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## Evaluating the implementation of interdisciplinary patient-centred care intervention for people with multimorbidity in primary care: a qualitative study

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## Evaluating the implementation of interdisciplinary patient-centred care intervention for people with multimorbidity in primary care: a qualitative study

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Abstract:

**Objective:** A patient-centred care interdisciplinary pragmatic intervention to support self-management for patients with multimorbidity was implemented in one region of Quebec, Canada. This embedded study aimed to evaluate the process of implementation.

**Design:** A descriptive qualitative study was conducted in 2016-2017 using semi-structured individual interviews. The Consolidated Framework for Implementation Research (CFIR) was used to guide the data coding, data analysis and reporting of the findings.

**Setting:** The study took place in seven Family Medicine Groups (FMGs) in one region (Saguenay-Lac-Saint-Jean) of Quebec, Canada.

**Participants:** Ten managers and 19 healthcare professionals (HCP) including family physicians, nurses, kinesiologists, nutritionists and a respiratory therapist were interviewed.

**Results:** Many key elements within the five CFIR domains were identified as impacting the implementation of the intervention : (1) intervention characteristics – evidence strength and quality, design quality and packaging, relative advantage, and complexity; (2) outer setting – patients' needs and resources, external policies and incentives; (3) inner setting – structural characteristics, networks and communication, culture, compatibility, readiness for implementation, and leadership engagement; (4) characteristics of the managers and healthcare professionals – knowledge and belief about the intervention; (5) process – planning, opinion leaders, formally appointed internal implementation leaders, reflecting and evaluating.

**Conclusion:** This study revealed the organisational and contextual aspects of the implementation based on different and complementary perspectives. With the growing

demand for interdisciplinary teams in primary care, we believe that our insights will be useful for practices, researchers, and policymakers interested in the implementation of disease prevention and management programs for people with multiple chronic conditions in primary care.

Key words: Multimorbidity, patient-centred care, implementation, primary care, qualitative research

#### Strengths and limitations of this study

- This study represents one of the few contributions in Quebec to explore, in-depth, the factors influencing the implementation of interdisciplinary disease prevention and management interventions for people with multiple chronic conditions in primary care.
- Using an existing framework helps to understand, describe, and identify factors that predict the likelihood of implementation success,
- This evaluation of the implementation is limited managers and healthcare professionals' perspectives and experience.
- Given the qualitative nature of the study, data interpretation could be subjective and thus, caution should be applied in interpretation.

#### Background

Chronic diseases (CD) such as cardiovascular and chronic respiratory diseases, cancer, and diabetes are responsible for seventy per cent of deaths worldwide, making them the leading global causes of death [1]. Furthermore, many individuals live with more than one CD, now described as multimorbidity, and defined as the co-existence of two or more CD [2]. Given that most people accessing primary care services have more than one CD [2], multimorbidity is a challenge for both the healthcare system and primary healthcare professionals in primary care. A growing number of studies, as reported in a recent systematic review [3], have investigated the effectiveness of healthcare services and patient-oriented interventions in people with multimorbidity in primary care and community settings. The focus of these interventions was on individualised care plans, self-management support, and to a lesser extent, on goal setting and peer support. Results, in general, were mixed and inconclusive, with most interventions having limited effect on clinical outcomes and patient-reported health outcomes such as quality of life and health service utilisation, or mixed effects on hospital admission rates and medication use and adherence. Thus, the authors highlighted the importance of considering overall participant experience, the context in which interventions take place and the need to integrate multimorbidity interventions into existing healthcare systems to support implementation and sustainability [3]. These recommendations are consistent with the chronic care model (CCM), which is focused on primary care. In Canada, several innovations with a focus on multimorbidity based on the Chronic Care Model, self-management programs and primary care renewal have been implemented, and very few of them have been assessed. The

1  
2  
3 Patient-Centred Innovations for Persons with Multimorbidity (PACE in MM) research  
4 program was developed to evaluate two complex interventions implemented in two  
5 Canadian provinces (Quebec and Ontario) [4]. This study is a part of the Quebec  
6 intervention. The Quebec intervention was a four-month, pragmatic, interdisciplinary  
7 intervention for the prevention and management of chronic diseases aimed at supporting  
8 self-management of patients with multimorbidity in primary care. The intervention was  
9 conducted from April 2016 to July 2017. The intervention consisted of six components: 1)  
10 relocating healthcare professionals (nurses, nutritionists, kinesiologists, or respiratory  
11 therapists) into Family Medicine Groups (FMGs); 2) training healthcare professionals on  
12 the patient-centered care (PCC) approach for patients with multimorbidity,  
13 interprofessional collaboration, motivational interviewing and self-management support;  
14 3) forming, with key resource persons within each FMG (nurses) and a FMG coordinator,  
15 a community of practice aiming to support the integration of the intervention, to ensure the  
16 quality of the care, harmonise ongoing changes to practice and consolidate achievements;  
17 4) assessing patients' eligibility for the program by family physicians or nurses; 5)  
18 providing each eligible patient with one-hour initial assessment by a primary care nurse to  
19 create an intervention plan focused on their needs and according to their objectives and; 6)  
20 directing patients to other healthcare professionals (nutritionists, kinesiologists or the  
21 respiratory therapist) according to their intervention plan.  
22  
23  
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25  
26

27 Ensuring that these different components have been implemented and delivered as intended  
28 is essential to explain intervention effects. To that end, assessment of the implementation  
29 process can offer insights into the "black box" of interventions [5].  
30  
31

32 The Consolidated Framework for Implementation Research (CFIR) was used to examine  
33 the implementation of an interdisciplinary intervention for people with multimorbidity in  
34 primary care in one region of Quebec, Canada. The CFIR is a compilation of 39 constructs  
35 related to implementation and divided into five domains: 1) characteristics of the  
36 intervention; 2) outer setting; 3) inner setting; 4) characteristics of the individuals involved;  
37 and 5) the process of implementation. According to Damschroder et al., [6] researchers  
38 may select the constructs from the CFIR that are most relevant for their study setting.  
39  
40

## 41 **Methods**

### 42 Study design and research sites

43 This qualitative descriptive study was part of a larger concurrent triangulation mixed-  
44 methods study [4].  
45  
46  
47

48 Seven of the eleven Family Medicine groups (FMGs) from Saguenay Lac-St-Jean, a region  
49 in the province of Quebec, Canada participated in both aspects of the evaluation  
50 (quantitative and qualitative). FMGs are primary care clinics in which family physicians  
51 work with other healthcare professionals (HCPs) to provide comprehensive primary care.  
52 [7].  
53  
54

### 55 Participants and sampling strategy

1  
2  
3 A purposive sample of healthcare professionals (family physicians, nurses, nutritionists,  
4 kinesiologists, and a respiratory therapist) and managers was recruited from the FMGs. A  
5 recruitment invitation was sent by e-mail to all healthcare professionals and managers who  
6 participated in the program or its implementation, followed by phone call reminders.  
7

#### 8 9 Data collection

10 Two semi-structured interview guides based on the literature review and the CFIR  
11 framework and tailored to each participant group were developed and pilot tested. The  
12 interview guides consisted of open-ended questions related to the participants' perceptions,  
13 expectations and role in the intervention implementation, and the impact of the intervention  
14 on their work and the functioning of their organisation.  
15

16 The individual semi-structured interviews were conducted from October 2016 to  
17 September 2017 (six months after the beginning of the intervention) by a research  
18 coordinator (TB), a PhD student (MS), a research assistant (BBD) trained in conducting  
19 qualitative interviews, and two senior researchers (MCC, MF). The interviews lasted  
20 between 23 and 74 minutes (average of 47 minutes) and were conducted face-to-face at the  
21 various sites.  
22  
23

#### 24 25 Data analysis

26 All nodes of transcribed audio-recorded interviews used in previous studies [8] were re-  
27 examined through secondary data analysis [9]. A hybrid process of inductive and deductive  
28 thematic content analysis in a stepwise manner, as described by Braun and Clarke [10] was  
29 conducted as an approach. Six steps were followed through the process. A research  
30 assistant with qualitative expertise (CF) read all transcripts and identifies possible themes  
31 (step 1). Two research team members (PN, CF) developed a coding scheme based on an  
32 independent review of three transcripts. Initial codes were created as themes based on the  
33 five domains in the CFIR framework and subnodes for the 39 CFIR constructs [6]. If some  
34 parts of the transcripts did not directly fit into any of the CFIR constructs, new codes were  
35 created. Agreement on a final coding scheme was reached by discussions with the research  
36 team. The same research team members used this to code all transcripts using NVivo  
37 V.11.0 to assist with data management (step 2). Together, PN and CF discussed and  
38 identified recurring and converging themes across participants. The codes that did not fit  
39 into the CFIR framework were evaluated and reconsidered. The refined themes were then  
40 discussed and agreed upon with other members of the research team (MF, JBB) (steps 3  
41 and 4). Finally, key quotes that illustrated each theme were extrapolated from the data  
42 (steps 5 and 6). To ensure the trustworthiness of this qualitative research, credibility was  
43 established. Credibility criteria involve establishing that the results of a qualitative research  
44 are believable to the participants of the study [11]. This was done by: (a) data triangulation  
45 of sources among the study participants showing, (b) iterative review of transcripts, and (c)  
46 showing the findings of this study to research team members from different disciplines  
47 involved in the study. They were able to recognise the implementations issues raised by  
48 this study.  
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Table 1. Characteristics of participants (n=29)

	Nurses n=12	Nutritionists n=4	Kinesiologists n=2	Respiratory therapists n=1	Managers n=10
Sex, women	9	4	1	1	8
Age, range (years)	20-52	20-69	20-30	40-49	30-69
Experience, range (years)	12-24	4-18	3-6	13	1-13

#### Patient and Public Involvement:

No patient involved.

