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RESEARCH

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What competencies are needed to develop collaboration between general practitioners and pharmacists through initial interprofessional training? An analysis of training needs through a qualitative occupational didactic approach

Maxence Pithon^{1,3*}, Gilles Tanguy¹, Sabrina Bedhomme¹ and H el ene Vaillant-Roussel²

Abstract

Background Collaborative practice in primary health care increases care quality and security. In France, primary health care professionals increasingly work together. The link between general practitioners (GPs) and community pharmacists (CPs) is an important element. Nevertheless, effective collaboration between GPs and CPs is difficult to develop and formalize. Interprofessional education has been identified as a necessary step to prepare “collaborative practice-ready professionals”. We aimed to identify the interprofessional training needs of last-year GP and CP students to develop interprofessional collaborations.

Method We conducted an analysis of training needs using a method inspired by occupational didactics. We collected data through individual semidirective interviews with CPs and GPs in 2022. At each stage we aimed to identify the elements of the occupational didactics to deduce the training needs in the form of a frame of reference: apparent competencies, emblematic situations and acting characteristics. We conducted an initial deductive thematic analysis to identify the apparent competencies of the two professions, the emblematic situations in which these competencies are used, and the acting characteristics used in these situations. We made an inductive categorization to define the collaborative competence and the families of situations and to model the actions of this GP-CP collaboration.

Results We defined the competency “to collaborate effectively in an interprofessional setting in order to respond to care issues in one’s territory” expressed in various professional situations. We described it by three capacities based on two interacting dynamics: one-off exchanges and structured collaborations. Various communication tools facilitate the implementation of these interactions. We modeled the actions of the GP-CP collaboration in the form of a conceptual map.

Conclusion The collaboration between the CP and the GP implements a competency that could be integrated into their professional referential.

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This competency, entitled “collaborating effectively in interprofessional settings to respond to care issues in one’s territory”, is expressed in a variety of professional situations. It is based on two parallel and interacting dynamics: one-off exchanges and a dynamic of lasting collaboration.

This study thus lays the groundwork for the development of this collaborative skill among general practice and pharmacy residents.

Keywords Interprofessional education, Interprofessional collaboration, General practice, Community pharmacy

Background

Interprofessional collaboration is growing up

Health professionals in primary care tend to practice as a team around a health project. These collaborations can take various forms: primary care teams (PCTs), multiprofessional health centers (MPHCs) and territorial professional health communities (TPHCs). PCTs and MPHCs are made up of primary care professionals who choose to coordinate their work around a common health project. PCTs include at least one general practitioner on the team. The MPHC is a larger form of primary care team that includes at least two GPs and enables the delegation of tasks and care protocols. TPHCs are designed to bring together the “healthcare players” in their area. They are made up of primary and secondary care professionals, as well as hospital, medical-social and social professionals from the same area. TPHCs are a territorial form of healthcare coordination. Their role is to coordinate the organization of care in the region. PCTs and MPHCs can be part of a TPHC.

With over 2,500 MPHCs comprising more than 40,000 healthcare professionals, this form of coordination is the leading form of healthcare organization [1]. The French government’s health strategy is based on the development of TPHC [2].

D’Amour defines these interprofessional collaborations in health care as “a set of relationships and interactions that allow professionals to pool and share their knowledge, expertise and experience in order to put them to work for patients” [3]. Friedberg describes the organizational approach this way: “interprofessional collaboration as the structuring of collective action among interdependent partners” [4]. The World Health Organization (WHO) includes in this collaboration the participation of patients and their families [5].

Collaborations contribute to improving the quality of primary care and the follow-up and support of patients with chronic diseases [6, 7]. The benefits of this collaborative work have been documented. These include reduced medication error rates, easier access to care, earlier detection of a patient’s worsening condition, and a better transition between inpatient and outpatient medicine. These effects are measurable by improved clinical

indicators: better quality of care, reduced hospitalization and use of emergency services, lower overall costs, reduced levels of burnout [8, 9]. The link between general practitioners (GPs) and community pharmacists (CPs) is an important element [7].

