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Formalization and subordination: A contingency theory approach to optimizing primary care teams

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Abstract

Objective: While there is consensus on the need to strengthen primary care capacities to improve health care systems' performance and sustainability, there is only limited evidence on the best way to organize primary care teams. In this article, we use a conceptual framework derived from contingency theory to analyze the structures and process optimizations of multiprofessional primary care teams. **Design:** We focus specifically on interrelationships among team size, formalization of care processes, and nurse autonomy. Data came from eight pilot sites in Quebec (Canada). The study was mostly exploratory and based on correlation analysis. **Results:** We found a negative covariation between care process formalization and nurses' autonomy/subordination. Team size was also positively associated with formalization. Such relationships validate the idea that these dimensions should be analyzed conjointly and are coherent with our suggestion that using a framework derived from a contingency approach makes sense. **Conclusions:** The results provide insights for the structural design of nurse-intensive primary care teams. Non-physicians' professional autonomy is likely to be higher in smaller teams. Likewise, a primary care team that aims to increase nurses' and other non-physicians' professional autonomy should be very careful about the extent to which it formalizes its processes.

Strengths and limitations of this study

This article relies on contingency theory to analyze how multiprofessional primary care teams are optimized.

Qualitative data from eight primary care pilot sites were used to measure team size, formalization of care processes, and nurse autonomy.

The analysis was exploratory and based on correlation analysis using a convenience sample.

Introduction

Data on demographic changes and healthcare expenditures suggest that continued reliance on current healthcare provision models to address population health needs is likely to exert considerable pressure on public finances.¹ Likewise, technical innovations and rapid growth in the intensity of care being provided will exacerbate the issue.^{2,3} Available evidence thus suggests that public health systems need to change significantly to preserve their capacity to maintain universal access to healthcare.^{4,5}

Strengthening primary care capacities is widely considered to be an approach with the potential to reinforce simultaneously health system sustainability and accessibility, continuity of care, and ultimately population health.^{3,5-10} However, for this to happen, available evidence suggests that efforts should not be limited to funding more of the same.¹¹ Primary care strengthening should include redefining the nature of the care provided and the professional roles and task sharing within teams.

From a narrative review of the literature,¹¹ we identified two important dimensions to consider in classifying and analyzing promising multiprofessional primary care teams. One is the degree to which the division of tasks in the team is formalized, and the other is whether the core professional around whom the practice is structured is a physician or a nurse.

Building on these dimensions, we argue here that a conceptual lens derived from contingency theory can be helpful to understand how best to optimize the structure and processes of multiprofessional primary care teams. We first discuss the theoretical underpinnings of such a view, and then we present an empirical analysis of this relationship using data from eight primary care teams studied in the context of a broader project in Quebec.

Conceptual framework

Contingency theory is undoubtedly the dominant school of thought for analyzing the link between organizations' functioning and performance.¹² This theory's core idea is that there is no one best way. Performance is not a product of organizational structure or processes per se. Performance needs to be conceived as a product of the *fit* between the organization's functioning and a set of contingency factors such as organizational size, age, environmental predictability, etc.

Our analysis is not focused on organizational performance, but relies on a similar logic to analyze the optimization of professional roles in primary care teams. We contend there is likely no one best way to organize primary care teams for dimensions such as professional roles definition, task sharing, team size, etc.

Our interest in applying a contingency approach to role definition stems in part from the results of a narrative review we conducted of the literature on high-performance nurse-intensive primary care models.¹¹ The review revealed various plausible operationalizations of high-performance multiprofessional primary care teams—not one best way, but different coherent articulations of the resources at hand, given environmental constraints and team objectives. The broad range of

organizational structures that, according to the literature, appear to succeed in delivering high-quality care efficiently and effectively points to the need for a contingency approach to understand primary care structures and process optimization.

The review also led to the identification of two dimensions that appeared important for classifying and analyzing promising multiprofessional primary care teams. The first was the degree to which the division of tasks in the team was formalized. At one extreme were formal models relying on explicit procedures that specified what service would be provided by which professional, to which patient, and at what point in time. At the other were organic approaches based on mutual adjustments, in which professionals adapted to structural circumstances and to patients' characteristics in deciding on care processes.

The second dimension was the training of the core professional around whom the practice was structured. Most primary care models are physician-centred, but there is a growing number of nurse-centred teams. When a model is nurse-centric, the core position is usually occupied by a primary healthcare nurse practitioner (NP).^{*} The relative centrality of either physicians or nurses and the level of autonomy granted to non-physician professionals is a second structuring dimension for the classification of primary care teams.

In our review, these two dimensions were key parameters to classify and describe multiprofessional primary care teams but the literature we analyzed did not posit any interdependency between the two. However, as we discuss below, the two dimensions of formalization and professional role relate to elements that are abundantly discussed in the literature on healthcare organizations.

Professionalism, formalization, and primary care delivery

From its inception, the organization science literature has strongly advocated the virtues of formalized and standardized production processes,^{13 14} the ultimate form of which would become the production line. However, despite the impressive successes of this approach in some industries, such as large-scale manufacturing, it failed to generalize to all sectors. Of particular interest here, organizations in which humans are the raw material¹⁵ rely on processes that are not easily standardized. Those organizations (healthcare, education, social services, etc.) thus tend to rely on a highly trained and specialized workforce responsible for handling the inherent unpredictability of the production.¹⁶

In the late 1970s, Henry Mintzberg deeply influenced the field by synthesizing contingency theory findings into a configurational approach.¹⁷ He offered five ideal types of potential fit between well-documented contingency factors and organizational structures. One ideal type, the professional bureaucracy, was coined to describe organizations that, on one hand, are forced to decentralize the control of production processes to relatively autonomous professionals and, on the other, rely on formalization and standardization for all the predictable portions of their operations. Professional bureaucracies are, by nature, engaged in a constant effort to find the optimal balance between professional autonomy and formalization in their production processes. The poster child of a professional bureaucracy is the acute care hospital.

Because of their organizational simplicity and small size, other care provision structures such as private clinics, physicians' offices, and the like were usually described as "simple structures" in Mintzberg's terms. In those, a few professionals would rely on self-adjustment and direct control to

^{*}NPs' training and legal scope of practice varies from one jurisdiction to the next. We use the term here to refer to nurses with graduate level university training and an extended scope of practice, including some prescribing rights, such that they are allowed to diagnose autonomously and treat a variety of common conditions.

run the operations. However, today the autonomous physician's office, as a care delivery model, is a near-extinct species. Primary care production is increasingly in the hands of larger, multiprofessional structures dealing with many of the characteristic contingencies of professional bureaucracies (e.g. size, age, vertical integration, division of labour among professionals and unpredictable production processes).¹⁸

Given the current evolution in primary care production structures, we believe a conceptual lens derived from contingency theory might help deepen our understanding of their optimal functioning parameters. Moreover, building upon results from the above-mentioned narrative review,¹¹ we will focus mainly on formalization and professional autonomy as the two core contingency parameters to be considered.

Defining formalization

Formalization can be conceived as both a process and an outcome. As an outcome, it is the extent to which behaviour within a team is prescribed by explicit procedures and rules.^{19 20} This has to do with what Dalton, et al.²¹ call the *structuring*—as opposed to the *structural*—components of organizational structure.²¹ Structural components describe the arrangements (such as size, subunit sizes, span of control, etc.) through which participants are formally interconnected. Structuring components are more processual in nature and refer to elements such as policies and activities aimed at codifying the behaviour of participants. As a process, formalization is therefore defined as efforts to increase the structuring of behaviours in order to strengthen the predictability of actions and decrease role ambiguity.²² This definition emphasizes the existence of a deliberate intention, whether of a person or a group, to increase predictability. We do acknowledge that strong macro-systemic, non-deliberate formalization forces exist that exert influence through the social processes described, for example, in the neo-institutional organizational literature.²³⁻²⁵ Our emphasis here on deliberate interventions was adopted because of the specific objectives of the study and not the relative importance of the micro/macro formalization pressures.

Defining professional autonomy and subordination

As stated earlier, the results from the narrative review suggest that two professional groups are commonly found at the centre of any primary care delivery model: physicians and nurses. However, despite its seemingly dichotomous nature, we argue this characteristic of primary care models should be conceived on a continuum of professional autonomy and subordination.

Historically, the medical profession has been very successful at claiming and protecting a monopoly over the provision of most human healthcare. However, to deliver the care while relying on a relatively scarce workforce, the medical profession has delegated a significant portion of the day-to-day work to “subordinate” professional groups, among which nursing is the most important.²⁶ For members of those historically subordinated professions, practical professional autonomy is highly dependent on the level of subordination of processes in their work environment.

Nurses are the most commonly found non-physician professionals in primary care and play a significant role in almost all primary care models. In teams where the core professional is a physician, nurses' level of professional autonomy varies greatly. At one end of the spectrum are physician-centric models in which nurses are highly subordinated, with a limited scope of practice and little autonomy. At the other end are nurse-centric models, such as *nurse-led clinics*, like those existing in Ontario or in the United States,²⁷⁻²⁹ where nurses have almost complete autonomy. In between lies a vast array of configurations, including inter-professional teams in which nurses enjoy varying levels of autonomy regarding the care they provide to their patients.

Measuring formalization and autonomy

We found no scales of formalization or autonomy that could be applied directly to our object. In both cases we relied on adaptations of existing tools.

The starting point of the scale we used to measure formalization is based on the seminal work of Hall, et al.¹⁸ which provides five dimensions, each appraised through two or three criteria (11 in total).¹⁸ To use this scale in our study, we had to edit it in two ways. First, we edited the criteria to make them more primary care specific. Second, we edited some items to remove conceptual overlap with the notion of subordination. For example, in the context of primary care teams, the existence of a “clear definition of the hierarchy of authority”, as per Hall, et al.¹⁸ would be largely overlapping with the concept of physician subordination as defined earlier. As we discuss below, the data used here were derived from in-depth qualitative interviews. Some elements of Hall, et al.¹⁸ typology were not documented in the interviews and therefore were not included. Table 1 presents the selected criteria from Hall, et al.¹⁸ and the way we operationalized them.