#### Ethical considerations

The study was approved by the Ethics Committee of the Chicoutimi Health and Social Services Center (Ethical code 2013-010). Informed consent was obtained from all participants.

#### Findings

Ten managers and 19 healthcare professionals (HCP) including family physicians, nurses, kinesiologists, nutritionists and a respiratory therapist participated in the study (Table 1).

### 1. Characteristics of the Intervention

The characteristics of the intervention were more often perceived by the participants as facilitators rather than as barriers to implementation.

#### *Evidence strength and quality*

Evidence strength and quality relates to stakeholders' perceptions of the quality and validity of evidence supporting the belief that the intervention will have the desired outcomes [6].

Participants reported that they were already successfully applying certain principles being put forward in the intervention. "Yes, [the intervention] has positive points. But you know ..., we just used methods that we already know, that we already knew to be efficient, and then reintegrate into a more structured form" (Nutritionist 10).

Participants' prior experiences or practices with interdisciplinary collaboration, motivational approaches and research appeared to have facilitated the intervention implementation as described by these participants. "We were already working in interdisciplinarity with a nutritionist and a social worker, we had done this before" (Physician manager 04). Another participant explained: "This approach [motivational] was used in all other settings where I worked [...]. So, we have already used it for several years" (Nutritionist 03).



### *Design quality and packaging*

Design quality and packaging construct refers to the perceived excellence in how the intervention is bundled, presented, and assembled [6].

The majority of the participants believe the intervention was well designed and innovative. For example, healthcare professionals highly appreciated the approaches sustained by the intervention, such as the patient-centred care approach and the motivational approach. "It is a new way to interact with patients because it is focused on them, on what they want to do with their chronic conditions" (Nurse 15).

In addition, the training offered at the beginning of the project also facilitated the implementation of the intervention by allowing the healthcare professionals to learn the new concepts before they applied them in practice. "Introduce us to the approach, describe it to us so that we can embrace it and then apply it". (Nurse 06).

### *Relative advantage*

Relative advantage relates to the stakeholders' perceptions of the benefit of implementing the intervention versus an alternative solution [6].

The participants described several advantages of the intervention. First, relocating nutritionists and kinesiologists into the FMGs improved interprofessional collaboration and patient follow-up. "Before (this intervention), clients were referred to the hospital, it was more challenging to have communication and to follow up on what happened, being on-site we have access to the whole background of the patient, then we are more able to target and then intervene correctly" (Nutritionist 06).

Another perceived advantage was that the intervention enabled healthcare professionals to focus on their roles and use their skills to manage patients. "I have a good opinion of it because it puts the overall competence of the nurse in the foreground, both at the evaluative level, the teaching level and at the collaborative level. It positions nursing ... in its pivotal role" (Nurse-Manager 02).

Some healthcare professionals felt that the preventive rather than curative nature of the intervention changed their practices, thereby reducing the use of health and emergency services. "I find it interesting because we see people very early, we can identify people who will develop problems for which they do not yet need medication, problems not already burdensome for the system" (Nutritionist 13).

### *Complexity*

The complexity construct describes the perceived difficulty of implementation, reflected by duration, scope, radicalness, disruptiveness, centrality, intricacy, and the number of steps required for the implementation [6].

Some of the participants found the intervention complex. They viewed some concepts as difficult. They found some concepts difficult to explain to patients and not applicable to

1  
2  
3 everyone. From the healthcare professionals' perspective, the use of leaflets explaining the  
4 intervention could have been beneficial for the patients. "We did not have any document  
5 to give to patients, to explain what [the intervention] meant. It was difficult for us to explain  
6 it" (Nurse 08). They also found it challenging to use the motivational approach.  
7 "Motivational interviewing is very difficult; I feel that I lacked information a little bit"  
8 (Nurse 09).  
9  
10

### 11 *Cost*

12  
13 According to some managers, the financial support received to deploy the intervention  
14 facilitated its implementation. "Receiving funds to help us get started is always welcome  
15 rather than reorganising activities using our resources" (Manager 08).  
16  
17

## 18 **2. Outer setting**

19 The components of the outer setting were perceived as present and positive in the  
20 implementation.  
21

### 22 *External policies and incentives*

23  
24 External policy and incentives are a broad construct that includes external strategies to  
25 spread innovations including policy and regulations (governmental or other central entity),  
26 external mandates, recommendations and guidelines, pay-for-performance, collaboratives,  
27 and public or benchmark reporting [6].  
28  
29

30 For most managers, the health reform context had influenced the ordinary course of the  
31 intervention implementation, particularly in terms of coordination and monitoring.  
32

33 "The health system reform was undoubtedly a difficulty because this great project  
34 happened at the same time as the whole reorganisation, which led to the creation of the  
35 CIUSSS" (Manager 08).  
36

37  
38 "Each team lost the link with its manager. Even for me, dealing with new teams and the  
39 realities from one sector to another was not easy. This change had an impact on the  
40 implementation of the approach" (Manager 07)  
41

42 Regarding the impact of the health system reorganisation, a manager mentioned it as "a  
43 difficult deployment" (Manager 01).  
44

45 For another manager, "The implementation of the intervention occurred during the  
46 establishment of the *Centre intégré universitaire de santé et services sociaux* (CIUSSS).  
47 The team had to deal with new leadership" (Manager 07).  
48  
49

### 50 *Patients' needs and resources*

51 The patient needs and resources construct concerns the extent to which patient needs, as  
52 well as barriers and facilitators to meet those needs, are accurately known and prioritised  
53 by the organisation [6]. Managers and healthcare professionals reported that the  
54  
55  
56

1  
2  
3 intervention met the organisation's (CIUSSS) mandate, the healthcare professionals'  
4 expectations, and patients' needs.  
5

6 "Yes, it meets our expectations because it has been a long time since we needed these  
7 healthcare professionals. Patients also found it hard to go to the hospital to have access to  
8 these resources. So having her with us [the nutritionist] is good" (Nurse 09).  
9

### 10 **3. Inner setting**

#### 11 *Structural characteristics*

12  
13 Structural characteristics is defined as the social architecture, age, maturity, and size of an  
14 organisation [6]. Participants specifically discussed coordination and monitoring of patient  
15 appointments by administrative staff, the sharing of patient records and staff turnover and  
16 vacations as key issues.  
17  
18

19  
20 Having administrative staff to coordinate and monitor patient appointments was  
21 unanimously emphasised by the healthcare professionals interviewed. They viewed this  
22 support as important for the proper conduct of the intervention. A participant working in  
23 two different FMGs, one with the support of a secretary and the other without this support  
24 stated that "It makes things a lot easier, it is not comparable" (Nutritionist 05).  
25  
26

27 The ability to navigate through the patient's electronic medical record and share  
28 information among the various healthcare professionals was described as supporting the  
29 implementation of the intervention. "It is very facilitating, we see the notes of the doctors,  
30 the nutritionist, the nurses. And before receiving a new patient, we know why we are seeing  
31 him [...]" (Kinesiologist 14).  
32  
33

34 Healthcare professionals' turnover interfered in the implementation because some newly  
35 relocated healthcare professionals were not systematically trained in the approach. Their  
36 training delayed their integration into the interdisciplinary team. "The new staff training  
37 resulted in delays in the intervention". (Manager 07).  
38  
39

#### 40 *Culture*

41 The culture refers to norms, values, and basic assumptions of a given organisation [6].  
42

43 The principles of the intervention were in line with FMGs vision and values, which  
44 facilitated the implementation. "I believe in it, and that is where we have to go more and  
45 more. It is aligned with the vision of our organisation, but also the concept of chronic  
46 disease management" (Manager 07).  
47  
48

#### 49 *Networks and communication*

50  
51 The networks and communication construct involve the nature and quality of social  
52 networks and the formal and informal communication within an organisation [6].  
53

54 Direct communication was the primary means used to present the intervention to the  
55 stakeholders (FMG managers, family physicians and other healthcare professionals). First,  
56

1  
2  
3 meetings were organised by the investigators (research team and leaders of the CIUSSS)  
4 to present the intervention and services offered to each FMG managers. When a FMG  
5 decided to implement the intervention, each FMG manager (coordinator, manager, or  
6 nurse) presented the intervention to family doctors and health professionals.  
7

8  
9 "My contribution is to talk to the teams as much as possible, to mobilise them. Make sure  
10 that there are people in place to support it, and that people feel comfortable doing it, that  
11 they have the proper training, and that there are also interdisciplinary relationships between  
12 nurses and other health professionals. Make sure that they understand what the intervention  
13 consists of and how to intervene with this clientele" (Manager 02).  
14

15  
16 Furthermore, some managers explained how telephone meetings during the  
17 implementation of the intervention facilitated communication with healthcare  
18 professionals. "At one point, we tried to use technology to make conference calls within  
19 the whole region. It was a facilitator or a success factor on some level because some teams  
20 did not speak to each other" (Manager 07).  
21

22  
23 Concerning patients' follow-up, the communication between healthcare professionals or  
24 with family physicians could vary depending on the reality of their environment. In some  
25 settings, face-to-face communication was possible during the implementation of the  
26 intervention. For other settings, it is the use of indirect communication, such as e-mail, that  
27 has facilitated interdisciplinary collaboration. "Since the implementation of the  
28 intervention, we take 5 minutes to discuss, either at the end or before dinner [the day] ...  
29 that allows us to ensure better follow-up" (Nurse 11). For other settings, the use of e-mail  
30 was prevalent. "When I have to speak with doctors, it is often by e-mail. We don't see them  
31 that much. We don't have an interdisciplinary meeting with them". (Kinesiologist 14).  
32  
33

### 34 Compatibility

35  
36 Compatibility is the degree of tangible fit between meaning and values attached to the  
37 innovation by the individuals involved, how those align with individuals' norms, values,  
38 and perceived risks and needs, and how the innovation fits with existing workflows and  
39 systems [6].  
40  
41

42 The majority of health professionals explained how the approaches advocated by the  
43 intervention such as interprofessional collaboration, motivational approach, self-  
44 management as well as the patient-centred care approach corresponded to their values and  
45 vision as healthcare professionals. "I love it because I have always believed in  
46 interdisciplinarity, not multidisciplinary. I have always believed in supporting self-  
47 management support and in motivational interviewing". (Kinesiologist 05).  
48  
49

50 However, some managers felt that the principles of the intervention were not compatible  
51 with the family physicians' philosophy and practice, and perhaps hindered the physicians'  
52 involvement. "There was a lack of collaboration. Family physicians do not adhere to the  
53 [intervention] philosophy. This approach consists of identifying client needs. They still  
54  
55

1  
2  
3 tend to say: 'I'm the doctor, I know what you need. I'll tell you what you need, then apply  
4 it'" (Manager 06).