CPs and GPs share numerous competencies [10, 11]. In 2019, the pharmacist’s field of competence was extended to include protocols for corresponding pharmacist and protocolized dispensing [12]. It is challenging to enable these professionals to organize their collaborations.

Interprofessional education in graduate training

A lack of knowledge of other professionals and their respective competencies would explain in part the difficulties in putting these cooperative ventures into practice. Initial health training that is too compartmentalized is probably at the root of this lack of knowledge. According to the WHO, “Interprofessional education occurs when two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes” [5]. To increase quality of care, they recommend developing interprofessional education (IPE) to improve interprofessional collaboration (IPC) [5].

Fifteen of the thirty-six French universities with a medical training and research unit offered interprofessional education in 2017 [13]. Of these, thirteen were conducting joint GP-CP training, reflecting the importance of this collaboration for universities interested in IPE [14]. To promote IPC and interaction among learners, the scenarios can take a variety of forms: writing and presenting an interprofessional project, role playing, simulation, and internship. These modalities were sometimes combined.

At the University Clermont Auvergne, several interprofessional teaching systems have been offered since 2008. Until 2017, they involved entire classes of students in various sectors, including nursing, pharmacy, and general practice. To redesign the teaching, an experimental format was then offered to groups of volunteer students until 2019. The health situation related to the COVID-19 pandemic put a stop to teaching in person, and this teaching could not be generalized to all students. We have not found a complete framework of competencies to serve as a basis for interprofessional initial training

between GPs and CPs. Nor have we found any training needs analysis on this subject using an occupational didactics approach. This study was the prerequisite to the making of a new interprofessional training program for community pharmacy and general practice students at the University of Clermont Auvergne.

The main objective of this study was to identify the interprofessional training needs of general practice and pharmacy students to define this competency framework. The secondary objective was to model this GP-CP collaboration.

Method

We conducted a training needs analysis study using a method inspired by occupational didactics [15]. Since this method involves qualitative data, we used the standards for reporting qualitative research guidelines [16]. Their application to our study is described in Appendix 1.

Investigators

The investigators were three general practice teachers (MP, GT, and HVR). The principal investigator (MP) had experience in qualitative research but no specific training in occupational didactics. He relied on his own reading as well as the advice of an expert in this method. He had participated as a GP student in two previous sessions of interprofessional training at the Faculty of Medicine in Clermont-Ferrand. This research was the subject of the MP’s masters in Education sciences. GT, HVR, and SB, a community pharmacist teacher, were in charge of this training.

Participants

To analyze the approach of each profession to comparable or similar situations, the participants were three pairs of professionals. They were CPs and GPs with experience in interprofessional practice. Different modes of multi-professional practice were possible: MPHc, TPHc, and less formal collaborations. We recruited initially through

three TPHCs in the Auvergne region and then by snowball effect to recruit the other member of the pair.

We transcribed the characteristics of the participants in the order in which the interviews were conducted (Table 1).

Data collection

We collected data by individual semistructured interviews with three CPs and three GPs between June and October 2022. The interview guide was developed for this study. To develop the interview guide, we conducted two exploratory interviews with experienced CPs and compared with the professional experience of the GP investigators, to develop the interview guide (Appendix 2).

We began the interviews with an opening question to contextualize a recent authentic situation of interprofessional collaboration. Then, we addressed the following themes: a care situation where there had been a direct solicitation, another one where coordinated action had been anticipated, and a multiprofessional meeting situation. For the first two themes, we explored the situations concerned, the reasons for the request or the implementation of a protocol, the means implemented and the result of this collaboration on the practice. In the third theme, the method of coordination, the content of these meetings and the results of each professional’s practice were explored.

We added a final theme during the first interview to capture what participants identified as facilitating this interprofessional collaboration. We incorporated this into the guide for subsequent interviews. The interviews ended with a question that might help identify emerging themes.

Analysis

After full transcription of the audio recordings and pseudonymization, we analyzed the verbatim interviews using Qualcoder® open-source software. The principal investigator analyzed the data and compared them with the opinions of the other researchers.