Table 1: Operationalization of the measure of formalization

<i>Hall et al 1967 Typology</i>	<i>Operationalization in this study</i>
<i>A. Roles</i>	
The degree to which the positions in the organization are concretely defined.	Non-physicians' professional roles are divided according to "care modules" mostly based on diseases. For example, diabetes, mental health, etc. (Yes = 2, To some extent = 1, No = 0)
<i>B. Authority Relations</i>	
The degree to which the authority structure is formalized (clear definition of the hierarchy of authority).	There are formal rules that specify which patients will be treated by which professional (Yes = 2, To some extent = 1, No = 0)
<i>C. Communications</i>	
The degree of emphasis on written communications.	An electronic health record (EHR) system is used to communicate patient information between professionals within the team (Yes = 2, EHR exists but isn't the main communication tool = 1, No = 0)
The degree of emphasis on going through established channels in the communications process.	Professionals will have team discussions on complex patients (Systematically = 2, If needed = 1, Informal chats only = 0)
<i>D. Norms and Sanctions</i>	
The number of written rules and policies.	Collective prescription rules are in place to structure non-physicians' capacity to provide drugs to patients they treat (Yes = 2, Some = 1, None = 0)
<i>E. Procedures</i>	
The degree of formalization of orientation programs for new members (systematic socialization for all new entrants).	Work within the team is structured according to formal teamlets (Yes = 2, Yes, but with flexibility = 1, No = 0)

For the autonomy/subordination scale, we mostly relied on the work of Adamson, et al.³⁰ and Hojat, et al.³¹ In those two scales, we selected items based on two criteria. First, an item had to have obvious conceptual ties with the concept of subordination in primary health care delivery. Second, the item had to be focused on actual practices or processes rather than on perceptions. Table 2 presents the selected criteria from Adamson, et al.³⁰ and Hojat, et al.³¹ and how we operationalized them.

Table 2: Operationalization of the measure of nurses' autonomy versus subordination

<i>From Heinemann et al 1999</i>	<i>Operationalization in this study</i>
The physician should not always have the final word in decisions made by health care teams	Nurses and other non-physician professionals are involved in clinical decisions regarding their patients (Yes, all the time = 2, Sometimes = 1, Rarely = 0)
The physician has the ultimate legal responsibility for decisions made by health care teams.	A physician has to be physically present in the clinic at all times for services to be delivered (No = 2, Yes, but exceptions apply = 1, Yes = 0)
<i>From Hojat et al 1999</i>	<i>Operationalization in this study</i>
Physicians and nurses should contribute to decisions regarding the hospital discharge of patients.	Nurses can treat and send a patient back home without asking permission from a physician (Yes = 2, In some circumstances = 1, No = 0)
Nurses should be involved in making policy decisions concerning the hospital support services on which their work depends.	Nurses and other non-physician professionals are involved in organizational/managerial decisions (Yes, all the time = 2, Sometimes = 1, Rarely = 0)
The primary function of the nurse is to carry out the physician's orders.	Nurses and other non-physician professionals are involved in supervision and training activities (Yes, all the time = 2, Sometimes = 1, Rarely = 0)

We also used a rough estimate of team size measured on a 1 to 4 scale. The rationale behind using such a scale rather than the number of people working in the clinic is presented in the next section.

Data and methods

The results presented here are part of a larger project whose complete research protocol is described in Contandriopoulos, et al.³² The general objective of that project is to understand the characteristics of high-performance primary care teams and to assess their outcomes through a two components mixed method study design. The data used here were derived from the qualitative first component, which was an implementation analysis based on developmental evaluation principles.^{33 34} The project, as well as all consent forms and research tools, was accepted by the University of Montreal Health Sciences Research Ethics Committee (CERES) and the Research Ethics Committee of the Centre de santé et de services sociaux de la Montagne.

Data

The eight primary care teams included in the study are all located in Quebec (Canada) and were selected on the basis of preliminary analysis showing they were all highly interprofessional and likely

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3 characterized by high levels of effectiveness and efficiency. The sample is thus deliberately not
4 representative of the average primary care team in Quebec. The sampling logic is in line with the goal
5 of the study, which is to understand the characteristics of high-performance primary care teams.
6

7 In each of the eight primary care settings, semi-structured interviews were conducted with various
8 informants (physicians, nurses, administrators, etc.) to identify the characteristics of the care
9 structures and processes. The conceptual framework used for this is available in Contandriopoulos,
10 et al.¹¹ A total of 78 interviews were conducted. Interviews lasted between 45 minutes and two hours
11 and were conducted by experienced researchers. Non-participant observation was also conducted in
12 most settings to document team dynamics and organizational culture.
13

14 *Patient and Public Involvement*

15
16 There was no direct patient or public involvement in the research component whose results are
17 discussed here. However, this component is part of a larger project in which 3000 patients and user
18 are being followed longitudinally to analyze the evolution of their satisfaction regarding services,
19 unmet needs, etc. in the 8 pilot sites.
20

21 *Methods*

22
23 Interviews were recorded and transcribed and then analyzed both by site and cross-sectionally. The
24 analysis was based on discourse analysis techniques.³⁵⁻³⁹ The end product was a narrative profile of
25 each site, about 20 single-spaced pages long. Draft versions of each profile were discussed at research
26 team meetings and adjusted until they were perceived as being both accurate in relation to the
27 interview transcripts and comprehensive in regard to available information. At that point, profiles
28 were sent to each informant for validation and then further edited based on their feedback.
29

30
31 For the purpose of the present analysis, preliminary scores for each criterion of the formalization and
32 autonomy/subordination scales were established based on each site's profile. The preliminary scores
33 were then discussed in team meetings involving the researchers who conducted the interviews.
34

35 At that point it became clear that some larger primary care sites in our sample actually consisted of
36 distinct submodels of practice. Specifically, in some settings, the practice model was very different
37 depending on whether the core professional was a nurse practitioner or a physician. We therefore
38 divided four of our sites into two subsites with different scores. This produced a total of 12 sites or
39 subsites. For confidentiality purposes, sites were identified only through a two-letter code. Sites that
40 were subdivided have either an -MD or -NP after their code names.
41

42 Having divided primary care sites according to such logic, it followed that what was meaningful for
43 assessing the functioning of the team was not the formal organizational boundaries. First, Quebec's
44 care delivery organizations have, in recent years, experienced large forced mergers, such that some of
45 our study settings are now part of huge structures that include acute care hospitals, long term care
46 facilities, and others. Obviously those formal boundaries do not constitute a coherent measure of
47 primary care team size. Second, according to the headcounts in the various physical locations, some
48 of our study settings are quite large, with a total workforce of over 100 persons, while others have
49 less than 10. Even so, in their daily work, the professionals function within more circumscribed work
50 environments. Nevertheless, being a small subteam within a large structure necessitates coordination
51 mechanisms with the rest of the organization that a small-scale practice does not require. This is
52 contingent, however, on the actual level of interdependence of the organizational components,
53 which in turn depends on the practice model. For these reasons, properly assessing team size was not
54 as straightforward as might have been expected. The formal organizational size, physical location site
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3 size, and practice model were therefore all taken into account and summarized as a rough score of 1
4 to 4.

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6 Discrepancies in all score assessments were resolved through consensus and, in some cases, a re-
7 analysis of interview transcripts. Scores were discussed and adjusted until we reached a team
8 consensus that they provided an accurate assessment of the situation.
9

10 **Results**

11
12 Table 3 presents the score for each criterion from the two scales for each site or subsite. The settings
13 were sorted according to their formalization scores. Even a cursory examination of the table suggests
14 there is a high level of negative covariation of the formalization and autonomy scores. The
15 correlation coefficient is -0.64.
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Table 3: Formalization and autonomy scores for each primary care setting

	SA	PX-NP	VA	FA-NP	SP	ND-NP	JU-NP	BA	FA-MD	PX-MD	ND-MD	JU-MD	Average	Std-dev
LEVEL OF FORMALIZATION														
Non-physicians' professional roles are divided according to "care modules" mostly based on disease, e.g. diabetes, mental health, etc. (Yes = 2, To some extent =1, No = 0)	0	2	1	2	0	0	2	2	2	2	1	2	1.3	0.9
There are formal rules that specify which patients will be treated by which professional (Yes = 2, To some extent = 1, No = 0)	1	1	2	0	0	1	2	2	0	2	2	2	1.3	0.9
An EHR (electronic health record) system is used to communicate patient information between professionals within the team (Yes = 2, EHR exists but isn't the main communication tool = 1, No = 0)	0	0	0	1	1	2	2	0	0	0	2	2	0.8	0.9
Professionals will have team discussions on complex patients (Systematically = 2, If needed = 1, Informal chats only = 0)	0	0	0	0	2	1	0	2	1	1	1	1	0.8	0.8
Collective prescriptions rules are in place to structure non-physicians' capacity to provide drugs to patients they treat (Yes = 2, Some = 1, None = 0)	0	0	1	1	2	0	0	0	2	2	1	2	0.9	0.9
Work within the team is structured according to formal teamlets (Yes = 2, Yes, but with flexibility =1, No = 0)	0	0	0	0	0	2	0	0	1	0	2	2	0.6	0.9
FORMALIZATION SCORE	1	3	4	4	5	6	6	6	6	7	9	11	5.7	2.6
SIZE SCORE	1	4	3	4	2	4	3	2	4	4	4	3	3.2	1.0
NURSES' AUTONOMY vs SUBORDINATION														
Nurses and other non-physician professionals are generally involved in significant clinical decisions (Yes, all the time = 2, Sometimes = 1, Rarely = 0)	2	2	0	1	2	2	2	1	1	0	1	1	1.3	0.8
A physician has to be physically present in the clinic at all times for services to be delivered (No = 2, Yes, but exceptions apply = 1, Yes = 0)	2	1	1	2	1	0	0	2	2	1	0	0	1.0	0.9
Nurses can treat and send a patient back home without asking permission from a physician (Yes = 2, In some circumstances = 1, No = 0)	2	2	1	2	2	2	2	2	1	1	1	1	1.6	0.5
Nurses and other non-physician professionals are involved in organizational/managerial decisions (Yes, all the time = 2, Sometimes = 1, Rarely = 0)	2	1	0	1	2	1	0	1	0	1	1	0	0.8	0.7

Nurses and other non-physician professionals are involved in supervision and training activities (Yes, all the time = 2, Sometimes = 1, Rarely = 0)	2	1	0	1	2	2	0	1	0	2	1	0	1.0	0.9
AUTONOMY SCORE	10	7	2	7	9	7	4	7	4	5	4	2	5.7	2.6

When plotted on a scatter graph, a linear regression provides a good fit with the data as shown on Figure 1 below.

INSERT FIGURE 1

We conducted sensitivity analyses by removing either the settings with the highest and lowest formalization scores or those with the highest and lowest autonomy scores. In both cases the correlation decreased (respectively to -0.26 and -0.47) but the direction of the covariation remained. Similarly, we tried merging back the primary care settings we had subdivided based on the training of the core professional by averaging their scores, and the same association remained (correlation score of -0.52).