#### 6 Leadership engagement

8 Leadership engagement is the commitment, involvement, and accountability of leaders and  
9 managers regarding the implementation [6].

11 Some participants felt the managers' involvement and commitment have certainly  
12 facilitated the implementation of the intervention. "The managers are involved in the  
13 project. They believe in it and we also believe in it at the organisational level" (Nurse 11).

#### 16 Readiness for implementation

18 The readiness for implementation construct describes tangible and immediate indicators of  
19 the organisations commitment to the decision to implement an intervention, including  
20 leadership, engagement and available resources [6].

22 The lack of infrastructure and scarcity of resources in some FMGs negatively impacted  
23 interprofessional collaboration and interdisciplinarity.

25 A manager summed it up well: "One constraint was the lack of physical space in some  
26 FMGs. Therefore, some healthcare professionals could not meet together to discuss patient  
27 action plans" (Manager 07).

29 Some health professionals who were working part-time did not feel they had enough time  
30 to discuss patient medical records with their colleagues. This situation probably influenced  
31 negatively the implementation of interprofessional collaboration, which was an essential  
32 component of the intervention. "I am here for half a day. We don't necessarily have time  
33 to go through the patient's file. I don't have time to read the notes of all my colleagues  
34 before I see my patients" (Respiratory therapist 17).

### 38 4. Characteristics of the individuals involved

#### 39 *Knowledge and belief about the intervention*

41 This concept refers to individuals' attitudes and the value placed on the innovation, as well  
42 as familiarity with facts, truths, and principles related to the intervention [6].

44 The low participation of some family physicians negatively influenced the implementation  
45 of the intervention. Among the reasons described by participants were doctors' age, lack of  
46 time to devote to interdisciplinary activities and the doctors' vision of nurses' role. "The  
47 collaboration with the doctors was not a success. Personally, I was afraid to refer clients"  
48 (Nurse 07).

### 51 5. Process of Implementation

#### 53 Planning

1  
2  
3 Planning refers to the degree to which a scheme (method) of behaviour and tasks for  
4 implementing an intervention are developed in advance and the quality of those schemes  
5 [6].  
6

7  
8 Several health care professionals emphasised the importance of setting goals that were both  
9 realistic and appropriate to maintain the patient's motivation in order to produce health and  
10 lifestyle changes. "We told patients that a small change is as good as and even better than  
11 a big one because we are gradually moving into the adoption of a lifestyle". (Nurse 15).  
12

### 13 *Opinion leaders*

14  
15 Opinions leaders refer to individuals who have a formal or informal influence on the  
16 attitudes and beliefs of their colleagues in implementing the intervention [6].  
17

18  
19 The presentation and promotion of the intervention with healthcare professionals working  
20 in the FMGs, conducted jointly by a group of researchers and managers, was highly  
21 appreciated. This activity added more credibility and enhanced the participants'  
22 consideration of adopting the approach conveyed by the intervention and probably  
23 facilitated/further supported the implementation process. "It's also good that it was  
24 clinicians, managers and researchers who presented this approach, so it brought credibility  
25 to the approach" (Manager 07).  
26

27  
28 The leadership conveyed by the managers played an essential role in the implementation  
29 of the intervention by ensuring the permanent flow of information, the mobilisation of  
30 teams and the supervision of the training of newly relocated healthcare professionals. "My  
31 contribution is to talk about it regularly to the teams, to mobilise them and then to make  
32 sure that I have the people in place to support. To ensure that they are adequately trained.  
33 (Manager 02)."  
34

### 35 *Formally appointed internal implementation leaders*

36  
37 Formally appointed internal implementation leaders refer to those individuals within the  
38 organisation who have been officially assigned the responsibility for implementing an  
39 intervention as coordinator, project manager, team leader, or other similar roles [6].  
40  
41

42  
43 Some healthcare professionals described the presence of a coordinating nurse in each FMG  
44 who was responsible for supervising the entire team and ensuring that the intervention was  
45 done appropriately. "There is also a coordinator who is always near us and who makes it  
46 work". (Kinesiologist 14).  
47

### 48 *Reflecting and evaluating*

49  
50 Reflecting and evaluating refer to quantitative and qualitative feedback about the progress  
51 and quality of implementation accompanied by regular personal and team debriefing about  
52 progress and experience [6].  
53

54  
55 Participants appreciated the monthly telephone meetings of the community of practice to  
56 discuss the evolution of the implementation and to share their knowledge and experiences.  
57

1  
2  
3 "During these meetings, we discussed specific themes. We updated our knowledge and  
4 shared literature. We also discussed cases that we encountered, shared the experiences and  
5 difficulties of the implementation" (Manager 06)  
6

## 7 **Discussion**

8  
9 Using the Consolidated Framework for Implementation Research (CFIR), this study aimed  
10 to evaluate the implementation of interdisciplinary patient-centred care intervention for  
11 people with multimorbidity in primary care. Following a content analysis, many key  
12 elements of the CFIR were identified as affecting the implementation of the intervention.  
13 The perceived evidence strength, the quality and the relative advantage of the intervention  
14 were a source of motivation for both healthcare professionals and managers.  
15

16  
17 Prior work indicates there is an increased likelihood that stakeholders who subscribe to the  
18 principles of evidence-based interventions for prevention and management of chronic  
19 diseases (CCM, patient-centred care) in primary care will be motivated to implement the  
20 program [12]. Furthermore, there is evidence that innovations in the field of chronic  
21 diseases, which has a relative advantage over standard care, has led to greater  
22 implementation [13]. For example, the Canadian Heart Health Kit (HHK), a risk  
23 management and patient education resource for the prevention of cardiovascular disease  
24 (CVD) and promotion of cardiovascular health for which the relative advantage was  
25 perceived by the participants resulted in better implementation [13]. The organisational  
26 culture, the leadership of managers and the presence of leaders are also recognised as  
27 successful ingredients for the implementation of an intervention based on the chronic care  
28 model in primary care [14].  
29

30  
31 On the other hand, the literature also shows that hierarchical working relationships without  
32 leadership for change negatively influence the implementation of healthcare changes  
33 intervention and innovation [15]. Thus, transforming care practices in a primary care  
34 organisation requires a culture of support for change and learning [16, 17]. Furthermore,  
35 leaders can be agents of change by ensuring the availability of resources and providing  
36 adequate support to staff [18].  
37

38  
39 The intervention was aligned with the participants and their organisation vision. The  
40 implementation is successful if the intervention is integrated into the vision of the  
41 organisation and a recognised need for the adoption of new care approaches for the  
42 prevention and management of chronic diseases in primary care [14, 19].  
43

44  
45 Although this evaluation identified many of constructs detailed in the CFIR, the  
46 implementation of the intervention faced several challenges, which are essential to  
47 consider. For instance, characteristics of individuals such as individuals' beliefs,  
48 knowledge, self-efficacy, and personal attributes may affect implementation [6]. In this  
49 study, the Family Physicians' lack of commitment and leadership appeared to deter  
50 implementation. The lack of involvement of family physicians in the implementation of  
51 complex interventions, including prevention, has been identified previously in the literature  
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[20-22]. One reason for this barrier might be the inconsistency between the ideals of patient-centred care and the reality of the healthcare system, which is oriented towards the biomedical model [17, 20]. However, the role of family physicians remains fundamental in interdisciplinary interventions based on the chronic care model (CCM) due to their privileged relationship with chronically ill patients [22]. Family physicians need to maintain a climate of trust and collaboration with other healthcare professionals. Therefore, physicians must be involved from the outset, beginning with the development phase of the intervention to ensure their involvement [23]. According to the "inner setting" of the CFIR, which refers to the characteristics of the implementing organisation [6], the high turnover of healthcare professionals and organisational changes also negatively influenced the intervention implementation. Staff turnover is a common barrier encountered when implementing chronic disease prevention and management interventions in primary care [24]. The difficulty in integrating newly relocated professionals into teams' routines also influenced the implementation, particularly for interprofessional interventions. Organisational changes caused by the integration of new staff and interprofessional collaboration with consequences such as lack of time, allocation of roles, distribution of work, work overload and the shortage of health professionals are regularly reported in complex interventions for chronic diseases in primary care [25]. The use of information and communication technologies such as electronic health records (EHRs) or telehealth is often proposed as a solution to overcome these challenges [26].

### Study strengths and limitations

The strengths of the study are the inclusion of different healthcare professions and managers to reveal several views. Using an existing framework within the field of implementations science is considered an important strength to understand better, describe, and identify factors that predict the likelihood of implementation success. The CFIR framework was useful in organising, analysing and categorising the data. Furthermore, applying the CFIR as an analysis lens allows comparisons with other contexts and settings and may be useful for practices, researchers, and policymakers interested in the implementation of disease prevention and management programs for people with multiple chronic conditions in primary care.