Table 1 Characteristics of the sample

Maintenance	Age	Gender	Profession	Year of installation	Place of practice	Coordinated Practice Pattern	TPHC	Reception of students in internship
E01	35	M	GP	2017	Rural	MPHC	Yes	Yes
E02	50	F	GP	2004	Rural	MPHC in progress	Yes	Yes
E03	37	F	CP	2014	Rural	PCT in progress	In progress	No
E04	64	M	GP	1988	Rural	PCT in progress	In progress	Yes
E05	32	M	CP	2017	Rural	MPHC	Yes	Yes
E06	58	M	CP	2007	Rural	MPHC in progress	Yes	Yes

We conducted a double stages analysis: an initial deductive analysis and then an inductive analysis.

To follow the principles of occupational didactics, first we conducted a deductive thematic analysis. Its purpose was to identify the apparent competencies of the two professions, the emblematic situations in which these competencies are used, and the acting characteristics used in these situations. Secondly we made an inductive categorization to describe the collaborative competence and the families of situations and to model the actions of this GP-CP collaboration.

Results

The results presented here constitute a proposal for a benchmark that could be the basis for initial interprofessional training for pharmacy and general practice students.

Interprofessional collaboration competency inferred from individual capacities

CPs ensured the safety and feasibility of dispensing drugs, medical devices, and medical equipment. They could use a variety of tools, such as shared medication assessments or pharmaceutical education interviews [17, 18]. They collected and shared information with other professionals. This information directly concerned patients, namely, compliance or self-medication behaviors.

“[...] what the pharmacist often brings to the multi-professional meeting is the notion of compliance, do they come regularly or not [...] are there associated self-medication behaviors.” (GP, E01)

It could also involve organizational data such as the availability of certain pharmaceutical products or regulatory changes. Pharmacists were also involved in prevention and screening activities, for example, by performing certain vaccinations. At the end of the pharmaceutical interview, they knew how to make a decision about action, advice or orientation adapted to the situation’s diagnosis.

“We had a patient treated by apixaban who was on 2.5 mg, and in fact, when my assistant interviewed the patient, she realized that he was not at all renal insufficient, that there was no reason for him to be on 2.5 mg. So, she went back to [the doctor] who went to look for information in the cardio consultations, and as a result, prescribed a 5 mg apixaban.” (CP, E03)

In certain well-defined cases, CPs could ensure the follow-up, in collaboration with the attending physician, of certain patients with stable chronic disease.

Finally, the CPs could either coordinate the action of the various professionals around an individual care situation or respond to the GP’s requests. The GP could also propose coordinated care arrangements or intervene at the request of the CP.

GPs made medical diagnosis after medical consultations, which could lead to a prescription. These consultations could also lead to advice, a decision to take action or a referral to another professional. The advice could also be given directly to the pharmacist, who was led to ask for it. Finally, they also participated in prevention and screening activities.

“[...] when they either need advice over the phone or I know I need to make an appointment a little quickly.” (GP, E04)

These apparent competencies permit us to define three capacities of the competency “to collaborate effectively in interprofessionality to respond to the problems of care in one’s territory” (Table 2).

The first ability requires skills to conduct an interview with the patient, collect relevant clinical data, conduct clinical reasoning, and arrive at a diagnosis of the situation from which an adapted decision will result. The second capacity includes secure communication between different professionals and the patient. The third capacity implies the ability to define a territorial diagnosis and to provide a coordinated response by a multiprofessional team.

Table 2 Capabilities of the collaborative skill

Competence “to collaborate effectively in interprofessionality to respond to the problems of care of its territory”.
Make a reasoned and shared decision to take action, to advise or to refer the patient to another health professional, adapted to the diagnosis of the situation
Coordinate the actions of the various professionals by ensuring the secure sharing of useful information for the patient and other professionals
Develop, in interprofessional collaboration, actions that respond to territorial public health issues.
Capacities of the competence “to collaborate effectively in interprofessional settings to respond to the care issues of one’s territory”. They were defined by integrating and reformulating the apparent competencies expressed by each professional in interprofessional collaboration situations

We propose that these three capacities correspond to the expert level of development of interprofessional collaboration competency.

