (15%), 2–3 h (26%), 3–4 h (27%), >4 h (30%). Although official information on this subject could not be provided by the NIHDI, it seems that the hourly volume associated with the preparation of an MPC meeting is similar to that of a PTAM meeting.

Meetings typically take place over a period of two hours, and participants are not generally expected to prepare for them. However, for PTAMs, depending on the topic, participants are sometimes required to prepare drug prescribing data from their own information system, research specific cases, or completing online training before meetings. In addition, participants in the PTAM group can alternate to facilitate meetings. Thus, each participant occasionally prepares for a meeting (CPs more often than GPs).

3.3. Context of PPPDG implementation in the three countries studied

Each PPPDG model has been implemented in a specific healthcare system. As PPPDGs involve GPs and CPs in institutionally recognized meetings, we specifically analyzed the implementation context of each country along three dimensions: the practice mode of GPs, the clinical practice of CPs, and the recognition of these professionals in the PPPDGs. Describing each of these dimensions is particularly important to better understand the context in which each model was implemented and assess how they may have influenced the implementation of PPPDGs within each country. These three dimensions are described in this section and summarized in Table 2.

Table 2
Context of PPPDG implementation for the three models studied.

Studied models	Belgium Medico-Pharmaceutical Concertation (MPC)	Netherlands PharmacoTherapy Audit Meeting (PTAM)	Switzerland Physicians Pharmacists Quality Circle (PPQC)
Mode of practice of general practitioners			
Mode of practice	Majority working alone (*60% in 2015*)	Majority working in medical groups (*90% in medical groups or healthcare centers in 2016*)	Significant solo practice (*45% in 2015*)
Participation in Quality Circle involving only GPs	Decreased (*60% in 2015* versus *75% in 2000*)	Significant and ongoing participation (*75% since the early 2000s*)	Significant increase (*85% in 2015 compared to 20% in 2000*)
Clinical practice of community pharmacists			
Introduction of clinical pharmacy	*Pharmaceutical care introduced by legislation in 2006*	*Developed in community pharmacies since the 1970s*	*Deployment after the establishment of PPQCs*
Current pharmaceutical services	Some paid pharmaceutical services (*reference pharmacist, use of corticosteroid in asthma*)	Good implementation of medication reviews as well as the establishment of cooperative programs	Several clinical and inter-professional services (Siscare, Netcare)
Financial recognition of professionals involved in PPPDGs			
Funder	NIHDI	Health insurers	Health insurers via a fund financed by all the community pharmacies
Subject of funding	MPC groups(*« Local project »*)	PTAM groups (*participants and facilitators*)	CP facilitators
Conditions of funding	Acceptance of the "local project" by the NIHDI Maximum budget allocated of 2500 euros per "local project »	Higher level groups with a majority of patients from certain insurers	Fulfilment of certain pre-established conditions (*facilitating at least 3 meetings per year, integrating GPs' prescribing data, making an annual report,* etc.)

CP: Community Pharmacist, GP: General Practitioner, MPC: Medico-Pharmaceutical Concertation, NHIDI: National Institute of Health and Disability Insurance, PPQC: Physicians-Pharmacists Quality Circle, PTAM: Pharmacotherapy Audit Meeting.

3.3.1. GP mode of practice

The practice pattern of GPs in a country can be reflected in their individual practice as well as their collaboration (alone, in medical centers, participation in peer groups, etc.).

In the Netherlands, GPs have been used to working in medical groups for several years. Most Dutch GPs work in medical groups or healthcare centers (90% in 2016)[27,28] and three-quarters of them regularly participate in Quality Circles involving only GPs, with a constant rate of participation since the early 2000s.[28]

In Switzerland, despite several initiatives launched by the Swiss Confederation or the Canton of Vaud to promote interprofessional practice, 45% of Swiss GPs practiced alone in 2015.[29] However, over the last 20 years, the practice of Quality Circles involving only GPs has become more attractive to GPs (85% in 2015 compared to 25% in 2000).[28] In addition, in several German-speaking regions of Switzerland, GPs directly dispense medications to patients, without involvement of community phramcies.[30] This represents GP practice diversity within the same country and explains the small number of community pharmacies and limited interprofessional collaboration between CPs and GPs in these regions.