Participation in this study was voluntary and limited to managers and healthcare professionals who have been involved in the implementation of the intervention in Saguenay-Lac-Saint-Jean, Québec. Therefore, the research team and social desirability may have influenced the perspectives of these participants.

### Conclusions

The implementation of an interdisciplinary patient-centred care intervention for the prevention and management of chronic diseases in primary care organisations is a complex process. Using the CFIR as a guide, this evaluation identified multiple CFIR constructs that assisted in the success of the implementation of the intervention. The results revealed organisational and contextual aspects of the implementation based on different and



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2  
3 complementary perspectives. With the growing demand for interdisciplinarity in primary  
4 care, we believe that our insights will be useful for practices, researchers, and policymakers  
5 interested in the implementation of disease prevention and management programs for  
6 people with multiple chronic conditions in primary care.  
7

8  
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12 Website: [http://webapps.cihr-](http://webapps.cihr-irsc.gc.ca/decisions/p/project_details.html?applId=283684&lang=en)  
13 [irsc.gc.ca/decisions/p/project\\_details.html?applId=283684&lang=en](http://webapps.cihr-irsc.gc.ca/decisions/p/project_details.html?applId=283684&lang=en).  
14

15 The funders had no role in study design, data collection and analysis, decision to publish,  
16 or preparation of the manuscript.

17 **Ethical approval:** The study was approved by the Ethics Committee of the Chicoutimi  
18 Health and Social Services Center (Ethical code 2013-010). Informed consent was obtained  
19 from all participants  
20

21  
22 **Data sharing statement:** The data that support the findings of this study are available on  
23 request from the corresponding author. The data are not publicly available due to privacy  
24 or ethical restrictions.  
25

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32  
33

34 **Conflict of interests:** The authors declare that they have no competing interests.  
35

36 **Author Contributions:** Conceptualization, P.N., J.B.B. and M.F.; methodology, P.N.,  
37 C.F., J.B.B. and M.F.; software, P.N. and C.F.; validation, M.F. and J.B.B.; formal analysis,  
38 P.N. and C.F.; investigation, M.S.1, M.F.; resources, M.F. and M.S.2; data curation, M.F.  
39 and J.B.B.; writing—original draft preparation, P.N.; writing - review and editing, P.N.,  
40 J.B.B., C.F., M.A.A.A., T.N.N., M.S.1, F.G., M.S.2, M.F.; visualization, P.N., J.B.B., C.F.,  
41 M.A.A.A., T.N.N., M.S.1, F.G., M.S.2, M.F.; supervision, J.B.B. an M.F.; project  
42 administration, M.F. and M.S.2; funding acquisition, M.F. and M.S.2. All authors have  
43 read and agreed to the published version of the manuscript.  
44  
45

46  
47 All authors listed on the manuscript contributed to the study design, data collection, data  
48 analysis and interpretation of the findings, and drafting and reviewing the final manuscript.  
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For peer review only

## Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

No	Item	Guide questions/description	
<b>Domain 1: Research team and reflexivity</b>			
Personal Characteristics			
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group?	None, but one author (MF) supervised closely the work of the professionals conducting the interviews
2.	Credentials	What were the researcher's credentials? <i>E.g. PhD, MD</i>	MF : MD, MSc, CMFC(F) MCC : RN, PhD BBD : PhD TB : MSc
3.	Occupation	What was their occupation at the time of the study?	MF : Researcher MCC : Researcher BBD : Research assistant TB : Research coordinator
4.	Gender	Was the researcher male or female?	MF : Male MCC : Female
5.	Experience and training	What experience or training did the researcher have?	MF : Family physician, MSC, senior researcher MCC : Registered nurse, PhD and senior researcher

No	Item	Guide questions/description	
Relationship with participants			
6.	Relationship established	Was a relationship established prior to study commencement?	No
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. <i>personal goals, reasons for doing the research</i>	The study was presented to all participants before enrollment. All participants signed a consent form. The goal of the interview was explained to all participants before the interviews.
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. <i>Bias, assumptions, reasons and interests in the research topic</i>	Two research professionals (a male and a female) conducted the interviews. Both worked with the research team since the beginning of the study.
<b>Domain 2: study design</b>			
Theoretical framework			
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. <i>grounded theory, discourse analysis, ethnography, phenomenology, content analysis</i>	Descriptive qualitative approach (close to Content analysis) embedded in a randomized trial
Participant selection			

No	Item	Guide questions/description	
10.	Sampling	How were participants selected? <i>e.g. purposive, convenience, consecutive, snowball</i>	Maximum variability was targeted based on age, gender, socio-economic status, practices.
11.	Method of approach	How were participants approached? <i>e.g. face-to-face, telephone, mail, email</i>	The managers and healthcare professionals were contacted by phone at their working place.
12.	Sample size	How many participants were in the study?	29 accepted to participate. - 10 managers - 19 healthcare professionals
13.	Non-participation	How many people refused to participate or dropped out? Reasons?	- All (29) participants contacted accepted to participate. - No participant dropped out
Setting			
14.	Setting of data collection	Where was the data collected? <i>e.g. home, clinic, workplace</i>	Primary health care practices
15.	Presence of non-participants	Was anyone else present besides the participants and researchers?	No
16.	Description of sample	What are the important characteristics of the sample? <i>e.g. demographic data, date</i>	Managers and healthcare professionals including family physicians, nurses, kinesiologists, nutritionists and a respiratory therapist actively participated in the program or its implementation.

No	Item	Guide questions/description	
Data collection			
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	The interview guides included open questions relating the perceived factors influencing the implementation of intervention developed by the research team based on theoretical framework. Interviews were in French. It was pretested and adjusted accordingly.
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many?	Not with this design
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data?	All interviews were audio-recorded
20.	Field notes	Were field notes made during and/or after the interview or focus group?	The interviewers took notes during and after the interviews.
21.	Duration	What was the duration of the interviews or focus group?	Average 47 minutes
22.	Data saturation	Was data saturation discussed?	Yes
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No



No	Item	Guide questions/description	
<b>Domain 3: analysis and findings</b>			
Data analysis			
24.	Number of data coders	How many data coders coded the data?	Two coders (PN and CF) with regular validation with one of the authors (MF). The two coders are also co-author.
25.	Description of the coding tree	Did authors provide a description of the coding tree?	No
26.	Derivation of themes	Were themes identified in advance or derived from the data?	The first codes were based on interview guide. Many other codes derived from the theoretical framework data following a mixed coding approach (inductive and deductive).
27.	Software	What software, if applicable, was used to manage the data?	NVivo 11
28.	Participant checking	Did participants provide feedback on the findings?	Not indicated (ref. Braun, V., & Clarke, V. Using thematic analysis in psychology. <i>Qualitative Research in Psychology</i> 2016, 3: 77–101.)
Reporting			
29.	Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.g. <i>participant number</i>	Yes. All quotes have been translated to English by a Professional Translator

No	Item	Guide questions/description	
30.	Data and findings consistent	Was there consistency between the data presented and the findings?	All findings are based on the collected and analyzed data. Major findings are consistent with the quantitative results (triangulation).
31.	Clarity of major themes	Were major themes clearly presented in the findings?	Major themes are described in the manuscript according to the theoretical framework.
32.	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	All themes are derived from the theoretical framework and described in the manuscript.

# BMJ Open

## Evaluating the implementation of interdisciplinary patient-centred care intervention for people with multimorbidity in primary care: a qualitative study

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<b>Primary Subject Heading</b>:	General practice / Family practice
Secondary Subject Heading:	Patient-centred medicine, Qualitative research, Health services research
Keywords:	PRIMARY CARE, QUALITATIVE RESEARCH, Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, GENERAL MEDICINE (see Internal Medicine)

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## Evaluating the implementation of interdisciplinary patient-centred care intervention for people with multimorbidity in primary care: a qualitative study

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Abstract:

**Objective:** A patient-centred care interdisciplinary pragmatic intervention to support self-management for patients with multimorbidity was implemented in one region of Quebec, Canada. This embedded study aimed to evaluate the process of implementation.

**Design:** A descriptive qualitative study was conducted in 2016-2017 using semi-structured individual interviews. The Consolidated Framework for Implementation Research (CFIR) was used to guide the data coding, analysis, and reporting of the findings.

**Setting:** The study took place in seven Family Medicine Groups (FMGs) in one region (Saguenay-Lac-Saint-Jean) of Quebec, Canada.

**Participants:** Ten managers and 19 healthcare professionals (HCP), including family physicians, nurses, kinesiologists, nutritionists and a respiratory therapist, were interviewed.

**Results:** Many key elements within the five CFIR domains were identified as impacting the implementation of the intervention : (1) intervention characteristics – evidence strength and quality, design quality and packaging, relative advantage, and complexity; (2) outer setting – patients' needs and resources, external policies and incentives; (3) inner setting – structural characteristics, networks and communication, culture, compatibility, readiness for implementation, and leadership engagement; (4) characteristics of the managers and healthcare professionals – knowledge and belief about the intervention; (5) process – planning, opinion leaders, formally appointed internal implementation leaders, reflecting and evaluating.