Families of situations

The families of situations (FS) correspond to groups of professional situations that are sufficiently similar to mobilize the same abilities. We group the emblematic situations into FS to be able to cross-reference them later with the abilities (Table 3). This will ensure that the abilities will be worked on and evaluated in all the FS where they are supposed to be expressed and thus ensure their transferability in professional situations.

Some FS are interdependent, such as the situation “development and implementation of a cooperation protocol”, which may result directly from a recurrent unscheduled care situation or from the implementation of a coordinated screening action at the territorial level, for example.

“This will be the case for strep throat because typically in the middle of an epidemic, it is possible to say “go and do a test”, a rapid diagnostic test for strep throat at the pharmacy [...] in the health center, we will be able to deliver the antibiotics. It will be protocolized.” (CP, E05)

In many of these situations, CPs and GPs interacted with nurses whose role was often central. In the follow-up of patients with chronic diseases, they visited the patient’s home several times a day. In case of an emergency or a request for unscheduled care, they could be the first professionals to assess the situation and to alert or refer the patient.

“There is really a triangular relationship with regard to equipment in the home, whether it is the bed, the potty chair, the walker. It will often be the nurse who will alert, who will trigger the prescrip-

tion, and then it will come back to me, and I will send it back to the pharmacist.” (GP, E02)

Because of their role in implementing the prescriptions issued by the pharmacist, nurses were often the first to be notified in the event of hospital discharge.

“It is our biggest job to coordinate the discharge from hospital [...] We had a case there one evening, a return home on calcic heparin, and no one had been warned, not even the pharmacist who did not have the right dosages at all. Fortunately the nurses were overstocked and able to contribute a little bit of it.” (GP, E02)

Finally, nurses participated in multiprofessional meetings and were involved in a large part of protocol development.

The acting characteristics, a model of how the GP-CP pair works

The interprofessional actions implemented in the interactions between these professionals, called the “acting characteristics” [13] by Mayen, enabled us to model the activities of the “general practitioner–community pharmacist” (GP-CP) pair. This model is shown in Fig. 1. The facilitating and hindering elements are shown in green and red, respectively.

A good knowledge of one’s own skills and limits was a prerequisite for the good functioning of this pairing. Trust in the other and a good perception of one’s own abilities was another prerequisite.

Nurses had a central place in this interaction and in the teams. Several participants referred to a “nurse-GP-CP triangle”. The nurses had an advisory and expert role in some of the situations. Their practice in the patients’ homes enabled them to provide information to the patients quickly, for example, in the case of therapeutic adaptation. They also had access to essential information for patient follow-up and sometimes acted as a conduit of information between patients and the GP or CP.

“We really have a triangular relationship between the nurses who are our eyes, us who are the prescribers and the pharmacist who does the dispensing.” (GP, E02)

In this relationship, patients were on the same level as other professionals. Communication between professionals was always the result of an exchange with the patient and led to a new discussion in the form of a consultation or an interview. Sometimes it was even the patients who were the carriers of information between the caregivers.

Table 3 Families of professional situations in which the collaboration skill is used

Emergencies and unscheduled care requests
Follow-up of patients with chronic pathologies
Coordinated screening and prevention actions
Operational implementation of a pharmaceutical product
Creation of a coordinated practice structure
Development and implementation of a cooperation protocol
Organization and participation in multi-professional meetings
Multi-professional organization of hospital discharges
Participation in clinical research projects

The families of professional situations were obtained from emblematic situations. These may be care situations or situations related to the structuring of interprofessional collaboration