We also found a positive covariation between team size and formalization as shown on figure 2 below.. However, the relationship was quite weak (0.35) and completely disappeared if the smallest team is removed from the sample. (-0.01)

INSERT FIGURE 2

Discussion

The results showed a clear negative covariation between the level of care process formalization and the level of nurses' autonomy/subordination. Such a relationship validates the idea that those two dimensions should be analyzed conjointly and is coherent with our suggestion that a conceptual framework inspired by a contingency approach makes sense.

The empirical data we used cannot inform on the plausibility of a causal relationship. However, conceptually, the hypothesis of a causal relationship in which an increased level of formalization leads to a drop in nurses' autonomy has much face validity. As mentioned earlier, based on the literature, formalization was defined as efforts made to strengthen the predictability of actions and decrease role ambiguity. We believe a partial explanation for the correlation found between the level of formalization and nurses' professional autonomy is that efforts made by the teams to decrease role ambiguity tend to formalize roles in ways that restrict nurses' professional autonomy.

Our data also showed a great deal of variation in nurses' levels of autonomy for similar levels of formalization. We interpret this variation as a sign that the relationship between formalization and nurses' autonomy is far from direct and mechanical. For formalization scores near the middle of the scale, no covariation existed with the level of nurses' autonomy. In-depth analysis of each practice setting also suggested teams have a great deal of agency in articulating their model of practice. We

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3 understand this as suggesting that, unless formalization is pushed to extremes in any given direction,
4 autonomy/subordination remains a dimension over which teams can have significant control.
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6 However, according to a contingency theory approach, the optimal level of formalization is not
7 something organizations can fully decide on their own. There are parameters (e.g. size, age,
8 environmental predictability, managerial style, etc.^{12 17 40}) that set a range of plausible levels. And
9 indeed, the rough measure of organizational size we applied did correlate with our measure of
10 formalization. This suggests there would be some merit in conceptualizing primary care teams'
11 structural and process optimization in a systemic way. The optimal choice for any given team is likely
12 to be contingent on a set of interconnected parameters. For example, if team size is indeed positively
13 associated with formalization and, in turn, if high levels of formalization tend to limit nurses'
14 autonomy, then team size and nurse autonomy should be seen as interdependent.
15

16 This provides some relevant policy insight for the structural design of nurse-intensive primary care
17 teams. Similarly, given the results obtained, we believe that if a primary care team aims to increase
18 nurses' and other non-physicians' professional autonomy, it should be very careful about the extent
19 to which it formalizes its processes. This advice is also worth considering in relation to the avalanche
20 of recommendations in the nursing literature suggesting that role clarification through formal
21 definitions is the way forward to increase nurses' autonomy and scope of practice.⁴¹⁻⁴³
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23

24 *Limitations*

25
26 This study has a few limitations worth discussing. First, the analysis was based on secondary analysis
27 of existing data. The hypothesis about a potential link between formalization and autonomy emerged
28 during the discussions about site descriptions. Therefore, the data collection was not initially aimed
29 at measuring those dimensions. The data are nevertheless rich and detailed, and we are confident in
30 their validity. However, the results presented here remain mostly exploratory, and further studies on
31 the topic would be needed.
32

33 Second, our sample was limited to Quebec and deliberately skewed towards well-functioning teams
34 whose care delivery processes relied to a large extent on non-physician professionals. It would be
35 interesting to study the topic in other jurisdictions and with a more diverse sample of primary care
36 teams.
37

38 Finally, the third element of note here has to do with the nature of the data, but is not a limitation
39 per se. Given the two limitations identified above, it would be tempting to measure formalization
40 and autonomy in a much larger sample of primary care teams using a quantitative survey instrument.
41 However, we are not aware of any survey instrument that would provide a satisfying level of
42 construct validity to be usable for such a purpose.
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46 **Conclusion**

47
48 Our earlier narrative review of the literature showed that formalization and the training of the team's
49 core professional are central parameters by which to classify and describe multiprofessional primary
50 care teams. The exploratory analysis conducted here suggests those dimensions should be analyzed
51 together from a contingency perspective.
52

53 While most jurisdictions internationally try to identify and implement coherent and efficient ways to
54 strengthen their primary care capacities, there is little evidence-informed advice in the literature about
55 the parameters for doing so. The present study suggests that adopting a contingency perspective
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3 might be an interesting way to disentangle some parameters of primary care team optimization. We
4 also believe the covariations we found between team size, formalization, and nurses' autonomy could
5 have a practical value for many teams currently grappling with the best way to rethink roles and
6 processes.
7

8 Finally, at the time of writing this article we do not have the data needed to assess whether there is a
9 link between level of professional autonomy and a team's performance. On one hand, contingency
10 theory suggests that under some circumstances it might make sense to restrict workers' autonomy.
11 On the other, the consensus in most nurse-based literature is that increased nurse autonomy
12 improves quality of care quality and efficiency. We believe this could be an interesting focus for
13 further research.
14

15 **Figure legends**

16 Figure 1: Relationship between formalization and nurses' autonomy

17 Figure 2: Relationship between team size and level of formalization
18

19 **Original protocol for the study**

20 This study is part of a larger project whose detailed protocol was published and is in open access.³²
21

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26

27 **Competing interests statement**

28 The authors declare no competing interests.
29

30 **Authors' contributions**

31 MP had the initial idea to study the link between formalization and autonomy and wrote the first
32 drafts. DC developed the conceptual framework, analyzed the data, and wrote most of the paper.
33 AD was involved in the team discussion at all steps and contributed to the final paper.
34

35 **Data sharing statement**

36 The data used here is composed of interview verbatims that can't be shared due to confidentiality issues
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38 **Bibliography**

- 39 1. Clavet N-J, Duclos J-Y, Fortin B, et al. Les dépenses en santé du gouvernement du Québec, 2013-
40 2030 : projections et déterminants. Montreal, QC: CIRANO Scientific Series 2013s-45, 2013.
- 41 2. Commission on Social Determinants of Health. *Achieving Health Equity: From Root Causes to Fair*
42 *Outcomes. Interim Statement. Geneva.* Geneva: World Health Organization,, 2007.
- 43 3. Rittenhouse DR, Shortell SM, Fisher ES. Primary care and accountable care -- two essential
44 elements of delivery-system reform. *N Engl J Med* 2009;**361**(24):2301-03.
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4. Ham C, Dixon A, Brooke B. Transforming the Delivery of Health and Social Care: The Case for Fundamental Change. London, UK: King's Fund, 2012.
<https://www.kingsfund.org.uk/publications/transforming-delivery-health-and-social-care> (accessed 15 Feb 2017).
5. Starfield B, Yushi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q* 2005;**83**(3):457-502.
6. Donaldson MS, Yordy KD, Lohr KN, et al. Primary Care: America's Health in a New Era (Committee on the Future of Primary Care, Institute of Medicine). Washington, DC: National Academies Press, 1996.
7. Feachem RG, Sekhri NK, White KL, et al. Getting more for their dollar: a comparison of the NHS with California's Kaiser Permanente. *BMJ* 2002;**324**(7330):135-43.
8. Haggerty J, Pineault R, Beaulieu M-D, et al. Practice features associated with patient-reported accessibility, continuity, and coordination of primary health care. *Ann Fam Med* 2008;**6**(2):116–23.
9. Hutchison B. From Hall to now: reflections on Canadian Medicare from a primary care perspective. Emmett Hall Memorial Lecture. Vancouver: Canadian Association for Health Services and Policy Research (CAHSPR), 2013.
10. Macinko J, Starfield B, Shi L. The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970–1998. *Health Serv Res* 2003;**38**(3):831-65.
11. Contandriopoulos D, Perroux M, Cockenpot A, et al. Analytical typology of multiprofessional primary care models. *BMC Family Practice* 2018;**19**:44.
12. Donaldson L. The normal science of structural contingency theory. In: Clegg SR, Hardy C, Nord WR, eds. *Handbook of Organization Studies*. Thousand Oaks, CA: SAGE Publications, 1996:57-76.
13. Fayol H. *General and Industrial Management*. London: Pitman, 1949.
14. Taylor FW. *The Principles of Scientific Management*. New York: Harper, 1911.
15. Hasenfeld Y. *Human Services as Complex Organizations*. 2nd ed. Thousand Oaks, CA: Sage Publications, 2010.
16. Abernethy MA, Stoelwinder JU. The role of professional control in the management of complex organizations. *Accounting, Organizations and Society* 1995;**20**(1):1-17.
17. Mintzberg H. *The Structuring of Organizations: A Synthesis of the Research*. Englewood Cliffs, N.J.: Prentice-Hall, 1979.
18. Hall RH, Johnson NJ, Haas JE. Organizational size, complexity, and formalization. *American Sociological Review* 1967;**32**(6):903-12.
19. Fredrickson JW. The strategic decision process and organizational structure. *The Academy of Management Review* 1986;**11**(2):280-97
20. Hage J, Aiken M. Routine technology, social structure and organizational goals. *Administrative Science Quarterly* 1969;**14**(3):368-79.

21. Dalton DR, Todor WD, Spendolini MJ, et al. Organization structure and performance: a critical review. *The Academy of Management Review* 1980;**5**(1):49-64.
22. Rizzo JR, House RJ, Lirtzman SI. Role conflict and ambiguity in complex organizations. *Administrative Science Quarterly* 1970;**15**(2):150-63.
23. Meyer JW, Rowan B. Institutionalized organizations: formal structure as myth and ceremony. *American Journal of Sociology* 1977;**83**(2):340-63.
24. Powell WW, DiMaggio PJ. *The New institutionalism in organizational analysis*. Chicago: University of Chicago Press, 1991.
25. Scott WR. *Organizations: Rational, Natural and Open Systems*. Upper Saddle River, NJ: Prentice Hall 2003.
26. Abbott A. *The System of Professions*. Chicago, IL: The University of Chicago Press,, 1988.
27. Heale R, Butcher M. Canada's first nurse practitioner-led clinic: a case study in healthcare innovation. *Nurs Leadersh* 2010;**23**(3):21-9.
28. Martínez-González NA, Djalali S, Tandjung R, et al. Substitution of physicians by nurses in primary care: a systematic review and meta-analysis. *BMC Health Services Research* 2014;**14**(1):214.
29. Wong FKY, Chung LCY. Establishing a definition for a nurse-led clinic: structure, process, and outcome. *J Adv Nurs* 2006;**53**(3):358-69.
30. Adamson BJ, Kenny DT, Wilson-Barnett J. The impact of perceived medical dominance on the workplace satisfaction of Australian and British nurses. *Journal of Advanced Nursing* 1995;**21**(1):172-83.
31. Hojat M, Fields SK, Veloski JJ, et al. Psychometric properties of an attitude scale measuring physician-nurse collaboration. *Evaluation & the Health Professions* 1999;**22**(2):208-20.
32. Contandriopoulos D, Duhoux A, Roy B, et al. Integrated Primary Care Teams (IPCT) pilot project in Quebec: a protocol paper. *BMJ Open* 2015;**5**(e010559).
33. Patton MQ. *Developmental Evaluation: Applying Complexity Concepts to Enhance Innovation and Use*. New-York, NY: The Guilford Press, 2011.
34. Patton MQ. Developmental Evaluation. *Evaluation Practice* 1994;**15**(3):311-19.
35. Hardy C, Palmer I, Philips N. Discourse as a strategic resource. *Human Relations* 2000;**53**(9):1227-48.
36. Chouliaraki L, Fairclough N. *Discourse in Late Modernity: Rethinking Critical Discourse Analysis*. Edinburgh: Edinburgh University Press, 1999.
37. Moch MK, Fields WC. Developing a content analysis for interpreting language use in organizations. *Research in the sociology of organizations* 1985;**4**:81-126.
38. Kirsch C, Bernier B. Le sens du discours écrit: propos méthodologiques à partir de deux recherches. *Culture* 1988;**8**(1):35-47.
39. Bourdieu P. *Ce que parler veut dire: l'économie des échanges linguistiques*. Paris: Fayard, 1982.
40. Lawrence PR, Lorsch JW. Differentiation and integration in complex organizations. *Administrative Science Quarterly* 1967;**12**(1):1-47.