**Conclusion:** This study revealed the organizational and contextual aspects of the implementation based on different and complementary perspectives. With the growing

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3 demand for interdisciplinary teams in primary care, we believe that our insights will be  
4 helpful for practices, researchers, and policymakers interested in the implementation of  
5 disease prevention and management programs for people with multiple chronic conditions  
6 in primary care.  
7

8  
9 Key words: Multimorbidity, patient-centred care, implementation, primary care,  
10 qualitative research  
11

### 12 Strengths and limitations of this study

- 13  
14 - This study represents one of the few contributions in Quebec to explore, in-depth,  
15 the factors influencing the implementation of interdisciplinary disease prevention  
16 and management interventions for people with multiple chronic conditions in  
17 primary care.  
18
- 19 - Using an existing framework helps to understand, describe, and identify factors  
20 that predict the likelihood of implementation success,  
21
- 22 - This evaluation of the implementation is limited to managers and healthcare  
23 professionals' perspectives and experience.  
24
- 25 - Given the qualitative nature of the study, data interpretation could be subjective,  
26 and thus, caution should be applied in interpretation.  
27

### 28 Background

29  
30 Chronic diseases (CD) such as cardiovascular and chronic respiratory diseases, cancer, and  
31 diabetes are responsible for seventy per cent of deaths worldwide, making them the leading  
32 global causes of death [1, 2]. Furthermore, many individuals live with more than one CD,  
33 now described as multimorbidity, and defined as the co-existence of two or more CD [3-  
34 5]. Given that most people accessing primary care services have more than one CD [2],  
35 multimorbidity is a challenge for both the healthcare system and primary healthcare  
36 professionals in primary care [3-7].  
37

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39 As reported in a recent systematic review [8], a growing number of studies have  
40 investigated the effectiveness of healthcare services and patient-oriented interventions in  
41 people with multimorbidity in primary care and community settings. These interventions  
42 focused on individualized care plans, self-management support, and to a lesser extent, goal  
43 setting and peer support. Results, in general, were mixed and inconclusive, with most  
44 interventions having limited effect on clinical outcomes and patient-reported health  
45 outcomes such as quality of life and health service utilization, or mixed effects on hospital  
46 admission rates and medication use and adherence. Thus, the authors highlighted the  
47 importance of considering overall participant experience, the context in which  
48 interventions occur, and the need to integrate multimorbidity interventions into existing  
49 healthcare systems to support implementation and sustainability [8]. These  
50 recommendations are consistent with the chronic care model (CCM) focused on primary  
51 care [9-11]. In Canada, several innovations focusing on multimorbidity based on the  
52 Chronic Care Model, self-management programs, and primary care renewal have been  
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3 implemented, and very few of them have been assessed [12]. For example, in 2015,  
4 Quebec's health and social services system has been reformed with a centralisation process  
5 that abolished Regional Health Authorities [13]. The government of Quebec explicitly  
6 stated that this reorganization was put in place to "facilitate and simplify access of services  
7 to the population, to improve the quality and security of services, and to increase the  
8 efficacy and efficiency of the health system" [14].  
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11 The Patient-Centred Innovations for Persons with Multimorbidity (PACE in MM) research  
12 program was developed to evaluate two complex interventions implemented in two  
13 Canadian provinces (Quebec and Ontario) [15]. This study is a part of the Quebec  
14 intervention.  
15

16  
17 The Quebec intervention was a four-month, pragmatic, interdisciplinary intervention for  
18 preventing and managing chronic diseases to support self-management of patients with  
19 multimorbidity in primary care. The intervention was conducted from April 2016 to July  
20 2017. The intervention consisted of six components: 1) relocating healthcare professionals  
21 (nurses, nutritionists, kinesiologists, or respiratory therapists) into Family Medicine  
22 Groups (FMGs); 2) training healthcare professionals on the patient-centered care (PCC)  
23 approach for patients with multimorbidity, interprofessional collaboration, motivational  
24 interviewing and self-management support; 3) forming, with key resource persons within  
25 each FMG (nurses) and a FMG coordinator, a community of practice aiming to support the  
26 integration of the intervention, to ensure the quality of the care, harmonize ongoing changes  
27 to practice and consolidate achievements; 4) assessing patients' eligibility for the program  
28 by family physicians or nurses; 5) providing each eligible patient with one-hour initial  
29 assessment by a primary care nurse to create an intervention plan focused on their needs,  
30 values, preferences and according to their objectives and; 6) directing patients to the most  
31 appropriate healthcare professionals (nutritionists, kinesiologists or the respiratory  
32 therapist) who ensure to integrate them into clinical decision-making and outcome  
33 assessments according to their intervention plan. The template for the Intervention  
34 Description and Replication (TIDieR) checklist [16] is available in Appendix S1  
35 (supplementary file).  
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41 To that end, the implementation process assessment can offer insights into the "black box"  
42 of interventions (an approach that can elaborate on the mechanisms through which changes  
43 in the outcomes operate) and identify how the potential effects of interventions are  
44 moderated and mediated [17]. Thus, this process evaluation aimed to identify barriers and  
45 facilitators in implementing an interdisciplinary patient-centred care intervention for  
46 patients with multimorbidity in primary care.  
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48

## 49 **Methods**

### 50 Theoretical Framework

51  
52  
53 The Consolidated Framework for Implementation Research (CFIR) was used to examine  
54 the implementation of interdisciplinary intervention for people with multimorbidity in  
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1  
2  
3 primary care in one region of Quebec, Canada. The CFIR is a compilation of 39 constructs  
4 related to implementation and divided into five domains: 1) characteristics of the  
5 intervention; 2) outer setting; 3) inner setting; 4) characteristics of the individuals involved,  
6 and 5) the process of implementation. According to Damschroder et al.[18], researchers  
7 may select the constructs from the CFIR that are most relevant for their study setting. The  
8 CFIR was chosen based on its comprehensiveness and ability to manage both breadth and  
9 depth of data to capture the intervention implementation's complexity. In addition, it  
10 includes many implementation aspects and is thus considered a helpful framework for  
11 illuminating barriers and facilitators influencing the implementation [18].  
12  
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14

### 15 Study design and research sites

16  
17 This qualitative descriptive study was part of a larger concurrent triangulation mixed-  
18 methods study [15]. A qualitative design allows answering questions about experience,  
19 meaning and perspective, most often from the participant's standpoint [19]. Furthermore,  
20 qualitative descriptive studies' goal is to summarise specific events experienced by  
21 individuals or groups of individuals [20]. Therefore, it is essential to use guidelines such  
22 as the COREQ checklist to avoid inadequate reporting that can lead to inappropriate  
23 application of qualitative research in decision-making, health care, health policy and future  
24 research [21]. The consolidated criteria for reporting qualitative research (COREQ) was  
25 used to guide reporting (see appendix S2 in supplementary file).  
26  
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28

### 29 Participants and sampling strategy

30  
31 Seven of the eleven Family Medicine groups (FMGs) from Saguenay Lac-St-Jean, a region  
32 in Quebec, Canada, participated in both evaluation aspects (quantitative and qualitative).  
33 FMGs are primary care clinics where family physicians work with other healthcare  
34 professionals (HCPs) to provide comprehensive primary care [22].  
35

36 A purposive sample of healthcare professionals (family physicians, nurses, nutritionists,  
37 kinesiologists, and respiratory therapist) and managers was recruited from the FMGs. A  
38 recruitment invitation was sent by e-mail to all healthcare professionals and managers who  
39 participated in the program or its implementation, followed by phone call reminders.  
40  
41

42 The sample size was determined based on achieving theoretical saturation with a minimum  
43 of 12 participants [23].  
44

### 45 Data collection

46  
47 Two semi-structured interview guides based on the literature review and the CFIR  
48 framework tailored to each participant group (managers and healthcare professionals) were  
49 developed, and pilot tested. The interview guides consisted of open-ended questions related  
50 to the participants' perceptions, expectations, role in the intervention implementation, and  
51 impact on their work and their organization's functioning (see Appendix S3 in  
52 supplementary file).  
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3 The individual semi-structured interviews were conducted from October 2016 to  
4 September 2017 (six months after the beginning of the intervention) by a research  
5 coordinator (TB), a PhD student (MS), a research assistant (BBD) trained in conducting  
6 qualitative interviews, and two senior researchers (MCC, MF). The interviews lasted  
7 between 23 and 74 minutes (average of 47 minutes) and were conducted face-to-face at the  
8 various sites. The interviewers also took field notes during the interviews. All interviews  
9 were audio-recorded. The goal of the interview was explained to all participants.  
10  
11

## 12 Data analysis

13  
14 A hybrid process of inductive and deductive thematic content analysis in a stepwise  
15 manner, as Braun and Clarke described [24], was conducted as an analysis approach. Six  
16 steps were followed through the process. First, a research assistant with qualitative  
17 expertise (CF) read all transcripts and identifies possible themes (step 1). Second, two  
18 research team members (PN, CF) developed a coding scheme based on an independent  
19 review of three transcripts. Initial codes were created as themes based on the five domains  
20 in the CFIR framework and subnodes for the 39 CFIR constructs [6]. New codes were  
21 created if some parts of the transcripts did not directly fit into any CFIR constructs.  
22 Discussions with the research team reached an agreement on a final coding scheme. The  
23 same research team members used this to code all transcripts using NVivo V.11.0 to assist  
24 with data management (step 2). Together, PN and CF discussed and identified recurring  
25 and converging themes across participants. The codes that did not fit into the CFIR  
26 framework were evaluated and reconsidered. The refined themes were then discussed and  
27 agreed upon with other research team members (MF, JBB) (steps 3 and 4). Finally, key  
28 quotes that illustrated each theme were extrapolated from the data (steps 5 and 6). Finally,  
29 credibility was established to ensure the trustworthiness of this qualitative research.  
30 Credibility criteria involve establishing that qualitative research results are believable to  
31 the study participants [25]. This was done by (a) data triangulation of sources among the  
32 study participants showing, (b) iterative review of transcripts, and (c) showing the findings  
33 of this study to research team members from different disciplines involved in the study. As  
34 a result, they were able to recognize the implementation issues raised by this study.  
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## 41 Patient and Public Involvement:

42 No patient involved.

## 43 Ethical considerations

44  
45 The study was approved by the Ethics Committee of the Chicoutimi Health and Social  
46 Services Center (Ethical code 2013-010). Informed consent was obtained from all  
47 participants.  
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## 51 Findings

52  
53 A total of 29 interviews were conducted. Intervention stakeholder participants included  
54 managers (n = 10, including two family physicians) and 19 healthcare professionals (HCP),  
55  
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including family physicians, nurses, kinesiologists, nutritionists, and respiratory therapists (Table 1). Informations about participants invited and the number that declined or did not respond are presented in the COREQ checklist (see appendix S2).