In Belgium, most GPs still practice alone. Despite policies undertaken since the 1970s to develop multidisciplinary medical centers,[27,31,32] the majority of GPs practiced alone in 2015 (60% in 2015 versus 70% in 2007).[27,28] In addition, the strong appeal of GPs to Quality Circle involving only GPs, has declined over the past 20 years. The participation rate in these groups decreased from 75% in 2000 to 60% in 2015.[28]

These data highlight that GP practice in each country has represented a different context for the implementation of PPPDGs in these locations.

3.3.2. Clinical practice of CPs

During PPPDG facilitation, CPs adopt a clinical and collaborative position with GPs to discuss pharmacotherapy, as in the practice of clinical pharmacy and pharmaceutical care. However, the PPPDGs were introduced in different contexts of CP clinical practice development in the three countries studied.

In the Netherlands, the concept of clinical pharmacy was first developed in community pharmacies in the 1970s. The introduction of this practice, as well as increased collaboration between GPs and CPs using shared medical records, allowed CPs to play a more important role in the pharmacotherapeutic management of patients[16,33] when PTAMs were launched in the early 1990s. The CP's expertise patient management was significantly strengthened within the Dutch primary healthcare system through the successful implementation of medication reviews and the establishment of cooperative programs involving GPs and CPs in the home care of elderly patients.[33,34]

In Switzerland, the evolution of CPs' clinical and interprofessional practices occurred later than the Netherlands. PPQCs were truly an innovation in CPs' role in prescribing and the development of interprofessional practice when there was little collaboration between GPs and CPs. Since the establishment of PPQCs, the practice of Swiss CPs has continued to evolve towards a more clinical and interprofessional approach, such as Siscare or Netcare.[35] In addition, the development of clinical pharmacy in Swiss hospitals has also contributed to better physician recognition of the pharmacist's expertise in the pharmacotherapeutic management of patients.

Clinical pharmacy in Belgium emerged even later than in the Netherlands and Switzerland. Indeed, the concept of pharmaceutical care was only legally introduced in 2006 and then defined in more detail in 2009 within the Good Pharmacy Practice with the Royal Decree of January 21, 2009.[36,37] Since then, a number of remunerated pharmaceutical services have been introduced (proper use of inhaled corticosteroids in asthma (2014), reference pharmacist (2017) and medication reviews (2023)).[36,38,39] However, MPCs have been established in a context where these new pharmaceutical services, oriented towards a clinical and interdisciplinary practice, encounter difficulties in setting up for various reasons (lack of interest from patients, lack of time, perception of GPs, work organization, etc.).[34,36]

3.3.3. Recognition of health professionals in the PPPDGs

Since PPPDGs have been recognized by institutions and professional organizations in the three countries studied, health professionals involved in PPPDGs have obtained financial and even professional recognition, notably through continuous training. However, in the three countries studied where the financial benefits paid to patients and/or health professionals are managed by health insurers, this recognition of health professionals involved in PPPDGs, whether they are facilitators or participants, has not been and is still not recognized in the same way and with the same conditions.

In the Netherlands and Switzerland, remuneration attributed to these professionals (facilitators and participants) is currently managed by the insurers. However, in these two countries, financial recognition is only

provided to some professionals and only in specific circumstances.

In the Netherlands, while all involved professionals received financial incentives from health insurers in the early years of PTAMs, not all PTAMs are currently paid. Only high-level groups are paid by insurers in instances when a majority of the patients are insured by certain insurers. This incentive consists of compensation in the form of a small, fixed annual amount for each patient.