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2
3 41. American Medical Directors Association. Collaborative and supervisory relationships between
4 attending physicians and advanced practice nurses in long-term care facilities. *Geriatric*
5 *Nursing* 2011;**32**(1):7-17.
6
7 42. Bush NJ, Watters T. The emerging role of the oncology nurse practitioner: a collaborative model
8 within the private practice setting. *alternate J* 2001;**28**(9):1425-31.
9
10 43. DiCenso A, Matthews S. *Report of the Nurse Practitioner Integration Task Team submitted to the Ontario*
11 *Minister of Health and Long-Term Care*. Toronto, ON: Ministry of Health and Long-Term Care,
12 2007.
13
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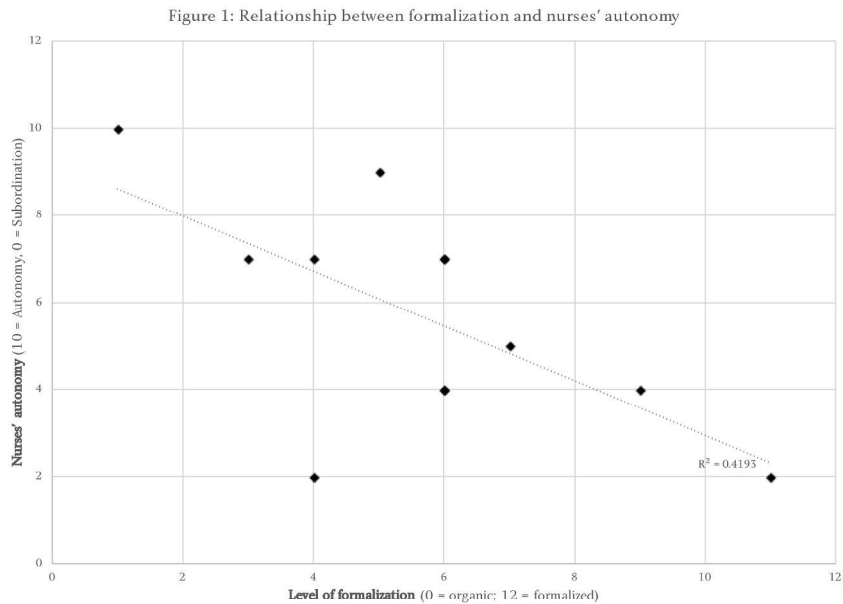


Figure 1: Relationship between formalization and nurses' autonomy

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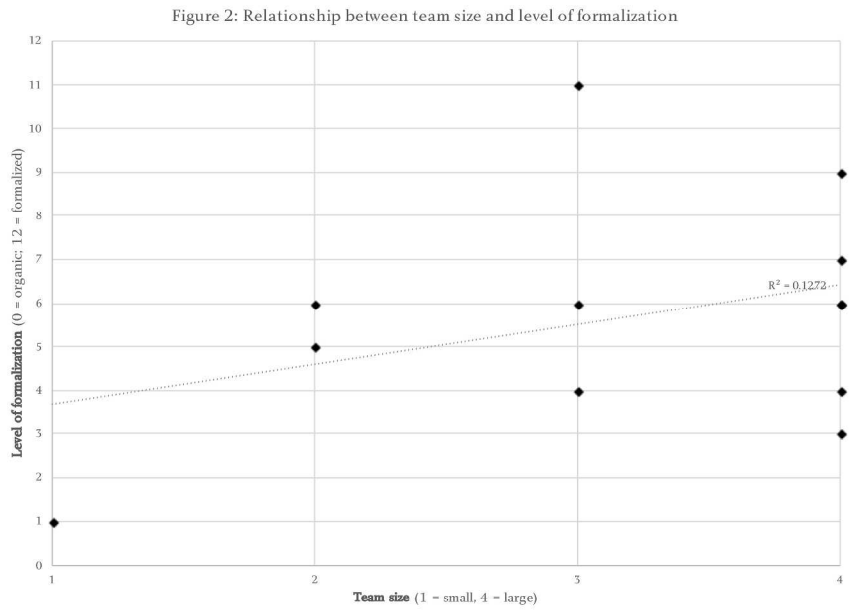


Figure 2: Relationship between team size and level of formalization

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Formalization and subordination: A contingency theory approach to optimizing primary care teams

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Formalization and subordination: A contingency theory approach to optimizing primary care teams

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Abstract

Objective: While there is consensus on the need to strengthen primary care capacities to improve health care systems' performance and sustainability, there is only limited evidence on the best way to organize primary care teams. In this article, we use a conceptual framework derived from contingency theory to analyze the structures and process optimizations of multiprofessional primary care teams. **Design:** We focus specifically on interrelationships between three dimensions: team size, formalization of care processes, and nurse autonomy. Interview-based qualitative data for each of these three dimensions was converted into ordinal scores. Data came from eight pilot sites in Quebec (Canada). **Results:** We found a positive association between team size and formalization (correlation score 0.55) and a negative covariation (correlation score -0.64) between care process formalization and nurses' autonomy/subordination. Despite the study being exploratory in nature, such relationships validate the idea that these dimensions should be analyzed conjointly and are coherent with our suggestion that using a framework derived from a contingency approach makes sense. **Conclusions:** The results provide insights about the structural design of nurse-intensive primary care teams. Non-physicians' professional autonomy is likely to be higher in smaller teams. Likewise, a primary care team that aims to increase nurses' and other non-physicians' professional autonomy should be careful about the extent to which it formalizes its processes.

Strengths and limitations of this study

This article relies on contingency theory to analyze how multiprofessional primary care teams are optimized.

Qualitative data from eight primary care pilot sites was used to assess the covariation between ordinal estimates of team size, formalization of care processes, and nurse autonomy.

The analysis was exploratory and based on correlation analysis using a convenience sample.

Introduction

The continued reliance on current healthcare provision models to address evolving population health needs is likely to exert considerable pressure on public finances¹. Likewise, technical innovations and rapid growth in the intensity of care being provided will exacerbate the issue^{2,3}. Available evidence thus suggests that public health systems need to change significantly to preserve their capacity to maintain universal access to healthcare^{4,5}.

Strengthening primary care capacities is widely considered to be an approach with the potential to reinforce simultaneously health system sustainability and accessibility, continuity of care, and, ultimately, population health^{3,5-11}. However, for this to happen, available evidence suggests that efforts should not be limited to funding more of the same¹². Primary care strengthening should include redefining the nature of the care provided as well as the professional roles and task sharing within teams^{7,13-16}. This article analyzes factors affecting the functioning of interprofessional teams in order to support the strengthening of primary care delivery structures and processes.

From a narrative review of the literature¹², we identified two important dimensions to consider in classifying and analyzing promising multiprofessional primary care teams. One is the degree to which the division of tasks in the team is formalized, and the other is whether the core professional around whom the practice is structured is a physician or an advanced practice nurse.

Building on these dimensions, we argue here that a conceptual lens derived from contingency theory can be helpful to understand how best to optimize the structure and processes of multiprofessional primary care teams. We first discuss the theoretical underpinnings of such a view, and then we present an empirical analysis of this relationship using data from eight primary care teams studied in the context of a broader project in Quebec¹⁷.

Conceptual framework

Contingency theory is the dominant school of thought for analyzing the link between organizations' functioning and performance¹⁸. This theory's core idea is that there is no one best way. Performance is not a product of organizational structure or processes per se. Performance needs to be conceived as a product of the *fit* between the organization's functioning and a set of contingency factors such as organizational size, age, environmental predictability, etc.

Our analysis is not focused on organizational performance, but relies on a similar logic to analyze the optimization of professional roles in primary care teams. We contend there is likely no one best way to organize primary care teams for dimensions such as professional roles definition, task sharing, team size, etc.