We have chosen to present our findings by CIFR domains. However, the complexity of the intervention and implementation processes made it difficult to separate key findings by constructs within each domain. As such, our findings are organized into seven themes that reflected participants' experiences with the intervention by the CFIR framework (see Appendix S4).

	Nurses n=12	Nutritionists n=4	Kinesiologists n=2	Respiratory therapists n=1	Managers n=10
Sex, women	9	4	1	1	8
Age, range (years)	20-52	20-69	20-30	40-49	30-69
Experience, range (years)	12-24	4-18	3-6	13	1-13

**Table 1. Characteristics of participants**

## 1. Characteristics of the Intervention

The intervention characteristics were more often perceived by the participants as facilitators rather than as barriers to implementation.

### *Familiarity with interventions principles*

Participants reported that they were already successfully applying certain principles being put forward in the intervention. "Yes, [the intervention] has positive points. But you know ..., we just used methods that we already know, that we already knew to be efficient, and then reintegrate into a more structured form" (Participant HCP1).

Participants' prior experiences or practices with interdisciplinary collaboration, motivational approaches, and research have facilitated the intervention implementation as described by these participants. "We were already working in interdisciplinarity with a nutritionist and a social worker; we had done this before" (Participant Manager 1). Another participant explained: "This approach [motivational] was used in all other settings where I worked [...]. So, we have already used it for several years" (Participant HCP2).

### *Appreciation of intervention components and relative advantage*

The majority of the participants believe the intervention was well designed and innovative. For example, healthcare professionals highly appreciated the intervention's approaches,

1  
2  
3 such as the patient-centred care and motivational approaches. "It is a new way to interact  
4 with patients because it is focused on them, on what they want to do with their chronic  
5 conditions" (Participant HCP3).  
6

7  
8 In addition, the training offered at the beginning of the project also facilitated the  
9 implementation of the intervention by allowing the healthcare professionals to learn the  
10 new concepts before they applied them in practice. "Introduce us to the approach, describe  
11 it to us so that we can embrace it and then apply it". (Participant HCP4).  
12

13 The participants described several advantages of the intervention. First, relocating  
14 nutritionists and kinesiologists into the FMGs improved interprofessional collaboration  
15 and patient follow-up. "Before (this intervention), clients were referred to the hospital, it  
16 was more challenging to have communication and to follow up on what happened, being  
17 on-site we have access to the whole background of the patient, then we are more able to  
18 target and then intervene correctly" (Participant HCP5).  
19  
20

21 Another perceived advantage was that the intervention enabled healthcare professionals to  
22 focus on their roles and use their skills to manage patients. "I have a good opinion of it  
23 because it puts the overall competence of the nurse in the foreground, both at the evaluative  
24 level, the teaching level and at the collaborative level. It positions nursing ... in its pivotal  
25 role" (Participant Manager 2).  
26  
27

28 Some healthcare professionals felt that the intervention's preventive rather than curative  
29 nature changed their practices, thereby reducing health and emergency services. "I find it  
30 interesting because we see people very early, we can identify people who will develop  
31 problems for which they do not yet need medication, problems not already burdensome for  
32 the system" (Participant HCP6).  
33  
34

35 Finally, according to some managers, the financial support received to deploy the  
36 intervention facilitated its implementation. "Receiving funds to help us get started is always  
37 welcome rather than reorganizing activities using our resources" (Participant Manager 3).  
38

39 The only barrier reported by the participants was the complexity of the intervention.  
40 According to Damschroder et al, the complexity describes the perceived difficulty of  
41 implementation, reflected by duration, scope, radicalness, disruptiveness, centrality,  
42 intricacy, and the number of steps required for the implementation [6].  
43  
44

45 Some of the participants found the intervention complex. They viewed some concepts as  
46 difficult. They found some concepts difficult to explain to patients and not applicable to  
47 everyone. From the healthcare professional's perspective, leaflets explaining the  
48 intervention could have been beneficial for the patients. "We did not have any document  
49 to give to patients, to explain what [the intervention] meant. It was difficult for us to explain  
50 it" (Participant HCP7). They also found it challenging to use the motivational approach.  
51 "Motivational interviewing is very difficult; I feel that I lacked information a little bit"  
52 (Participant HCP8).  
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## 2. Outer setting

The components of the outer setting were perceived as present and positive in the implementation.

### *Health system reorganization*

For most managers, the health reform context had influenced the ordinary course of the intervention implementation, particularly in coordination and monitoring.

"The health system reform was undoubtedly a difficulty because this great project happened simultaneously as the whole reorganization, which led to the creation of the CIUSSS" (Participant Manager 3).

"Each team lost the link with its manager. Even for me, dealing with new teams and the realities from one sector to another was not easy. This change had an impact on the implementation of the approach" (Participant Manager 4)

Regarding the impact of the health system reorganization, a manager mentioned it as "a difficult deployment" (Participant Manager 5).

For another manager, "The implementation of the intervention occurred during the establishment of the *Centre intégré universitaire de santé et services sociaux* (CIUSSS). The team had to deal with new leadership" (Participant Manager 4).

## 3. Inner setting

### *Internal organization*

Participants specifically discussed coordination and monitoring of patient appointments by administrative staff, the sharing of patient records and staff turnover and vacations as key issues.

Having administrative staff coordinate and monitor patient appointments was unanimously emphasized by the healthcare professionals interviewed. They viewed this support as important for the proper conduct of the intervention. For example, a participant working in two different FMGs, one with the support of a secretary and the other without this support, stated that "It makes things a lot easier, it is not comparable" (Participant HCP9).

The ability to navigate through the patient's electronic medical record and share information among the various healthcare professionals supported the implementation of the intervention. "It is very facilitating; we see the notes of the doctors, the nutritionist, the nurses. Moreover, we know why we see him [...]" (Participant HCP10).

Participants appreciated the community of practice's monthly telephone meetings to discuss the evolution of the implementation and share their knowledge and experiences. "During these meetings, we discussed specific themes. We updated our knowledge and shared literature. We also discussed cases that we encountered, shared the experiences and difficulties of the implementation" (Participant Manager 6)

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3 Healthcare professionals' turnover interfered in the implementation because some newly  
4 relocated healthcare professionals were not systematically trained in the approach. Their  
5 training delayed their integration into the interdisciplinary team. "The new staff training  
6 resulted in delays in the intervention". (Participant Manager 4).  
7  
8

9 Concerning patients' follow-up, the communication between healthcare professionals or  
10 family physicians could vary depending on their environment's reality. In some settings,  
11 face-to-face communication was possible during the implementation of the intervention.  
12 For other settings, it is the use of indirect communication, such as e-mail, that has facilitated  
13 interdisciplinary collaboration. "Since the implementation of the intervention, we take 5  
14 minutes to discuss, either at the end or before dinner [the day] ... that allows us to ensure  
15 better follow-up" (Nurse 11). For other settings, the use of e-mail was prevalent. "When I  
16 have to speak with doctors, it is often by e-mail. We do not see them that much. We do not  
17 have an interdisciplinary meeting with them". (Participant HCP10).  
18  
19

20 However, certain aspects of the internal organization of FMGs, such as the availability of  
21 premises and health professionals, negatively influenced the implementation of the  
22 intervention.  
23  
24

25 The lack of infrastructure and scarcity of resources in some FMGs negatively impacted  
26 interprofessional collaboration and interdisciplinarity.  
27

28 A manager summed it up nicely: "One constraint was the lack of physical space in some  
29 FMGs. Therefore, some healthcare professionals could not meet together to discuss patient  
30 action plans" (Participant Manager 4).  
31

32 Some health professionals working part-time did not feel they had enough time to discuss  
33 patient medical records with their colleagues. This situation probably influenced negatively  
34 the implementation of interprofessional collaboration, which was an essential component  
35 of the intervention.  
36  
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38 "I am here for half a day. We do not necessarily have time to go through the patient's file.  
39 I do not have time to read the notes of all my colleagues before I see my patients"  
40 (Participant HCP11).  
41

#### 42 *Compatibility of the intervention with participants vision and values*

43

44 The principles of the intervention were in line with FMGs vision and values, which  
45 facilitated the implementation. "I believe in it, and that is where we have to go more and  
46 more. It is aligned with the vision of our organization, but also the concept of chronic  
47 disease management" (Participant Manager 4).  
48  
49

50 The majority of health professionals explained how the intervention's approaches, such as  
51 interprofessional collaboration, motivational approach, self-management, and the patient-  
52 centred care approach, correspond to their values and vision as healthcare professionals.  
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"I love it because I have always believed in interdisciplinarity, not multidisciplinary. I have always believed in supporting self-management support and in motivational interviewing". (Participant HCP12).

Some healthcare professionals described a coordinating nurse in each FMG responsible for supervising the entire team and ensuring that the intervention was done appropriately. "There is also a coordinator who is always near us and who makes it work". (Kinesiologist 14).

However, some managers felt that the intervention principles were not compatible with the family physicians' philosophy and practice and perhaps hindered the physicians' involvement. "There was a lack of collaboration. Family physicians do not adhere to the [intervention] philosophy. This approach consists of identifying client needs. They still tend to say: 'I am the doctor, I know what you need. I will tell you what you need, then apply it'" (Participant Manager 6).