In Switzerland, although there was initially no funding for facilitators or participants, all CP facilitators were compensated for their involvement in PPQCs starting in 2012. Currently, the remuneration of CP facilitators comes from negotiations between pharmaSuisse and the umbrella organizations of insurance companies, Santésuisse and Curafutura. This remuneration is disbursed from a joint fund shared between pharmaSuisse and the umbrella organizations of insurance companies.[40] This is a contribution fund established through a levy on each box of prescription only medicines sold by CPs and is used to finance projects to evaluate new services and to finance PPQCs up to around 16,000 euros[1] per year and per CP facilitator. To be paid, each CP facilitator must meet several conditions, such as facilitating at least three meetings per year, integrating GPs' drug prescribing data, and producing an annual report.

In Belgium, the professionals involved in MPCs are not paid by the health insurers themselves but by an institutional organization, the NIHDI, which is in charge of general management and control of healthcare and indemnity insurance in Belgium.[41] In fact, as part of legislation in 2015, which defined the conditions and the modalities of the MPCs' implementation,[24] the NIHDI allocates a maximum budget of 2000 euros to finance a "local project" of MPC.[42] Within this budget, projects with facilitator(s) receive an additional allocation based on the cost of the facilitator(s), with a ceiling of 500 euros more per MPC. Thus, the maximum budget that can be allocated per "local project" is 2500 euros.[42] To be paid, a facilitator must either be attached to the "quality promotion program" on which the project is based or have undergone specific facilitator training.[42]

Furthermore, professional recognition of professionals involved in PPPDGs, particularly in terms of continuous training, exists in the three countries but in different ways. In Switzerland, PPQCs are recognized as continuing education activities by the Swiss Society of General Medicine and pharmaSuisse.[19] In Belgium and the Netherlands, the involvement of professionals is also recognized as part of continuous training by their professional organizations, but different procedures are present for GPs and CPs.

3.4. Challenges of the current implementation level of PPPDGs in these countries

Owing to differences in history and implementation contexts, as well as the various dynamics encountered, the implementation level of PPPDGs is different in the three countries studied, with each model currently facing various development or maintenance challenges. These findings are summarized in Table 3.

In the Netherlands, PTAMs have been well-established for many years, and saw a rapid and significant establishment among Dutch GPs and CPs.[6] Thus, since 1995, almost all Dutch GPs and CPs (up to 95%) have been involved. There were over 800 PTAMs in 2022.[6,14,16] Public policies have accompanied the development of PTAMs and still consider PTAMs an important tool for optimizing pharmacotherapeutic management. Therefore, the government still finances the development of independent supporting materials, to which the Dutch College of General Practitioners and the Royal Dutch Pharmacists Association contribute. These professional organizations promote PTAMs because they see them as an important instrument for the implementation of their guidelines (concerning pharmacotherapy) and as an implementation tool for successful interventions in primary care. In addition, PTAMs are part of the training program for pharmacy students and, to a lesser extent, medical students in general practice (depending on the university).

In Switzerland, there were approximately 100 PPQCs (which represent approximately 800 GPs and 100 CPs) in 2022, but they are not homogeneously distributed throughout the country.[43] Indeed, after being introduced in a few cantons, this model has gradually spread across Switzerland. However, they mainly exist within the French-speaking cantons, with nearly a third of PPQCs were counted in 2019 in the canton of Vaud (30 PPQCs).[43] They are also present within Italian cantons, and a minimal presence of less than five PPQCs in the German-speaking regions of Switzerland. This can be explained by competition between GPs and CPs within these regions, where GPs can also dispense medications. Compared to the Netherlands, the participation rate of professionals in PPQCs is lower, but these data highlight a growing and consolidated implementation level in certain cantons where this model has been established since its beginning (e.g., Canton of Vaud).[43] Currently, PPQCs are facing difficulties in their future development. The funding of the model with health insurers requires pharmaSuisse to assess the medico-economic efficiency of PPQCs to negotiate the remuneration of CP facilitators and to make the model sustainable. Obtaining high quality medico-economic data is an important parameter requested by facilitators to easily manipulate and discuss the data during meetings.