Our interest in applying a contingency approach to role definition stems in part from the results of a narrative review we conducted of the literature on high-performance nurse-intensive primary care models¹². The review revealed various plausible operationalizations of high-performance

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3 multiprofessional primary care teams—not one best way, but different coherent articulations of the
4 resources at hand, given environmental constraints and team objectives. The broad range of
5 organizational structures that, according to the literature, appear to succeed in delivering high-quality
6 care efficiently and effectively points to the need for a contingency approach to understand primary
7 care structures and process optimization.
8

9 The review also led to the identification of two dimensions that appeared important for classifying
10 and analyzing promising multiprofessional primary care teams. The first was the degree to which the
11 division of tasks in the team was formalized. At one extreme were formal models relying on explicit
12 procedures that specified what service would be provided by which professional, to which patient,
13 and at what point in time. At the other were organic approaches based on mutual adjustments, in
14 which professionals adapted to structural circumstances and to patients' characteristics in deciding
15 on care processes¹⁹.
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17 The second dimension was the training of the core professional around whom the practice was
18 structured. Most primary care models are physician-centred, but there is a growing number of nurse-
19 centred teams. When a model is nurse-centric, the core position is usually occupied by a primary
20 healthcare nurse practitioner (NP).^{*} The relative centrality of either physicians or nurses and the level
21 of autonomy granted to non-physician professionals is a second structuring dimension for the
22 classification of primary care teams.
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24 In our review, these two dimensions were key parameters to classify and describe multiprofessional
25 primary care teams but the literature we analyzed did not posit any interdependency between the two.
26 However, as we discuss below, the two dimensions of formalization and professional role relate to
27 elements that are abundantly discussed in the literature on healthcare organizations.
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30 *Professionalism, formalization, and primary care delivery*

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32 From its inception, the organization science literature has strongly advocated the virtues of
33 formalized and standardized production processes,^{20 21} the ultimate form of which would become the
34 production line. However, despite the impressive successes of this approach in some industries, such
35 as large-scale manufacturing, it failed to generalize to all sectors. Of particular interest here,
36 organizations in which humans are the raw material²² rely on processes that are not easily
37 standardized. Those organizations (healthcare, education, social services, etc.) thus tend to rely on a
38 highly trained and specialized workforce responsible for handling the inherent unpredictability of the
39 production.²³
40

41 In the late 1970s, Henry Mintzberg deeply influenced the field by synthesizing contingency theory
42 findings into a configurational approach.²⁴ He offered five ideal types of potential fit between well-
43 documented contingency factors and organizational structures. One ideal type, the professional
44 bureaucracy, was coined to describe organizations that, on one hand, are forced to decentralize the
45 control of production processes to relatively autonomous professionals and, on the other, rely on
46 formalization and standardization for all the predictable portions of their operations. The poster
47 child of a professional bureaucracy is the acute care hospital.
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50 Because of their organizational simplicity and small size, other care provision structures such as
51 private clinics, physicians' offices, and the like were usually described as "simple structures" in
52 Mintzberg's terms. In those, a few professionals would rely on self-adjustment and direct control to
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54 ^{*}NPs' training and legal scope of practice varies from one jurisdiction to the next. We use the term here to refer to nurses
55 with graduate level university training and an extended scope of practice, including some prescribing rights, such that
56 they are allowed to diagnose autonomously and treat a variety of common conditions.
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run the operations. However, today the independent small-scale physician's office is a near-extinct species as a care delivery model. Primary care production is increasingly in the hands of larger, multiprofessional structures⁷ dealing with many of the characteristic contingencies of professional bureaucracies (e.g. size, age, vertical integration, division of labour among professionals and unpredictable production processes)²⁵.

Given the current evolution in primary care production structures, we believe a conceptual lens derived from contingency theory might help deepen our understanding of their optimal functioning parameters. Moreover, building upon results from the above-mentioned narrative review,¹² we will focus mainly on formalization and professional autonomy as the two core contingency parameters to be considered.

Defining formalization

Formalization can be conceived as both a process and an outcome. As an outcome, it is the extent to which behaviour within a team is prescribed by explicit procedures and rules.^{26 27} This has to do with what Dalton, et al.²⁸ call the *structuring*—as opposed to the *structural*—components of organizational structure.²¹ Structural components describe the arrangements (such as size, subunit sizes, span of control, etc.) through which participants are formally interconnected. Structuring components are more processual in nature and refer to elements such as policies and activities aimed at codifying the behaviour of participants. As a process, formalization is therefore defined as efforts to increase the structuring of behaviours in order to strengthen the predictability of actions and decrease role ambiguity.²⁹ This definition emphasizes the existence of a deliberate intention, whether of a person or a group, to increase predictability. We do acknowledge that strong macro-systemic, non-deliberate formalization forces exist that exert influence through the social processes described, for example, in the neo-institutional organizational literature³⁰⁻³². Our emphasis here on deliberate interventions was adopted because of the specific objectives of the study and not the relative importance of the micro/macro formalization pressures.

Defining professional autonomy and subordination

As stated earlier, the results from the narrative review suggest that two professional groups are commonly found at the centre of any primary care delivery model: physicians and nurses. However, despite its seemingly dichotomous nature, we argue this characteristic of primary care models should be conceived on a continuum of professional autonomy and subordination³³.

Historically, the medical profession has been very successful at claiming and protecting a monopoly over the provision of most human healthcare. However, to deliver the care while relying on a relatively scarce workforce, the medical profession has delegated a significant portion of the day-to-day work to “subordinate” professional groups, among which nursing is the most important.³⁴ For members of those historically subordinated professions, practical professional autonomy is highly dependent on the level of subordination of processes in their work environment.

Nurses are the most commonly found non-physician professionals in primary care and play a significant role in almost all primary care models. In teams where the core professional is a physician, nurses' level of professional autonomy varies greatly. At one end of the spectrum are physician-centric models in which nurses are highly subordinated, with a limited scope of practice and little autonomy. At the other end are nurse-centric models, such as *nurse-led clinics*, like those existing in Ontario or in the United States³⁵⁻³⁷, where nurses have almost complete autonomy. In between lies a vast array of configurations, including inter-professional teams in which nurses enjoy varying levels of autonomy regarding the care they provide to their patients.

Data and methods

The results presented here are part of a larger project whose complete research protocol is described in Contandriopoulos, et al.¹⁷ The general objective of that project is to understand the characteristics of high-performance primary care teams and to assess their outcomes through a two components mixed method study design. The data used here were derived from the qualitative first component, which was an implementation analysis based on developmental evaluation principles.^{38 39} The project, as well as all consent forms and research tools, was accepted by the University of Montreal Health Sciences Research Ethics Committee (CERES) and the Research Ethics Committee of the Centre de santé et de services sociaux de la Montagne.

Data

The eight primary care teams included in the study are all located in Quebec (Canada) and within either urban (Montreal or Quebec) or dense suburban settings (Montreal South-shore). They were selected on the basis of preliminary analysis showing they were all highly interprofessional (at least half of the professional workforce is composed of non-physicians)¹⁶ and likely characterized by high levels of effectiveness and efficiency (according to the opinion of regional and provincial experts collected during pre-selection interviews). The sample is thus deliberately not representative of the average primary care team in Quebec. The sampling logic is in line with the goal of the study, which is to understand the characteristics of high-performance primary care teams.

In each of the eight primary care settings, semi-structured interviews were conducted with various informants (physicians, nurses, administrators, etc.) to identify the characteristics of the care structures and processes. The conceptual framework used for this is available in Contandriopoulos, et al.¹² A total of 73 interviews were conducted with a total of 53 informants (15 physicians, 9 NPs, 18 RNs and LPNs, 4 administrators, 8 other professionals such as social workers and psychologists). Interviews lasted between 45 minutes and two hours and were conducted by experienced researchers. The focus of the interviews was on the evolution of the practice model, the way professional roles were structured and evolved, the ways in which professional roles and patient flow interact, professional communication processes, administrative and decision-making processes, etc. Non-participant observation was also conducted in most settings to document team dynamics and organizational culture.

Patient and Public Involvement

There was no direct patient or public involvement in the research component whose results are discussed here. However, this component is part of a larger project in which 3000 patients and user are being followed longitudinally to analyze the evolution of their satisfaction regarding services, unmet needs, etc. in the 8 pilot sites.

Measuring formalization and autonomy

We found no scales of formalization or autonomy that could be applied directly to our object. In both cases we relied on adaptations of existing tools.

The starting point of the scale we used to measure formalization is based on the seminal work of Hall, et al.²⁵ which provides five dimensions, each appraised through two or three criteria (11 in total).¹⁸ To use this scale in our study, we had to edit it in two ways. First, we edited the criteria to make them more primary care specific. Second, we edited some items to remove conceptual overlap with the notion of subordination. For example, in the context of primary care teams, the existence of

a “clear definition of the hierarchy of authority”, as per Hall, et al.²⁵ would be largely overlapping with the concept of physician subordination as defined earlier. As we discuss below, the data used here were derived from in-depth qualitative interviews. Some elements of Hall, et al.²⁵ typology were not documented in the interviews and therefore were not included. Table 1 presents the selected criteria from Hall, et al.²⁵ and the way we operationalized them.

Table 1: Operationalization of the measure of formalization

<i>Hall et al 1967 Typology</i>	<i>Operationalization in this study</i>
<i>A. Roles</i>	
The degree to which the positions in the organization are concretely defined.	Non-physicians' professional roles are divided according to "care modules" mostly based on diseases. For example, diabetes, mental health, etc. (Yes = 2, To some extent = 1, No = 0)
<i>B. Authority Relations</i>	
The degree to which the authority structure is formalized (clear definition of the hierarchy of authority).	There are formal rules that specify which patients will be treated by which professional (Yes = 2, To some extent = 1, No = 0)
<i>C. Communications</i>	
The degree of emphasis on written communications.	An electronic health record (EHR) system is used to communicate patient information between professionals within the team (Yes = 2, EHR exists but isn't the main communication tool = 1, No = 0)
The degree of emphasis on going through established channels in the communications process.	Professionals will have team discussions on complex patients (Systematically = 2, If needed = 1, Informal chats only = 0)
<i>D. Norms and Sanctions</i>	
The number of written rules and policies.	Collective prescription rules are in place to structure non-physicians' capacity to provide drugs to patients they treat (Yes = 2, Some = 1, None = 0)
<i>E. Procedures</i>	
The degree of formalization of orientation programs for new members (systematic socialization for all new entrants).	Work within the team is structured according to formal teamlets (Yes = 2, Yes, but with flexibility = 1, No = 0)

For the autonomy/subordination scale, we mostly relied on the work of Adamson, et al.⁴⁰ and Hojat, et al.⁴¹ In those two scales, we selected items based on two criteria. First, an item had to have obvious conceptual ties with the concept of subordination in primary health care delivery. Second, the item had to be focused on actual practices or processes rather than on perceptions. Table 2 presents the selected criteria from Adamson, et al.⁴⁰ and Hojat, et al.⁴¹ and how we operationalized them.

Table 2: Operationalization of the measure of nurses' autonomy versus subordination

<i>From Heinemann et al 1999</i>	<i>Operationalization in this study</i>
The physician should not always have the final word in decisions made by health care teams	Nurses and other non-physician professionals are involved in clinical decisions regarding their patients (Yes, all the time = 2, Sometimes = 1, Rarely = 0)
The physician has the ultimate legal responsibility for decisions made by health care teams.	A physician has to be physically present in the clinic at all times for services to be delivered (No = 2, Yes, but exceptions apply = 1, Yes = 0)
<i>From Hojat et al 1999</i>	<i>Operationalization in this study</i>
Physicians and nurses should contribute to decisions regarding the hospital discharge of patients.	Nurses can treat and send a patient back home without asking permission from a physician (Yes = 2, In some circumstances = 1, No = 0)
Nurses should be involved in making policy decisions concerning the hospital support services on which their work depends.	Nurses and other non-physician professionals are involved in organizational/managerial decisions (Yes, all the time = 2, Sometimes = 1, Rarely = 0)
The primary function of the nurse is to carry out the physician's orders.	Nurses and other non-physician professionals are involved in supervision and training activities (Yes, all the time = 2, Sometimes = 1, Rarely = 0)

Score attribution

Interviews were recorded and transcribed and then analyzed both by site and cross-sectionally. The analysis was based on discourse analysis techniques.⁴²⁻⁴⁶ The end product was an in-depth narrative profile of each site. Draft versions of each profile were discussed at research team meetings and adjusted until they were perceived as being both accurate in relation to the interview transcripts and comprehensive in regard to available information. At that point, profiles were sent to each informant for validation and then further edited based on their feedback.