#### **4. Characteristics of the individuals involved**

##### *Leadership engagement*

The leadership conveyed by the managers played an essential role in implementing the intervention by ensuring the permanent flow of information, the mobilization of teams and the supervision of the training of newly relocated healthcare professionals. "My contribution is to talk about it regularly to the teams, to mobilize them and then to make sure that I have the people in place to support. Finally, to ensure that they are adequately trained. (Participant Manager 7)." Indeed, some participants felt the managers' involvement and commitment have certainly facilitated the implementation of the intervention. "The managers are involved in the project. They believe in it, and we also believe in it at the organizational level" (Participant HCP13).

Furthermore, the presentation and promotion of the intervention with healthcare professionals working in the FMGs, conducted jointly by researchers and managers, was highly appreciated. This activity added more credibility, enhanced the participants' consideration of adopting the intervention's approach, and probably facilitated/further supported the implementation process. "It is also good that it was clinicians, managers and researchers who presented this approach, so it brought credibility to the approach" (Participant Manager 4).

On the other hand, the low participation of some family physicians negatively influenced the implementation of the intervention. Participants' reasons were doctors' age, time to devote to interdisciplinary activities, and the doctors' vision of nurses' role. "The collaboration with the doctors was not a success. I was afraid to refer clients" (Participant HCP14).

#### **5. Process of Implementation**

##### *Communication*

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3 Communication, both face-to-face and through telephone meetings, has helped maintain  
4 interaction between healthcare professionals during implementation.  
5

6 Direct communication was the primary means to present the intervention to the  
7 stakeholders (FMG managers, family physicians and other healthcare professionals). First,  
8 meetings were organized by the investigators (research team and leaders of the CIUSSS)  
9 to present the intervention and services offered to each FMG managers. Then, when a FMG  
10 decided to implement the intervention, each FMG manager (coordinator, manager, or  
11 nurse) presented the intervention to family doctors and health professionals.  
12  
13

14 "My contribution is to talk to the teams as much as possible, to mobilize them. Ensure that  
15 there are people in place to support it, that people feel comfortable doing it, have the proper  
16 training, and that there are also interdisciplinary relationships between nurses and other  
17 health professionals. Make sure that they understand what the intervention consists of and  
18 how to intervene with this clientele" (Participant Manager 7).  
19  
20

21 Furthermore, some managers explained how telephone meetings during the  
22 implementation of the intervention facilitated communication with healthcare  
23 professionals. "At one point, we tried to use technology to make conference calls within  
24 the whole region. It was a facilitator or a success factor on some level because some teams  
25 did not speak to each other" (Participant Manager 4).  
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### 30 **Discussion**

31  
32 This study aimed to evaluate the implementation of interdisciplinary patient-centred care  
33 intervention for people with multimorbidity in primary care. Many key elements of the  
34 were identified as facilitating the implementation of the intervention (familiarity with  
35 intervention principles, the quality and the relative advantage of the intervention, the  
36 leadership engagement). Although, some obstacles were identified such as the complexity  
37 of the intervention, the health system reorganization, the internal organization of FMGs,  
38 the compatibility of the intervention principles with some family physicians' philosophy  
39 and practice.  
40  
41

42 Prior work indicates an increased likelihood that stakeholders who subscribe to the  
43 principles of evidence-based interventions for the prevention and management of chronic  
44 diseases (CCM, patient-centred care) in primary care will be motivated to implement the  
45 program [26]. Furthermore, there is evidence that innovations in chronic diseases, which  
46 has a relative advantage over standard care, have led to greater implementation [13]. For  
47 example, the Canadian Heart Health Kit (HHK), a risk management and patient education  
48 resource for the prevention of cardiovascular disease (CVD) and promotion of  
49 cardiovascular health for which the participants perceived the relative advantage, resulted  
50 in better implementation [27]. The organizational culture, the leadership of managers, and  
51 leaders' presence are also recognized as successful ingredients for implementing an  
52 intervention based on the chronic care model in primary care [10].  
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3 On the other hand, the literature also shows that hierarchical working relationships without  
4 leadership for change negatively influence healthcare changes intervention and innovation  
5 [28]. Thus, transforming care practices in a primary care organization requires a culture of  
6 support for change and learning [29, 30]. Furthermore, leaders can be agents of change by  
7 ensuring resources and providing adequate support to staff [31].  
8  
9

10 The intervention was aligned with the participants and their organization vision. The  
11 implementation is successful if the intervention is integrated into the organisation's vision  
12 and a recognized need to adopt new care approaches to prevent and manage chronic  
13 diseases in primary care [10, 32].  
14

15 Although this evaluation identified many facilitators, the implementation of the  
16 intervention faced several challenges, which are essential to consider. For instance,  
17 characteristics of individuals such as individuals' beliefs, knowledge, self-efficacy, and  
18 personal attributes may affect implementation [18]. In this study, the Family Physicians'  
19 lack of commitment and leadership appeared to deter implementation. The lack of  
20 involvement of family physicians in implementing complex interventions, including  
21 prevention, has been identified previously in the literature [33-35]. One reason for this  
22 barrier might be the inconsistency between the ideals of patient-centred care and the reality  
23 of the healthcare system, which is oriented towards the biomedical model [30, 33].  
24 However, the role of family physicians remains fundamental in interdisciplinary  
25 interventions based on the chronic care model (CCM) due to their privileged relationship  
26 with chronically ill patients [35]. Family physicians need to maintain a climate of trust and  
27 collaboration with other healthcare professionals. Therefore, physicians must be involved  
28 from the outset, beginning with the development phase of the intervention to ensure their  
29 involvement [36]. The high turnover of healthcare professionals and organizational  
30 changes also negatively influenced the intervention implementation. Staff turnover is a  
31 common barrier encountered when implementing chronic disease prevention and  
32 management interventions in primary care [37]. The difficulty in integrating newly  
33 relocated professionals into teams' routines also influenced the implementation,  
34 particularly for interprofessional interventions. Organizational changes caused by  
35 integrating new staff and interprofessional collaboration with consequences such as lack  
36 of time, allocation of roles, distribution of work, work overload and the shortage of health  
37 professionals are regularly reported in complex interventions for chronic diseases in  
38 primary care [38]. The use of information and communication technologies such as  
39 electronic health records (EHRs) or telehealth is often proposed as a solution to overcome  
40 these challenges [39].  
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#### 49 Study strengths and limitations

50 The strengths of the study are the inclusion of different healthcare professions and  
51 managers to reveal several views. It is a contribution to improve the prevention and  
52 management interdisciplinary interventions for people with multiple chronic conditions in  
53 primary care. Using an existing framework within implementations science is considered  
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3 an important strength to better understand, describe, and identify factors that predict  
4 implementation success. The CFIR framework was useful in organizing, analyzing and  
5 categorizing the data. Furthermore, applying the CFIR as an analysis lens allows  
6 comparisons with other contexts and settings. With the growing demand for  
7 interdisciplinarity in primary care, the findings of this study will be useful for practices,  
8 researchers, and policymakers interested in implementing disease prevention and  
9 management programs for people with multiple chronic conditions in primary care at local,  
10 regional and international levels.  
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12

13  
14 A limitation of this work is the lack of patients' perspective. However, we made this choice  
15 because we believe that since the patients did not actively participate in the implementation  
16 phase, they could not have shed light to understand the implementation process.  
17

18 Participation in this study was voluntary and limited to managers and healthcare  
19 professionals involved in implementing the intervention in Saguenay-Lac-Saint-Jean,  
20 Québec. Therefore, the research team and social desirability may have influenced the  
21 perspectives of these participants.  
22  
23

## 24 Conclusions

25  
26 Implementing an interdisciplinary patient-centred care intervention to prevent and manage  
27 chronic diseases in primary care organizations is a complex process. Using the CFIR as a  
28 guide, this evaluation identified multiple elements that assisted in implementing the  
29 intervention. In addition, the results revealed organizational and contextual aspects of the  
30 implementation based on different and complementary perspectives. With the growing  
31 demand for interdisciplinarity in primary care, we believe that our insights will be useful  
32 for practices, researchers, and policymakers interested in implementing disease prevention  
33 and management programs for people with multiple chronic conditions in primary care.  
34  
35

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40 [irsc.gc.ca/decisions/p/project\\_details.html?applId=283684&lang=en](http://webapps.cihr-irsc.gc.ca/decisions/p/project_details.html?applId=283684&lang=en).  
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43 The funders had no role in study design, data collection and analysis, decision to publish,  
44 or manuscript preparation.

45 **Ethical approval:** The Ethics Committee of the Chicoutimi Health and Social Services  
46 Center (Ethical code 2013-010). Informed consent was obtained from all participants  
47

48 **Data sharing statement:** The data supporting this study's findings are available on request  
49 from the corresponding author. The data are not publicly available due to privacy or ethical  
50 restrictions.  
51

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55  
56

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## Appendix S1: TiDIER CHECKLIST