In Belgium, the development of MPCs seems modest. Although financial planning allocated a budget to support 800 "local projects" per year until the end of 2018, only 386 have been established since 2015.[9] MPCs implementation encounters different dynamics between the French and Dutch-speaking parts of the country. In fact, MPCs are implemented more in the Dutch-speaking part, where 322 "local projects" have been recorded since 2015, 48 in the French-speaking part, and 16 in the Brussels area. In Belgium, one of the main challenges faced by the MPCs is their development. According to the only study carried out in Belgium on this model, this practice is appreciated by involved professionals whose enthusiasm seems to be growing.[9] The lack of use of drug prescribing data is a limitation of MPCs in promoting their usefulness for public policies seeking to optimize drug prescribing in Belgium, particularly by GPs.

Although the configurations of these three PPPDG models and their current implementation levels differ, it was possible to assess the contribution of PPPDGs to each of the three healthcare systems studied.

3.5. Contributions of different PPPDG models implemented

Based on the evaluations conducted by the supporting organizations and those published in academic journals, it appears that these three models were not evaluated according to the same criteria or with the same methodological precision. These institutional and academic assessments have variable levels of proof. However, they provide do indications, sometimes precise and quantify the contributions made by PPPDGs to the healthcare systems. These assessments are reported using three dimensions: quality of drug prescription, cost-effectiveness, and collaboration between GPs and CPs.

3.5.1. Regarding the quality and safety of drug prescription

Studies on the implementation of the three models have highlighted the overall positive effect of PPPDGs on the quality and safety of drug prescriptions by participating GPs, particularly regarding the choice of drugs prescribed. These studies show that PPPDGs have contributed to improving the quality of drug prescriptions for specific pharmacotherapeutic management, such as reducing the prescription of benzodiazepines or obtaining a more appropriate prescription of antibiotics for respiratory disorders in adults and adolescents (in the Netherlands),[44,45] and in the management of cardiovascular diseases and diabetes (in

[1] In this article, the conversion of the beginning of the year 2022 which is 1 euro = 1.03 CHF was used to express the amounts mentioned in the Swiss evaluations.

Table 3
Current implementation levels of the three PPPDG models studied.

Studied models	Belgium Medico-Pharmaceutical Concertation (MPC)	Netherlands PharmacoTherapy Audit Meeting (PTAM)	Switzerland Physicians Pharmacists Quality Circle (PPQC)
Development	Difficult in view of the allocated funding	Fast and significant from its establishment	Increasing and gradual implementation
Current implementation level of PPPDGs	386 "local projects" implemented since 2015	Over 800 PTAMs (*95% of Dutch GPs and CPs*)	Around 100 PPQCs (*about 800 GPs and 100 CPs*)
Distribution within the country	Majority in the Dutch-speaking part (*322 "local projects"*), French-speaking part (*48*) and Brussels region (*16*)	Homogeneous distribution	Mainly in the French-speaking (*one third*) and in Italian-speaking cantons Very few in the German-speaking parts (< *5*)

MPC: Medico-Pharmaceutical Concertation, PPPDG: Physicians-Pharmacists Pharmacotherapy Discussion Group, PPQC: Physicians-Pharmacists Quality Circle, PTAM: Pharmacotherapy Audit Meeting.