For the purpose of the present analysis, preliminary scores for each criterion of the formalization and autonomy/subordination scales were established independently by two researchers based on each site's profile. Every criterion (see tables 1 and 2) is phrased as a descriptive claim regarding observable characteristics of the team. Ordinal scores of either 0, 1 or 2 were attributed depending on the claim being true, sometimes true, or false. Those preliminary scores were then discussed in team meetings involving the researchers who conducted the interviews. There was an initial discrepancy in 6 of the 132 items (4.5%). As scores were based on descriptive claims, the discrepancies were all resolved by identifying whether the interview data supported the claim or not.

However, those team discussions also made it clear that some larger primary care sites in our sample actually consisted of distinct submodels of practice. Specifically, in some settings, the practice model was different depending on whether the core professional was a nurse practitioner or a physician. We therefore divided four of our sites into two subsites with different scores. This produced a total of 12 sites or subsites. For confidentiality purposes, sites were identified only through a two-letter code. Sites that were subdivided have either an -MD or -NP after their code names.

Having divided primary care sites according to such logic, it followed that what was meaningful for assessing the functioning of the team was not the formal organizational boundaries. First, Quebec's

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3 care delivery organizations have, in recent years, experienced large forced mergers, such that some of
4 our study settings are now part of huge structures that include acute care hospitals, long-term care
5 facilities, and others. Obviously, those formal boundaries do not constitute a coherent measure of
6 primary care team size. Second, according to the headcounts in the various physical locations, some
7 of our study settings are quite large, with a total workforce of over 100 persons, while others have
8 less than 10. In larger teams' daily work, the professionals function within more circumscribed work
9 environments. Nevertheless, being a small subteam within a large structure necessitates coordination
10 mechanisms with the rest of the organization that a small-scale practice does not require. This is
11 contingent, however, on the actual level of interdependence of the organizational components,
12 which in turn depends on the practice model. For these reasons, properly assessing team size was not
13 as straightforward as might have been expected.
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16 Based on the elements discussed above we estimated practical team size based on three factors: size
17 of the overall organization (0-10 FTE =1; 20-50 FTE =2; 50 and more FTE =3); size of the care
18 delivery site (0-5 FTE =1; 5-15 FTE =2; 15 and more FTE =3) and level of interdependency in daily
19 practice within the team (minimal=1; moderate=2; high=3). Size scores were established and
20 validated according to the same approach described earlier. Initial discrepancies in 3 items out of 36
21 (8.3%), all related to the interdependency dimension, were resolved by identifying whether interview
22 data supported the claim or not.
23
24

25 *Analysis*

26 Based on the conceptual framework presented earlier we sequentially assessed the covariation
27 between size and formalization and between formalization and autonomy. For each three
28 dimensions, we relied on site total scores based on the sum of each criterion for each dimension.
29

30 Given the exploratory nature of this study and the data used, we limited ourselves to simple Pearson
31 correlation coefficients. We conducted sensitivity analyses by removing settings with the highest and
32 lowest scores. The covariation between the dimensions studied was also visually analyzed on scatter
33 graphs including a linear regression.
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36 **Results**

37 Table 3 presents the score for each criterion from the two scales for each site or subsite. The settings
38 were sorted according to their formalization scores.
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Table 3: Formalization and autonomy scores for each primary care setting

SITES ABBREVIATED NAMES		SA	PX-NP	VA	FA-NP	SP	ND-NP	JU-NP	BA	FA-MD	PX-MD	ND-MD	JU-MD	Average	Std-dev
SIZE	Overall organization size (0-10 =1; 10-50=2; +50 =3)	1	3	3	3	2	3	2	2	3	3	3	2	2.5	0.7
	Local care team size (0-5 =1; 5-15=2; +15 =3)	1	2	2	1	2	2	2	2	3	3	3	2	2.1	0.7
	Interdependency in daily practice (minimal=1; moderate=2; high=3)	2	1	1	2	3	2	1	2	1	2	2	2	1.8	0.6
SIZE SCORE		4	6	6	6	7	7	5	6	7	8	8	6	6.3	1.2
LEVEL OF FORMALIZATION	Non-physicians' professional roles are divided according to "care modules" mostly based on disease, e.g. diabetes, mental health, etc. (Yes = 2, To some extent =1, No = 0)	0	2	1	2	0	0	2	2	2	2	1	2	1.3	0.9
	There are formal rules that specify which patients will be treated by which professional (Yes = 2, To some extent = 1, No = 0)	1	1	2	0	0	1	2	2	0	2	2	2	1.3	0.9
	An EHR (electronic health record) system is used to communicate patient information between professionals within the team (Yes = 2, EHR exists but isn't the main communication tool = 1, No = 0)	0	0	0	1	1	2	2	0	0	0	2	2	0.8	0.9
	Professionals will have team discussions on complex patients (Systematically = 2, If needed = 1, Informal chats only = 0)	0	0	0	0	2	1	0	2	1	1	1	1	0.8	0.8
	Collective prescriptions rules are in place to structure non-physicians' capacity to provide drugs to patients they treat (Yes = 2, Some = 1, None = 0)	0	0	1	1	2	0	0	0	2	2	1	2	0.9	0.9
	Work within the team is structured according to formal teamlets (Yes = 2, Yes, but with flexibility =1, No = 0)	0	0	0	0	0	2	0	0	1	0	2	2	0.6	0.9
FORMALIZATION SCORE		1	3	4	4	5	6	6	6	6	7	9	11	5.7	2.6
NURSES' AUTONOMY vs SUBORDINATION	Nurses and other non-physician professionals are generally involved in significant clinical decisions (Yes, all the time = 2, Sometimes = 1, Rarely = 0)	2	2	0	1	2	2	2	1	1	0	1	1	1.3	0.8
	A physician has to be physically present in the clinic at all times for services to be delivered (No = 2, Yes, but exceptions apply = 1, Yes = 0)	2	1	1	2	1	0	0	2	2	1	0	0	1.0	0.9
	Nurses can treat and send a patient back home without asking permission from a physician (Yes = 2, In some circumstances = 1, No = 0)	2	2	1	2	2	2	2	2	1	1	1	1	1.6	0.5
	Nurses and other non-physician professionals are involved in organizational/managerial decisions (Yes, all the time = 2, Sometimes = 1, Rarely = 0)	2	1	0	1	2	1	0	1	0	1	1	0	0.8	0.7
	Nurses and other non-physician professionals are involved in supervision and training activities (Yes, all the time = 2, Sometimes = 1, Rarely = 0)	2	1	0	1	2	2	0	1	0	2	1	0	1.0	0.9
AUTONOMY SCORE		10	7	2	7	9	7	4	7	4	5	4	2	5.7	2.6

We found a positive covariation between team size and formalization (see Figure 1). The Pearson correlation coefficient is 0.55. Sensitivity tests show that the relation remains when the smallest site is removed (0.30), when the largest site is removed (0.78), and when both are removed (0.63)

INSERT FIGURE 1

We also found a negative covariation between formalization and autonomy (see Figure 2). The Pearson correlation coefficient is -0.64). We conducted sensitivity analyses by removing either the settings with the highest and lowest formalization scores or those with the highest and lowest autonomy scores. In both cases the correlation decreased (respectively to -0.26 and -0.47) but the direction of the covariation remained. Similarly, we tried merging back the primary care settings we had subdivided based on the training of the core professional by averaging their scores, and the same association remained (correlation score of -0.52).

INSERT FIGURE 2

Discussion

The results showed a negative covariation between the level of care process formalization and the level of nurses' autonomy/subordination. Such a relationship validates the idea that those two dimensions should be analyzed conjointly and is coherent with our suggestion that a conceptual framework inspired by a contingency approach makes sense.

The empirical data we used cannot inform on the plausibility of a causal relationship. However, conceptually, the hypothesis of a causal relationship in which an increased level of formalization leads to a drop in nurses' autonomy has much face validity. As mentioned earlier, based on the literature, formalization was defined as efforts made to strengthen the predictability of actions and decrease role ambiguity. We believe a partial explanation for the correlation found between the level of formalization and nurses' professional autonomy is that efforts made by the teams to decrease role ambiguity tend to formalize roles in ways that restrict nurses' professional autonomy.

Our data also showed a great deal of variation in nurses' levels of autonomy for similar levels of formalization. We interpret this variation as a sign that the relationship between formalization and nurses' autonomy is far from direct and mechanical. For formalization scores near the middle of the scale, no covariation existed with the level of nurses' autonomy. In-depth analysis of each practice setting also suggested teams have a great deal of agency in articulating their model of practice. We understand this as suggesting that, unless formalization is pushed to extremes in any given direction, autonomy/subordination remains a dimension over which teams can have significant control.

However, according to a contingency theory approach, the optimal level of formalization is not something organizations can fully decide on their own. There are parameters (e.g. size, age, environmental predictability, managerial style, etc.^{18 24 47}) that set a range of plausible levels. And indeed, the rough measure of organizational size we applied did correlate with our measure of formalization. This suggests there would be some merit in conceptualizing primary care teams' structural and process optimization in a systemic way. The optimal choice for any given team is likely to be contingent on a set of interconnected parameters. For example, if team size is indeed positively

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3 associated with formalization and, in turn, if high levels of formalization tend to limit nurses'
4 autonomy, then team size and nurse autonomy should be seen as interdependent. Such an
5 observation is especially timely given that the current trend toward a more diverse and
6 interprofessional workforce in primary care goes hand in hand with increasingly large practice size⁷.

7
8 Similarly, given the results obtained, we believe that if a primary care team aims to increase nurses'
9 and other non-physicians' professional autonomy, it should be very careful about the extent to which
10 it formalizes its processes. This advice is also worth considering in relation to the avalanche of
11 recommendations in the nursing literature suggesting that role clarification through formal
12 definitions is the way forward to increase nurses' autonomy and scope of practice.⁴⁸⁻⁵⁰

13 14 15 *Limitations*

16 This study has a few limitations worth discussing. First, the analysis was based on secondary analysis
17 of existing data. The hypothesis about a potential link between formalization and autonomy emerged
18 during the discussions about site descriptions. Therefore, the data collection was not initially aimed
19 at measuring those dimensions. The data are nevertheless rich and detailed, and we are confident in
20 their validity. However, the results presented here remain mostly exploratory, and further studies on
21 the topic would be needed.