Item	
Provide the name or a phrase that describes the intervention	A four-month, pragmatic, interdisciplinary intervention for the prevention and management of chronic diseases aimed at supporting self-management of patients with multimorbidity in primary care.
Describe any rationale, theory or goal of the elements essential to the intervention	See protocol: Stewart M, Fortin M; Patient-Centred Innovations for Persons with Multimorbidity Team*. Patient-Centred Innovations for Persons with Multimorbidity: funded evaluation protocol. CMAJ Open. 2017;5(2): E365–E372. doi:10.9778/cmajo.20160097
Materials: describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in the training of the intervention providers	<p>Added information :</p> <p>Each healthcare professional was given a training handbook containing information about each intervention component.</p> <p>No specific material was used during interventions. Instead, healthcare professionals used their material.</p>
Procedures: Describe each of the procedures, activities and /or processes used in the intervention, including any enabling or support activities	<p>Patients were assessed for eligibility by family physicians or registered nurses.</p> <p>Each eligible patient was provided with a one-hour initial assessment by a primary care nurse to create an intervention plan focused on their needs and according to their objectives and; to direct patients to other healthcare professionals (nutritionists, kinesiologists or the respiratory therapist) according to their intervention plan. Each patient's intervention had to be based on the educational and coaching content of the training (patient-centered care approach for patients with multimorbidity, self-management support, and motivational interviewing). Interdisciplinary meetings</p>

	between family physicians, nurses and other health professionals were to be held to discuss cases and harmonize the intervention plan.”
For each category of intervention provider, describe their expertise, background, and any specific training given.	Practice Nurse; Nutritionists; Kinesiologists; Respiratory therapists. The training was given to all healthcare professionals who worked with chronic diseases patients. This involved being trained on patient-centered care approach for patients with multimorbidity, self-management support, and interprofessional collaboration and motivational interviewing. Their training lasted an average 7.8 hours.
Describe the modes of delivery (such as face-to-face or by some other mechanism, such as internet or telephone) of the intervention, and whether it was provided individually or in a group	Interventions were provided individually and face-to-face.
Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features	Recruitment and intervention was undertaken in the patient’s FMGs.
Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule and their duration, intensity or dose.	Once recruited, patients had an initial assessment with the nurse during approximately one hour. Based on patients’ centered care, no specific number of sessions was planned. Therefore, patients could see healthcare professionals as much (or as little) as they wanted during a 4-month period. In average, patients had 2.6 hours of interventions throughout the 4-month period.
If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when and how.	See above.
If the intervention was modified during the course of the study, describe the changes (what, why, when and how)	N/A

Planned: if intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them.	Intervention adherence was assessed after intervention completion by the research team.
Actual: if intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned.	Intervention adherence will be discussed in another paper that is now in the publication process.

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Appendix S2. Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

No	Item	Guide questions/description	
<b>Domain 1: Research team and reflexivity</b>			
Personal Characteristics			
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group?	None, but one author (MF) supervised closely the work of the professionals conducting the interviews
2.	Credentials	What were the researcher's credentials? <i>E.g. PhD, MD</i>	MF : MD, MSc, CMFC(F) MCC : RN, PhD BBD : PhD TB : MSc
3.	Occupation	What was their occupation at the time of the study?	MF : Researcher MCC : Researcher BBD : Research assistant TB : Research coordinator
4.	Gender	Was the researcher male or female?	MF : Male MCC : Female



No	Item	Guide questions/description	
5.	Experience and training	What experience or training did the researcher have?	MF : Family physician, MSC, senior researcher MCC : Registered nurse, PhD and senior researcher
Relationship with participants			
6.	Relationship established	Was a relationship established prior to study commencement?	No
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. <i>personal goals, reasons for doing the research</i>	The study was presented to all participants before enrollment. All participants signed a consent form. The goal of the interview was explained to all participants before the interviews (page 5).
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. <i>Bias, assumptions, reasons and interests in the research topic</i>	Interviews were conducted by a research coordinator (TB), a PhD student (MS), a research assistant (BBD) trained in conducting qualitative interviews, and two senior researchers (MCC, MF). All of them worked with the research team since the beginning of the study. (page 5)
<b>Domain 2: study design</b>			
Theoretical framework			
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. <i>grounded theory,</i>	Descriptive qualitative approach (close to Content analysis) embedded in a randomized trial (page 4)

No	Item	Guide questions/description	
		<i>discourse analysis, ethnography, phenomenology, content analysis</i>	
Participant selection			
10.	Sampling	How were participants selected? <i>e.g. purposive, convenience, consecutive, snowball</i>	Maximum variability was targeted based on age, gender, socio-economic status, practices (page 4).
11.	Method of approach	How were participants approached? <i>e.g. face-to-face, telephone, mail, email</i>	The managers and healthcare professionals were contacted by phone at their working place (page 4).
12.	Sample size	How many participants were in the study?	29 accepted to participate (page 5). - 10 managers including two family physicians - 19 healthcare professionals
13.	Non-participation	How many people refused to participate or dropped out? Reasons?	- All (29) participants contacted accepted to participate (page 6). - No participant dropped out
Setting			
14.	Setting of data collection	Where was the data collected? <i>e.g. home, clinic, workplace</i>	Primary health care practices (page 4)

No	Item	Guide questions/description	
15.	Presence of non-participants	Was anyone else present besides the participants and researchers?	No
16.	Description of sample	What are the important characteristics of the sample? <i>e.g. demographic data, date</i>	Managers including family physicians and healthcare professionals, nurses, kinesiologists, nutritionists and a respiratory therapist actively participated in the program or its implementation (page 4).
Data collection			
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	The interview guides included open questions relating the perceived factors influencing the implementation of intervention developed by the research team based on theoretical framework. Interviews were in French. It was pretested and adjusted accordingly (page 4, Appendix S3).
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many?	Not with this design
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data?	All interviews were audio-recorded (page 5)
20.	Field notes	Were field notes made during and/or after the interview or focus group?	The interviewers took notes during and after the interviews (page 6).
21.	Duration	What was the duration of the interviews or focus group?	Average 47 minutes (page5)

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No	Item	Guide questions/description	
22.	Data saturation	Was data saturation discussed?	Yes
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No
<b>Domain 3: analysis and findings</b>			
Data analysis			
24.	Number of data coders	How many data coders coded the data?	Two coders (PN and CF) with regular validation with one of the authors (MF). The two coders are also co-author (page 5).
25.	Description of the coding tree	Did authors provide a description of the coding tree?	No
26.	Derivation of themes	Were themes identified in advance or derived from the data?	The first codes were based on interview guide. Many other codes derived from the theoretical framework data following a mixed coding approach (inductive and deductive). (Page 5)
27.	Software	What software, if applicable, was used to manage the data?	NVivo 11 (page 5)

No	Item	Guide questions/description	
28.	Participant checking	Did participants provide feedback on the findings?	Not indicated (ref. Braun, V., & Clarke, V. Using thematic analysis in psychology. <i>Qualitative Research in Psychology</i> 2016, 3: 77–101.)
Reporting			
29.	Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.g. <i>participant number</i>	Yes. All quotes have been translated to English by a Professional Translator
30.	Data and findings consistent	Was there consistency between the data presented and the findings?	All findings are based on the collected and analyzed data. Major findings are consistent with the quantitative results (triangulation).
31.	Clarity of major themes	Were major themes clearly presented in the findings?	Major themes are described in the manuscript according to the theoretical framework (page 6 to 11, and appendix S4).
32.	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	All themes are derived from the theoretical framework and described in the manuscript (page 6 to 11, and appendix S4).

## Appendix Interview guides

Participants	Questions
Managers	<ol style="list-style-type: none"> <li>1. Can you describe the program and your role? Does the program meet your expectations? How does it meet your expectations?</li> <li>2. What is your general opinion of the program?</li> <li>3. What do you think facilitates the activities of the program?</li> <li>4. How do these factors have influenced the program effectiveness?</li> <li>5. In your opinion, what are the barriers that this program faces?</li> <li>6. About this program, are there any contextual factors that serve as facilitators or barriers (Question: space, time, distance, organizational problems)</li> </ol>
Healthcare professionals	<ol style="list-style-type: none"> <li>1. How was the patient referral made? How did the communication take place (phone, paper, report, etc.)?</li> <li>2. Are you aware of whether a patient action plan/intervention plan has been developed as part of the program by one or more professionals (nurse, nutritionist, etc.) and the patient? If so, are you aware of the plan of the elements? Did you know if the plan was changed in the process of being carried out?</li> <li>3. Tell us about the dynamic between the team members?</li> <li>4. Tell us about the interdisciplinary practices in this program?</li> <li>5. Tell us about the patient's role in the healthcare team?</li> <li>6. What is your general opinion about the program?</li> <li>7. Does it meet your expectations?</li> <li>8. How would you describe the impact of the program on your patients and their families?</li> <li>9. How do program services help patients manage their chronic diseases?</li> </ol>

## Appendix S4. Key elements influencing the intervention implementation based on CFIR domains

Domains	Barriers	Facilitators
<b>A. Intervention characteristics</b>		Quotes
1. Familiarity with interventions principles		<p>Participants reported that they were already successfully applying certain principles being part of the intervention.</p> <p>Participants' prior experiences or practices in interdisciplinary collaboration, motivational approach and research</p>
2. Appreciation of intervention components and relative advantage		<p>Most of the participants believe the intervention was well designed and innovative. For example, healthcare professionals highly appreciated the intervention's approaches, such as the patient-centred care and motivational approaches.</p>
4. Complexity	<p>Some concepts were difficult to explain to patients and not applicable to everyone.</p> <p>It was challenging to use the motivational approach</p>	
<b>B. Outer setting</b>		
1. Health system reorganization	<p>The health reform context has influenced the ordinary course of the intervention implementation, particularly in terms of coordination and monitoring.</p>	
<b>C. Inner setting</b>		
1. Internal organization	<p>Staff turnover/holidays and vacations</p> <p>Lack of infrastructures in some FMGs negatively impacted interprofessional collaboration and interdisciplinarity.</p>	<p>Coordination/monitoring of patient appointments</p> <p>Sharing patient records</p>
2. Compatibility	<p>The principles of the intervention were not compatible with the family physicians' philosophy and practice. This likely hindered interprofessional collaboration and negatively influenced physician involvement</p>	<p>the approaches advocated by the intervention such as interprofessional collaboration, motivational approach, self-management as well as the patient-centered care approach correspond to their values and vision as healthcare professionals.</p>

<b>D. Characteristics of individuals</b>		
1. Leadership engagement		<p>Managers involvement and commitment have certainly facilitated the implementation of the intervention.</p> <p>The presentation and promotion of the intervention with healthcare professionals working in the FMGs, conducted jointly by a group of researchers and managers, was highly appreciated.</p>
<b>E. Process of implementation</b>		
1. Communication		<p>Communication, both face-to-face and through telephone meetings, has helped maintain interaction between healthcare professionals during implementation.</p>