Switzerland).[13,19]

In the Netherlands, even if not all the studies are unanimous concerning the correlation between the quality level of PTAMs (4 predefined levels) and the quality of the drug prescription, it appears nevertheless that PTAMs globally contribute to improving drug prescribing by the involved GPs, especially for high-quality PTAMs.[11,14,46–49] This issue has not been extensively studied in the Belgian model, but the only published study shows that this model has led, for some of these groups, to the elaboration of consensus, such as the notification of kidney function on prescriptions in order to inform CPs of the patient's kidney function during drug dispensing.[9] While the actual impact of these consensuses on practice has not been evaluated, their development is a first step in improving the quality of drug prescribing by participating GPs.[9]

3.5.2. *Concerning the cost-effectiveness of the drug prescription*

The most convincing results in terms of the cost-effectiveness of drug prescription were highlighted in studies that evaluated the Swiss PPQC model. The last evaluation conducted between 1999 and 2010 reported that PPQCs contributed to a significant reduction in the costs of drugs, a 40% difference in annual drug costs per patient for GPs involved in PPQCs.[13] This evaluation focused on the overall costs of expenses incurred per patient as well as those relating more specifically to five pharmacological classes from the category of cardiovascular drugs, in particular with regard to the level of generics and the choice of drugs.[13] In 2016, the savings made with PPQCs were evaluated at 27 euros for a patient followed by a GP involved with a PPQC.[22] This represents a saving of 40,735 euros per physician per year. Extrapolating this amount to all GPs working in Switzerland (around 21,000), the potential savings would be approximately 855 million euros per year.[22] A study financed by a fund for joint quality (pharmacists-insurers) is currently ongoing in Switzerland to assess the cost-effectiveness and adequacy of PPQCs. No large-scale studies have demonstrated the economic benefits of the PPPDGs in the Netherlands and Belgium. However, in the Netherlands, data indicate that the implementation of PTAMs has allowed some territories to decrease their health expenditure. In the city of Asten (about 16,000 inhabitants), in 2018, the primary care drug expenditure was 600,000 euros lower in 2018 than expected for a community of the same size.[50]

3.5.3. *Concerning the collaboration between GPs and CPs*

The satisfaction of the involved professionals, whether as facilitators or participants, has been demonstrated by various studies in the three countries studied and, in this sense, converges particularly with regard to the improvement of collaboration between GPs and CPs. For the three models, these studies have confirmed greater satisfaction and an enrichment for GPs and CPs working together in PPPDGs.[6,9,22] Thus, these studies have shown that this practice has contributed to improve their relationships through better mutual knowledge, a better understanding of each other's tasks as well as an enrichment of their professional practices.[6,9,22] For their part, CPs mentionned that they were much more likely to contact a GP when they had a question.[6] However, as highlighted by two studies,[6,9] professional expectations seem to evolve depending on the history of their involvement in this practice. First, professionals seem to seek to improve communication with other professionals and exchange medical information and drug-prescribing behaviors. Second, they aim to implement effective measures in their respective practices. In a survey conducted in November 2017 in Switzerland, a large majority of CP facilitators (84%) considered it worthwhile to set up PPQCs because even if time investment was important, it allowed them to improve patient care (70%) while increasing collaboration with GPs (88%).[22]

The evaluations conducted during the implementation of the PPPDGs for the three models studied have led to positive results concerning the three criteria discussed, even though the levels of evidence were variable.

4. Discussion

This series of case studies shows that PPPDGs have been implemented through various national models with both similarities and specificities. However, all models seek to optimize the quality, safety, and cost-effectiveness of drug prescribing among GPs by combining the expertise of GPs and CPs. Despite the different histories and dynamics observed between models, these evaluations nevertheless show the potential of PPPDGs for the practice of professionals, but also for healthcare systems seeking to address various challenges such as controlling drug expenditures, shifting towards the proper use of drugs, or increasing interprofessional relationships.

Many factors may have conditioned the implementation, deployment, and contribution of the three PPPDG models. Therefore, this comparative analysis is limited and highlights some of the factors that can be classified into three contextual levels: those associated with the individual practices of professionals, those associated with the characteristics of the implemented model, and those related more generally to the functioning of the healthcare system.

Concerning the individual practices of professionals, the response of the PPPDGs to the expectations of professionals, whether facilitators or participants, is undoubtedly a condition for their involvement. Professionals saw PPPDGs as a relevant way to improve their drug prescription activity and had more relationships with other GPs and CPs in their territory. Evaluations showed that these expectations were satisfied,[6,8,9,22] particularly in the Netherlands and Switzerland where this practice has a certain history.