22
23 Second, our sample was limited to Quebec and deliberately skewed towards well-functioning teams
24 whose care delivery processes relied to a large extent on non-physician professionals. It would be
25 interesting to study the topic in other jurisdictions and with a more diverse sample of primary care
26 teams, and especially teams with some variability in funding mechanisms^{51 52}.

27
28 Finally, the third element of note here has to do with the nature of the data, but is not a limitation
29 per se. Given the two limitations identified above, it would be tempting to measure formalization
30 and autonomy in a much larger sample of primary care teams using a quantitative survey instrument.
31 However, we are not aware of any survey instrument that would provide a satisfying level of
32 construct validity to be usable for such a purpose.

33 34 35 **Conclusion**

36
37 Our earlier narrative review of the literature showed that the level of formalization and the training
38 of the team's core professional are central parameters by which to classify and describe
39 multiprofessional primary care teams. The exploratory analysis conducted here suggests those
40 dimensions should be analyzed together from a contingency perspective.

41
42 While most jurisdictions internationally try to identify and implement coherent and efficient ways to
43 strengthen their primary care capacities, there is little evidence-informed advice in the literature about
44 the parameters for doing so. The present study suggests that adopting a contingency perspective
45 might be an interesting way to disentangle some parameters of primary care team optimization. We
46 also believe the covariations we found between team size, formalization, and nurses' autonomy could
47 have a practical value for many teams currently grappling with the best way to rethink roles and
48 processes.

49
50 Finally, at the time of writing this article we do not have the data needed to assess whether there is a
51 link between level of professional autonomy and a team's performance. On one hand, contingency
52 theory suggests that under some circumstances it might make sense to restrict workers' autonomy.
53 On the other, the consensus in most nurse-based literature is that increased nurse autonomy
54 improves quality of care quality and efficiency. We believe this could be an interesting focus for
55 further research.

Figure legends

Figure 1: Relationship between team size and level of formalization

Figure 2: Relationship between formalization and nurses' autonomy

Original protocol for the study

This study is part of a larger project whose detailed protocol was published and is in open access.¹⁷

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Competing interests statement

The authors declare no competing interests.

Authors' contributions

MP had the initial idea to study the link between formalization and autonomy and wrote the first drafts. DC developed the conceptual framework, analyzed the data, and wrote most of the paper. AD was involved in the team discussion at all steps and contributed to the final paper.

Data sharing statement

The data used here is composed of interview verbatims that can't be shared due to confidentiality issues

Bibliography

1. Clavet N-J, Duclos J-Y, Fortin B, et al. Les dépenses en santé du gouvernement du Québec, 2013-2030 : projections et déterminants. Montreal, QC: CIRANO Scientific Series 2013s-45, 2013.
2. Commission on Social Determinants of Health. *Achieving Health Equity: From Root Causes to Fair Outcomes. Interim Statement.* Geneva. Geneva: World Health Organization,, 2007.
3. Rittenhouse DR, Shortell SM, Fisher ES. Primary care and accountable care -- two essential elements of delivery-system reform. *N Engl J Med* 2009;**361**(24):2301-03.
4. Ham C, Dixon A, Brooke B. Transforming the Delivery of Health and Social Care: The Case for Fundamental Change. London, UK: King's Fund, 2012.
<https://www.kingsfund.org.uk/publications/transforming-delivery-health-and-social-care> (accessed 15 Feb 2017).
5. Starfield B, Yushi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q* 2005;**83**(3):457-502.
6. Donaldson MS, Yordy KD, Lohr KN, et al. Primary Care: America's Health in a New Era (Committee on the Future of Primary Care, Institute of Medicine). Washington, DC: National Academies Press, 1996.
7. Bauer L, Bodenheimer T. Expanded roles of registered nurses in primary care delivery of the future. *Nursing Outlook* 2017;**65**(5):624-32.

- 1
- 2
- 3 8. Feachem RG, Sekhri NK, White KL, et al. Getting more for their dollar: a comparison of the NHS with
- 4 California's Kaiser Permanente. *BMJ* 2002;**324**(7330):135-43.
- 5
- 6 9. Haggerty J, Pineault R, Beaulieu M-D, et al. Practice features associated with patient-reported accessibility,
- 7 continuity, and coordination of primary health care. *Ann Fam Med* 2008;**6**(2):116–23.
- 8
- 9 10. Hutchison B. From Hall to now: reflections on Canadian Medicare from a primary care perspective.
- 10 Emmett Hall Memorial Lecture. Vancouver: Canadian Association for Health Services and Policy
- 11 Research (CAHSPR), 2013.
- 12
- 13 11. Macinko J, Starfield B, Shi L. The contribution of primary care systems to health outcomes within
- 14 Organization for Economic Cooperation and Development (OECD) countries, 1970–1998. *Health*
- 15 *Serv Res* 2003;**38**(3):831-65.
- 16
- 17 12. Contandriopoulos D, Perroux M, Cockenpot A, et al. Analytical typology of multiprofessional primary
- 18 care models. *BMC Family Practice* 2018;**19**:44.
- 19
- 20 13. Poghosyan L, Norful AA, Liu J, et al. Nurse Practitioner Practice Environments in Primary Care and
- 21 Quality of Care for Chronic Diseases. *Medical Care* 2018;**56**(9):791–97.
- 22
- 23 14. Poghosyan L, Liu J, Norful AA. Nurse practitioners as primary care providers with their own patient
- 24 panels and organizational structures: A cross-sectional study. *International Journal of Nursing Studies*
- 25 *2017*;**74**:1-7.
- 26
- 27 15. Auerbach DI, Staiger DO, Buerhaus PI. Growing Ranks of Advanced Practice Clinicians — Implications
- 28 for the Physician Workforce. *New England Journal of Medicine* 2018;**378**(25):2358-60.
- 29
- 30 16. Wagner EH, Flinter M, Hsu C, et al. Effective team-based primary care: observations from innovative
- 31 practices. *BMC Family Practice* 2017;**18**(1):13.
- 32
- 33 17. Contandriopoulos D, Duhoux A, Roy B, et al. Integrated Primary Care Teams (IPCT) pilot project in
- 34 Quebec: a protocol paper. *BMJ Open* 2015;**5**(e010559).
- 35
- 36 18. Donaldson L. The normal science of structural contingency theory. In: Clegg SR, Hardy C, Nord WR, eds.
- 37 *Handbook of Organization Studies*. Thousand Oaks, CA: SAGE Publications, 1996:57-76.
- 38
- 39 19. Norful AA, Jacq Kd, Carlino R, et al. Nurse Practitioner–Physician Comanagement: A Theoretical Model
- 40 to Alleviate Primary Care Strain. *Annals of Family Medicine* 2018;**16**(3):250-56.
- 41
- 42 20. Fayol H. *General and Industrial Management*. London: Pitman, 1949.
- 43
- 44 21. Taylor FW. *The Principles of Scientific Management*. New York: Harper, 1911.
- 45
- 46 22. Hasenfeld Y. *Human Services as Complex Organizations*. 2nd ed. Thousand Oaks, CA: Sage Publications, 2010.
- 47
- 48 23. Abernethy MA, Stoelwinder JU. The role of professional control in the management of complex
- 49 organizations. *Accounting, Organizations and Society* 1995;**20**(1):1-17.
- 50
- 51 24. Mintzberg H. *The Structuring of Organizations: A Synthesis of the Research*. Englewood Cliffs, N.J.: Prentice-Hall,
- 52 1979.
- 53
- 54 25. Hall RH, Johnson NJ, Haas JE. Organizational size, complexity, and formalization. *American Sociological*
- 55 *Review* 1967;**32**(6):903-12.
- 56
- 57 26. Fredrickson JW. The strategic decision process and organizational structure. *The Academy of*
- 58 *Management Review* 1986;**11**(2):280-97
- 59
- 60 27. Hage J, Aiken M. Routine technology, social structure and organizational goals. *Administrative Science*
- Quarterly 1969;**14**(3):368-79.
28. Dalton DR, Todor WD, Spendolini MJ, et al. Organization structure and performance: a critical review.
- The Academy of Management Review* 1980;**5**(1):49-64.

29. Rizzo JR, House RJ, Lirtzman SI. Role conflict and ambiguity in complex organizations. *Administrative Science Quarterly* 1970;**15**(2):150-63.
30. Meyer JW, Rowan B. Institutionalized organizations: formal structure as myth and ceremony. *American Journal of Sociology* 1977;**83**(2):340-63.
31. Powell WW, DiMaggio PJ. *The New institutionalism in organizational analysis*. Chicago: University of Chicago Press, 1991.
32. Scott WR. *Organizations: Rational, Natural and Open Systems*. Upper Saddle River, NJ: Prentice Hall 2003.
33. Liberati EG. Separating, replacing, intersecting: The influence of context on the construction of the medical-nursing boundary. *Social Science & Medicine* 2017;**172**:135-43.
34. Abbott A. *The System of Professions*. Chicago, IL: The University of Chicago Press,, 1988.
35. Heale R, Butcher M. Canada's first nurse practitioner-led clinic: a case study in healthcare innovation. *Nurs Leadersh* 2010;**23**(3):21-9.
36. Martínez-González NA, Djalali S, Tandjung R, et al. Substitution of physicians by nurses in primary care: a systematic review and meta-analysis. *BMC Health Services Research* 2014;**14**(1):214.
37. Wong FKY, Chung LCY. Establishing a definition for a nurse-led clinic: structure, process, and outcome. *J Adv Nurs* 2006;**53**(3):358-69.
38. Patton MQ. *Developmental Evaluation: Applying Complexity Concepts to Enhance Innovation and Use*. New-York, NY: The Guilford Press, 2011.
39. Patton MQ. Developmental Evaluation. *Evaluation Practice* 1994;**15**(3):311-19.
40. Adamson BJ, Kenny DT, Wilson-Barnett J. The impact of perceived medical dominance on the workplace satisfaction of Australian and British nurses. *Journal of Advanced Nursing* 1995;**21**(1):172-83.
41. Hojat M, Fields SK, Veloski JJ, et al. Psychometric properties of an attitude scale measuring physician-nurse collaboration. *Evaluation & the Health Professions* 1999;**22**(2):208-20.
42. Hardy C, Palmer I, Philips N. Discourse as a strategic resource. *Human Relations* 2000;**53**(9):1227-48.
43. Chouliaraki L, Fairclough N. *Discourse in Late Modernity: Rethinking Critical Discourse Analysis*. Edinburgh: Edinburgh University Press, 1999.
44. Moch MK, Fields WC. Developing a content analysis for interpreting language use in organizations. *Research in the sociology of organizations* 1985;**4**:81-126.
45. Kirsch C, Bernier B. Le sens du discours écrit: propos méthodologiques à partir de deux recherches. *Culture* 1988;**8**(1):35-47.
46. Bourdieu P. *Ce que parler veut dire: l'économie des échanges linguistiques*. Paris: Fayard, 1982.
47. Lawrence PR, Lorsch JW. Differentiation and integration in complex organizations. *Administrative Science Quarterly* 1967;**12**(1):1-47.
48. American Medical Directors Association. Collaborative and supervisory relationships between attending physicians and advanced practice nurses in long-term care facilities. *Geriatric Nursing* 2011;**32**(1):7-17.
49. Bush NJ, Watters T. The emerging role of the oncology nurse practitioner: a collaborative model within the private practice setting. *alternate J* 2001;**28**(9):1425-31.
50. DiCenso A, Matthews S. *Report of the Nurse Practitioner Integration Task Team submitted to the Ontario Minister of Health and Long-Term Care*. Toronto, ON: Ministry of Health and Long-Term Care, 2007.