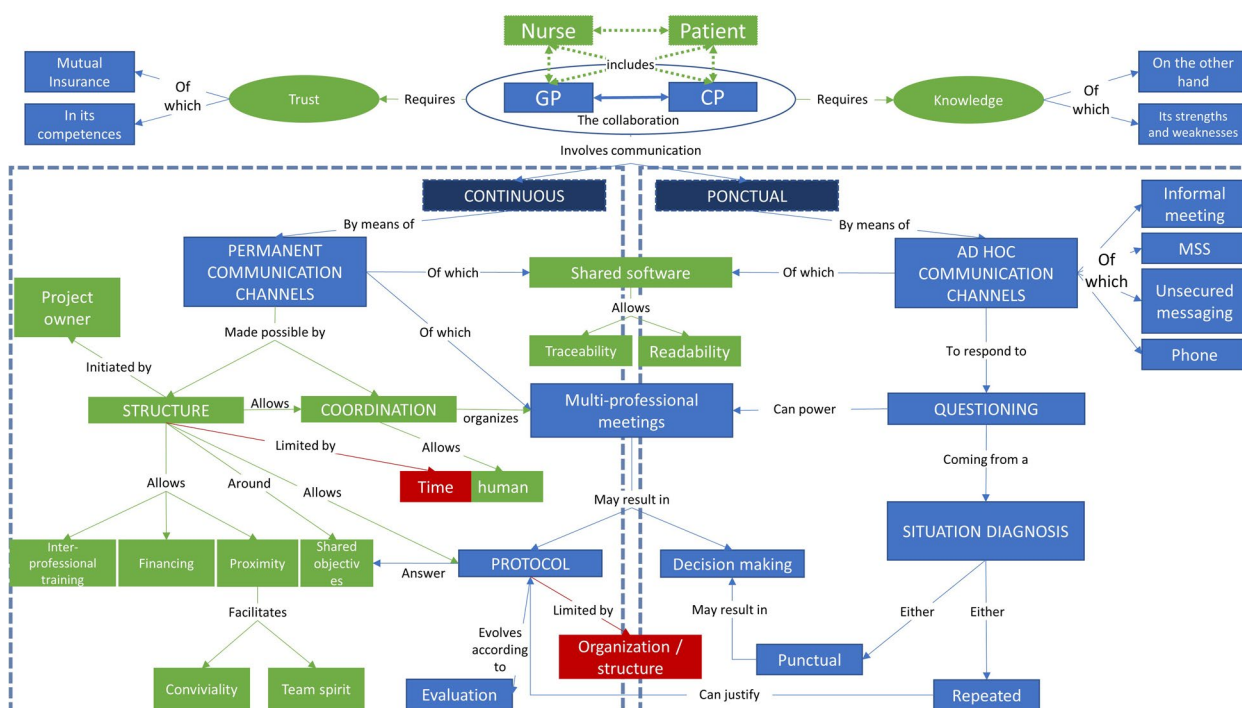


Fig. 1 Modelling the actions of the MG-CP collaboration. This model of the actions of the GP-CP collaboration is built from the acting characteristics. GP: General practitioner CP: Pharmacist RG: Registered Nurse. SHM: Secure Health Messaging. Colors: Green = facilitating factors, Red = barriers to collaboration

This collaboration was based on communication, which could be done on an ad hoc basis for a given care situation or on an ongoing basis through permanent communication channels.

Ad hoc communication

This type of communication enabled the participants to answer a specific question about a specific situation, which most often resulted from the diagnosis of the situation. This diagnosis was defined at the end of the medical consultation (GP) or the pharmaceutical interview (CP).

Communication was then based on multiple channels. The main ones were messaging services (secure or not) and telephone exchanges. Informal meetings were also an opportunity for exchange. Professionals could sometimes use the patient’s prescription to communicate information or transmit the information by the patient himself.

The exchange led to a decision that could be a direct professional action (therapeutic adaptation, medical prescription, delivery of medical or pharmaceutical advice, referral to another professional).

“The goal is to find a pharmacological form that will be easier to manage.” (CP, E05)

Teams that had permanent communication channels such as multiprofessional meetings or shared software sometimes used these tools to discuss specific situations. Prevalent situations could also lead to multiprofessional meetings and result in a protocol. In this case, the action in this situation was permanently modified for both professionals.

Continuous communication

In structured teams (e.g., primary care teams, multiprofessional health centers, territorial professional health communities), communication channels were permanent. The most emblematic was the shared software, which allowed teams to share patient files and secure internal messaging. This tool ensured traceability and better readability of the information transmitted.