The characteristics of the implemented model are other factors that may affect the implementation of PPPDGs and influence the integration of PPPDGs into professional practices. Depending on the configuration chosen by the supporting organizations to implement their respective model (practical aspects of preparation and facilitation, support provided, etc.), the characteristics of the implemented model may have a

greater or lesser impact on the involvement of professionals, particularly in terms of their personal availability. Indeed, while the contribution of the participants is rather modest, mainly represented by their simple participation in meetings, the contribution of facilitators is much more important and can be perceived as such. Although the contribution of facilitators was not cited as a limit, especially in Switzerland, where it was considered important by the latter,[22] the contribution of facilitators may represent a limitation to implementing PPPDGs. The role played by supporting organizations is, therefore, essential to facilitate the implementation of PPPDGs using the provision of various supporting materials (drug prescribing data, training modules for facilitators, etc.). Considering the observed dynamics, one model does not seem to be more suitable than the other. However, the PTAM and MPC models are advantageous as preparation for meetings is less time-consuming. Furthermore, the initial support provided to Dutch professionals by IVM advisors during the establishment of PTAMs[6] was a measure that probably helped in the rapid implementation of PTAMs in the Netherlands.

Beyond integrating PPPDGs into professional practice, the question of valuing participation in PPPDG must also be asked. Participants and facilitators devote time and effort to making these groups work. In countries where the majority of these health professionals are independent, particularly GPs,[28] recognition of their involvement, by financial (compensation for time spent) or professional (recognition in terms of continuous training) recognition could legitimately be a facilitating factor. Conversely, the lack of remuneration may be a hindrance, particularly when CP facilitators spend considerable time preparing and facilitating, as is the case in Switzerland. The amount of time spent therefore makes the question of remuneration or recognition more or less decisive. In Switzerland, CP facilitators are paid. In the Netherlands, there was funding from health insurers at the onset of PTAMs; however, currently, only professionals involved in a few high-level PTAMs are funded, and this non-systematic funding of professionals has not prevented this practice in the Netherlands. To judge the need for remuneration for their involvement, it would also be necessary to examine the overall patterns of remuneration of professionals and what is covered by the income already received.

Beyond the factors related to the individual practices of professionals and the characteristics of the implemented model, more general factors associated with the functioning of healthcare systems may have influenced the implementation of PPPDGs in the three countries studied.

First, the characteristics of primary healthcare organizations are factors that may have conditioned the implementation of PPPDGs. A primary healthcare organization such as the one in the Netherlands, where the majority of GPs are used to having a collaborative practice (participation in Quality Circles involving only GP groups, working in medical groups, collaborating with CPs), is a favorable context that may have facilitated the implementation of PPPDGs and explained in part the rapid and significant implementation of PTAMs in the Netherlands. On the other hand, the characteristics of a primary healthcare organization, such as Belgium, where most GPs still practice alone and where pharmaceutical services are not so widely deployed, may have represented a limiting context for the implementation of PPPDGs. Additionally, the coexistence of different healthcare organizations or professional practices in the same country can have a significant impact on the implementation of PPPDGs. The implementation of PPPDGs with varying dynamics in Switzerland and Belgium is an example that can be explained by different professional practices between regions, such as the dispensing of medicines by GPs in German-speaking parts of Switzerland, as well as by other factors that could not be identified in this analysis.

Healthcare and professional policies that define the role of CPs and their practices in primary healthcare are also factors that may have conditioned the implementation of PPPDGs. Indeed, historically focused on the preparation and dispensing of drugs, the CP's activities in all these countries have evolved towards the concept of pharmaceutical care, which represents an activity that is more focused on pharmaceutical expertise towards patients and GPs. Thus, the history of the political measures taken to legislate this evolution and its effective evolution within the country may have conditioned the implementation of the PPPDGs. The much older and more developed pharmaceutical care practice in the Netherlands than in Belgium may partly explain the different dynamics of PPPDG implementation between the two countries. In this context, the willingness of institutions or professional pharmaceutical organizations to support this type of practice may have played an important role. This is the case in Switzerland, where the support of pharmaSuisse and the medico-economic evaluation carried out have allowed PPQCs to be recognized by politicians and funders, as well as to be integrated into Swiss policies by using the expertise of CPs in the search for the cost-effectiveness of their healthcare system. In the Netherlands, public policies have also supported this practice through its development (funding for the development of independent supporting materials), and professional organizations promote this practice, which is integrated into the initial training of pharmacy students and some general medical students. In Belgium, support from professional organizations such as the SSPF for the preparation and conduct of meetings, as well as recent legislation in 2015 framing the conditions and modalities for the implementation of MPCs through NIHDI funding are also facilitating professional and political actions. The non-systematic provision of drug prescribing data during these meetings seems to have led to a less ambitious policy orientation towards this practice in Belgium. However, the fact that professionals initially expect more from exchanges with other professionals than a quantified assessment of their practice[6,9] did not seem to represent a significantly limiting factor in the implementation of MPCs in Belgium.

As previously mentioned, funding for professionals involved in PPPDGs may have facilitated their implementation. However, the nature of funders and their relationships with professionals may be other key elements in both the objectives and implementation of PPPDGs. Indeed, the funding of professionals involved in PPPDGs by health insurers, as is the case in the Netherlands and Switzerland, aims to reduce healthcare costs. This method of funding with selective consideration returns (higher-level PTAMs with a majority of patients from certain insurers and CP facilitators who meet the pre-established conditions) may represent a non-facilitating way of funding the establishment of PPPDGs. This did not seem to be a limiting factor with regard to the dynamics of PTAMs and PPQCs, but this requires negotiation between health insurers and professionals, as pharmaSuisse does, to make this model sustainable. On the other hand, the funding of professionals involved in PPPDGs by an institutional organization such as the NIHDI in Belgium, which is responsible for the general management and control of healthcare insurance, may represent a facilitating factor, especially for the initial establishment of this practice. Indeed, although professionals are paid by health insurers as part of their daily practice in Belgium, this public funding of professionals through smaller considerations than in other PPPDG models (PPQCs and PTAMs) may have facilitated the initiation of PPPDGs in Belgium.

This comparative analysis of the implementation of PPPDGs in Belgium, the Netherlands, and Switzerland allowed to identify some factors that may have conditioned the implementation of PPPDGs at three different contextual levels: the individual practices of professionals, the characteristics of the implemented model, and the functioning of the healthcare system. Based on the Generic Implementation Framework (GIF),[51] Fig. 1 illustrates the various implementation factors at the contextual level.

5. Strengths and limitations of the study

Based on a series of case studies, this study represents the first step in identifying factors that may affect the implementation of PPPDGs. The use of a case series leads to a better understanding of how PPPDGs can be implemented but does not enable the assessment of the specific