Having a structured team also made it possible to organize multiprofessional meetings. These meetings could serve as a forum for discussion of care situations that raised one or more questions for the caregivers. They could also allow the creation and implementation of cooperation protocols to respond to recurring situations.

“It shows up in the software, at the bottom of the patient history section, there’s a multiprofessional meeting with a link to go directly to the minutes.” (GP, E01)

The coordinating function, provided by a competent coordinator who was not necessarily a health care worker, was a key element of these teams. It made it possible to remove a major obstacle identified by the participants, which was the need for human time. This time could be used to coordinate the organization of these meetings and the follow-up of coordinated actions in the territory.

“The fact of having a coordinator at the territorial professional health communities level is easy, as a health professional, because then all the organizational stuff is taken care of and we only do medical stuff.” (CP, E05)

These structures were often created on the initiative of at least one professional who was project leader and allowed for the financing of this coordination function and all of the communication and coordination tools.

The structure and funding provided also offered professionals the possibility of carrying out interprofessional training. When a public health need was identified in the territory, a training session allowed all of the professionals involved to standardize their practices and to acquire the prerequisites to develop a protocol.

“At the moment, it has been mainly a time of shared training. [...] the fact of having a common training, of having common information with validated scientific information, we are all going to go in the same direction, and I think that the patient is going to gain in terms of understanding and follow-up.” (CP, E05)

Finally, the structure allowed for proximity by offering a place and a space for permanent exchanges. This contributes to maintaining the conviviality and team spirit that the participants also identified as central elements of their multiprofessional practice.

“That remains the most important thing I think in building a multiprofessional team, is spending human time together.” (CP, E05)

Discussion

Main results

Interprofessional collaboration among primary care providers has become an essential component of quality care. Interprofessional collaboration between the CP and the GP is based on a competence that is implemented in different professional situations. Situations can be of two types: care situations requiring coordinated action or situations requiring structured exchanges.

The competence, entitled “collaborating effectively in interprofessional settings to respond to care issues in one’s territory”, is expressed through many active

characteristics that allow this space of exchange and communication. Depending on the situation, the exchanges can be one-off or part of a long-lasting dynamic. These exchanges can be based on dedicated spaces that encourage informal meetings. There are permanent communication channels and more occasional means on which professionals rely.

Numerous communication tools facilitate the operational implementation of these interactions. A better understanding of how the GP-CP pair works can help future professionals organize themselves to work better together. This model can therefore also be used for interprofessional training.

The characteristics of the competence “collaborating effectively in interprofessional settings to respond to care issues in one’s territory”, could be integrated into the professional reference frameworks.

In the general practice competency framework, certain levels of development of the “continuity, follow-up, coordination” competency could be similar to those identified in this study, such as “[the student] solicits the expertise of other health care providers by using appropriate means of communication” or “participates in the coordination of health care providers in the home and the patient” [19]. In the pharmacy competency framework, some elements of the competency “to develop a communication policy” could also correspond to the capacities we have identified [20]. However, by limiting themselves to coordination and expertise, these capacities were not sufficient to reflect the complexity of the collaborative action between GPs and CPs. The proposed title for this competency could be integrated into existing competency frameworks.

In our study, the level of development defined for this competency corresponds to the level that could be expected for certification. The method we used enabled us to define the level of the expert practitioners interviewed. The two curricula are independent and different in many aspects, starting with their duration. It will be important to define the intermediate levels of development for the integration of this competency in the two curricula.

Strengths and limitations

We were able to model the GP-CP interaction by analyzing the acting characteristics of their collaboration. All the participants mentioned the role of the nurse, and some even spoke of a nurse-GP-CP triangle. The model presented in Fig. 1 remains focused on GP-CP collaboration. This was the objective of the study, so the method did not include a survey of the nurses. However, the characteristics presented do not seem to be limited to the GP-CP pair and may correspond to the

functioning of a coordinated care team. These results could probably be extrapolated to a GP-CP-nurse trio. It would be interesting to verify this by completing the data collection with a few interviews with the nurses working on the teams surveyed. In this model, we find the place of the patient an equal part of the interprofessional relationship, as suggested by the WHO in its definition [5].

We used a method inspired by occupational didactics, an approach that has proven to analyze the activity and questioning of professionals before and during training [15, 21].

The principal investigator was a teacher in the Department of General Practice in Clermont-Ferrand and was jointly responsible for the interprofessional teaching offered to general practice residents and pharmacy students. This position enabled him to conduct all of the stages of the study with a view to the possible implications for this teaching. His investment may also have resulted in a limitation by influencing the collection and analysis since he had some expertise in the subject. To mitigate this limitation, we informed the participants of this role and the context of the study.

The regulatory constraints that made it difficult to observe care settings required an adaptation of the method to collect data by individual interviews rather than by direct observation of the professional activity. This methodological compromise leads to a limitation related to participants' memorization and interpretation of their own actions. The data collection carried out independently with both members of the GP-CP pairs reduced this risk by allowing a double collection for the majority of the situations mentioned.

Another limitation is intrinsic to occupational didactics. This theoretical framework "struggles to integrate the affective and motivational dimensions of the work activity" [21]. Interprofessional collaboration is intrinsically affective and motivational. This is why the interviews were enriched by an explicit collection of the elements that the participants considered facilitators in the implementation and practice of a collaborative exercise.

All participants practiced in rural areas. We solicited multiprofessional structures covering urban areas without response. For organizational reasons, we could not extend the recruitment of this participant profile. We diversified the sample on all other desired characteristics. We collected the data from experienced professionals practicing in various locations at various levels of team structure.

Conclusion

The framework we propose in this study can be a basis to design initial interprofessional trainings between GPs and CPs and help to develop this collaborative practice in primary care.

To define the modalities of an initial interprofessional training between GPs and CPs students, the families of situations can be crossed with the capacities of competence to propose authentic learning situations for the learners. The challenge of this process will be to guarantee that they will learn and be evaluated in all the families of situations and thus to ensure that they are integrated into their professional practices.

To encourage interaction between learners, a pedagogical device should be based on encouraging authentic situations. Role-playing and simulation would allow for authentic situations outside the internship. The writing and presentation of interprofessional projects would also seem to familiarize students with this specific activity of coordinated teams. It may also be appropriate to supplement this system with internship modalities that facilitate interprofessional exchange in real-life situations. In particular, internships can make it possible to integrate the culture of informal encounters into the training.

This study thus lays the groundwork for the development of this collaborative skill among general practice and pharmacy residents. It would be interesting to carry out additional data collection with nurses and patients to fully integrate them into the conclusions of this work.

The implementation of this framework in initial training modalities, both outside and within the internship, integrated into existing curricula, will allow future caregivers to develop personally and professionally through collaborations fully integrated into their practice.

Abbreviations

CP	Community pharmacist
GP	General practitioner
IPC	Interprofessional collaboration
IPE	Interprofessional education
MPHC	Multiprofessional health centers
PCT	Primary care teams
SRQR	Standards for reporting qualitative research
TPHC	Territorial professional health communities
WHO	World Health Organization

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12909-024-05857-6>.

Supplementary Material 1: Appendix 1. Standards for Reporting Qualitative Research (SRQR).

Supplementary Material 2: Appendix 2. Final version of the interview guide based on two exploratory interviews.

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Authors' contributions

M.P. was responsible for the conceptualization, collection, analysis and interpretation phase. He drafted the manuscript and figures. G.T. and H.V.R. helped construct the protocol, interpret the results and write the manuscript. S.B. helped proofread the manuscript. All authors read and approved the final manuscript.

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SB participated in the proofreading of the manuscript.

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Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study received a favorable opinion from the institutional review board of the University of Clermont Auvergne (IRB-UCA ethics committee). The reference number is: IRB00011540-2022-61).

The IRB informed us that the French law on biomedical research (Article L.1121-1-1 and Article R.1121-1 of the public health code) does not apply to this study, however, a need for consent to participate was not necessary. According to the reference methodology for the processing of personal data in the context of research not involving the human person (MR-004), of the national commission for information technology and civil liberties (CNIL), a written no objection form was signed by all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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