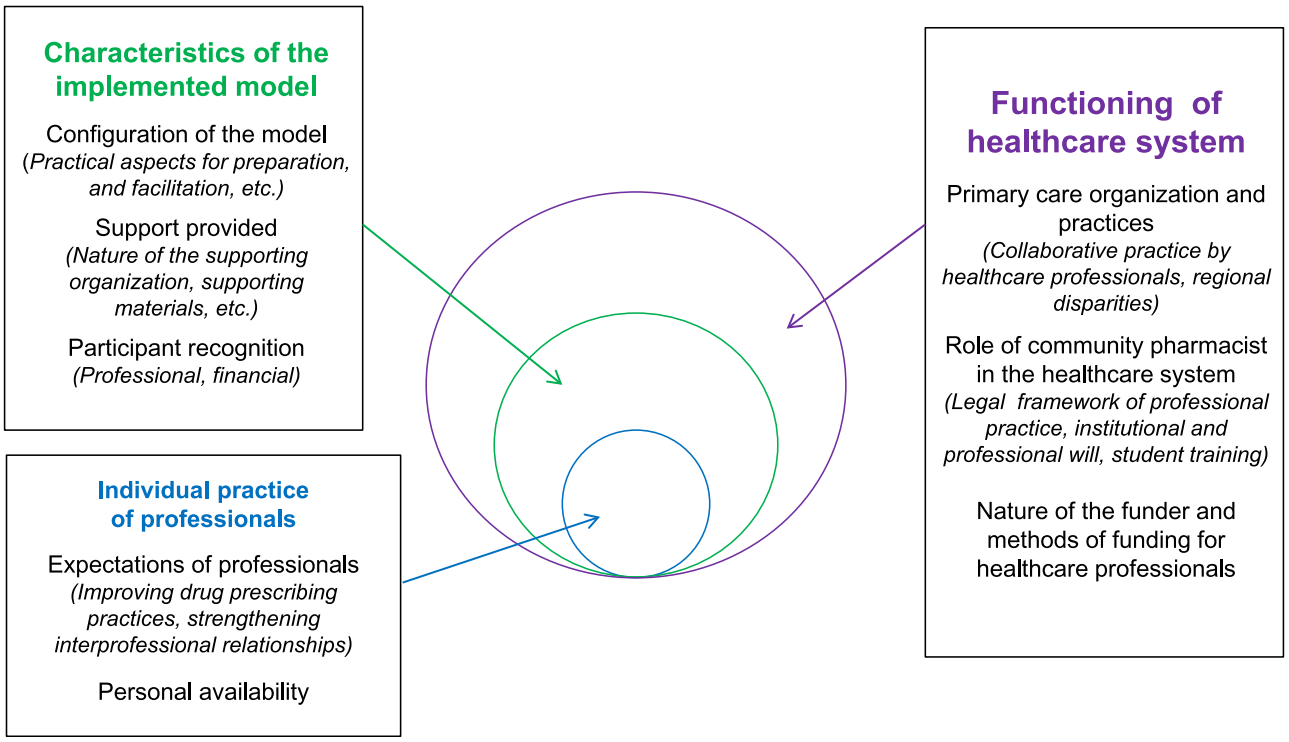

Fig. 1. Mapping of PPPDGs implementation factors by contextual level.

contribution of a given factor for the successful implementation of PPPDGs. Therefore, this study does not provide general recommendations for other countries wishing to implement PPPDGs within their healthcare systems. However, these results allow countries wishing to implement PPPDGs to assess and analyze the factors that should be considered. Further studies are needed to better understand the most important factors in the successful implementation of PPPDGs. Expanding this comparative study with other countries (for instances New Zealand,[10] Scotland,[17] Sweden[18]) where PPPDGs seemed to exist, could provide more insights into factors associated with successful implementation of PPPDGs. In addition, further studies on the implementation of the three models studied (MPC, PPQC, and PTAM) could help to more precisely identify the role and effect of individual factors on the implementation of PPPDGs. The use of more sophisticated implementation frameworks, such as the Consolidated Framework for Implementation Research (CFIR)[52] and the integration of professionals through interviews could help achieve these objectives.

6. Conclusion

This series of case studies has shown that PPPDGs can be implemented in different ways, although their common overall objectives are to improve drug prescribing practices and cost-effectiveness, and strengthen inter-professional relationships. Some factors that may affect the implementation of PPPDGs have been identified, such as the GPs' and CPs' expectations of this practice, the configuration of the implemented model, and the CP's role in the healthcare organization. These results provide a starting point for understanding the successful implementation of PPPDGs, which can be used by health professionals to improve the quality, safety, cost-effectiveness of drug prescriptions and systems in primary care. This study welcomes further research with more explanatory approaches to more precisely determine the importance of various factors.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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