- 1
2
3 51. Poghosyan L, Aiken LH. Maximizing Nurse Practitioners' Contributions to Primary Care Through
4 Organizational Changes. *The Journal of Ambulatory Care Management* 2015;**38**(2):109-17.
5
6 52. Wranik WD, Haydt SM, Katz A, et al. Funding and remuneration of interdisciplinary primary care teams
7 in Canada: a conceptual framework and application. *BMC Health Services Research* 2017;**17**(351):1-
8 12.
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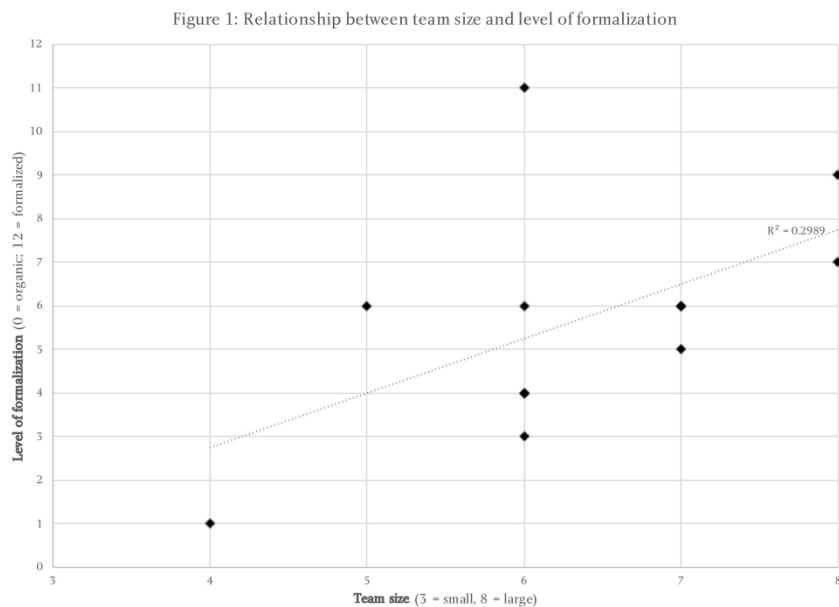


Figure 1: Relationship between team size and level of formalization

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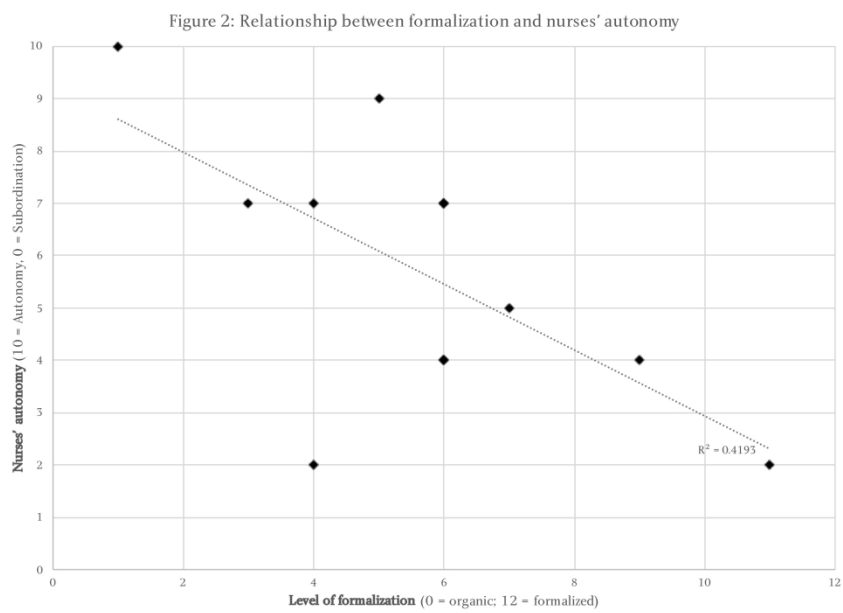


Figure 2: Relationship between formalization and nurses' autonomy
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Formalization and subordination: A contingency theory approach to optimizing primary care teams

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Formalization and subordination: A contingency theory approach to optimizing primary care teams

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Abstract

Objective: While there is consensus on the need to strengthen primary care capacities to improve health care systems' performance and sustainability, there is only limited evidence on the best way to organize primary care teams. In this article, we use a conceptual framework derived from contingency theory to analyze the structures and process optimizations of multiprofessional primary care teams. **Design:** We focus specifically on interrelationships between three dimensions: team size, formalization of care processes, and nurse autonomy. Interview-based qualitative data for each of these three dimensions was converted into ordinal scores. Data came from eight pilot sites in Quebec (Canada). **Results:** We found a positive association between team size and formalization (correlation score 0.55) and a negative covariation (correlation score -0.64) between care process formalization and nurses' autonomy/subordination. Despite the study being exploratory in nature, such relationships validate the idea that these dimensions should be analyzed conjointly and are coherent with our suggestion that using a framework derived from a contingency approach makes sense. **Conclusions:** The results provide insights about the structural design of nurse-intensive primary care teams. Non-physicians' professional autonomy is likely to be higher in smaller teams. Likewise, a primary care team that aims to increase nurses' and other non-physicians' professional autonomy should be careful about the extent to which it formalizes its processes.

Strengths and limitations of this study

This article relies on contingency theory to analyze how multiprofessional primary care teams are optimized.

Qualitative data from eight primary care pilot sites was used to assess the covariation between ordinal estimates of team size, formalization of care processes, and nurse autonomy.

The analysis was exploratory and based on correlation analysis using a convenience sample.

Introduction

The continued reliance on current healthcare provision models to address evolving population health needs is likely to exert considerable pressure on public finances¹. Likewise, technical innovations and rapid growth in the intensity of care being provided will exacerbate the issue^{2,3}. Available evidence thus suggests that public health systems need to change significantly to preserve their capacity to maintain universal access to healthcare^{4,5}.

Strengthening primary care capacities is widely considered to be an approach with the potential to reinforce simultaneously health system sustainability and accessibility, continuity of care, and, ultimately, population health^{3,5-11}. However, for this to happen, available evidence suggests that efforts should not be limited to funding more of the same¹². Primary care strengthening should include redefining the nature of the care provided as well as the professional roles and task sharing within teams^{7,13-16}. This article analyzes factors affecting the functioning of interprofessional teams in order to support the strengthening of primary care delivery structures and processes.

From a narrative review of the literature¹², we identified two important dimensions to consider in classifying and analyzing promising multiprofessional primary care teams. One is the degree to which the division of tasks in the team is formalized, and the other is whether the core professional around whom the practice is structured is a physician or an advanced practice nurse.

Building on these dimensions, we argue here that a conceptual lens derived from contingency theory can be helpful to understand how best to optimize the structure and processes of multiprofessional primary care teams. We first discuss the theoretical underpinnings of such a view, and then we present an empirical analysis of this relationship using data from eight primary care teams studied in the context of a broader project in Quebec¹⁷.

Conceptual framework

Contingency theory is the dominant school of thought for analyzing the link between organizations' functioning and performance¹⁸. This theory's core idea is that there is no one best way. Performance is not a product of organizational structure or processes per se. Performance needs to be conceived as a product of the *fit* between the organization's functioning and a set of contingency factors such as organizational size, age, environmental predictability, etc.

Our analysis is not focused on organizational performance, but relies on a similar logic to analyze the optimization of professional roles in primary care teams. We contend there is likely no one best way to organize primary care teams for dimensions such as professional roles definition, task sharing, team size, etc.

Our interest in applying a contingency approach to role definition stems in part from the results of a narrative review we conducted of the literature on high-performance nurse-intensive primary care models¹². The review revealed various plausible operationalizations of high-performance

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3 multiprofessional primary care teams—not one best way, but different coherent articulations of the
4 resources at hand, given environmental constraints and team objectives. The broad range of
5 organizational structures that, according to the literature, appear to succeed in delivering high-quality
6 care efficiently and effectively points to the need for a contingency approach to understand primary
7 care structures and process optimization.
8

9 The review also led to the identification of two dimensions that appeared important for classifying
10 and analyzing promising multiprofessional primary care teams. The first was the degree to which the
11 division of tasks in the team was formalized. At one extreme were formal models relying on explicit
12 procedures that specified what service would be provided by which professional, to which patient,
13 and at what point in time. At the other were organic approaches based on mutual adjustments, in
14 which professionals adapted to structural circumstances and to patients' characteristics in deciding
15 on care processes¹⁹.
16

17 The second dimension was the training of the core professional around whom the practice was
18 structured. Most primary care models are physician-centred, but there is a growing number of nurse-
19 centred teams. When a model is nurse-centric, the core position is usually occupied by a primary
20 healthcare nurse practitioner (NP).^{*} The relative centrality of either physicians or nurses and the level
21 of autonomy granted to non-physician professionals is a second structuring dimension for the
22 classification of primary care teams.
23

24 In our review, these two dimensions were key parameters to classify and describe multiprofessional
25 primary care teams but the literature we analyzed did not posit any interdependency between the two.
26 However, as we discuss below, the two dimensions of formalization and professional role relate to
27 elements that are abundantly discussed in the literature on healthcare organizations.
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30 *Professionalism, formalization, and primary care delivery*

31

32 From its inception, the organization science literature has strongly advocated the virtues of
33 formalized and standardized production processes,^{20 21} the ultimate form of which would become the
34 production line. However, despite the impressive successes of this approach in some industries, such
35 as large-scale manufacturing, it failed to generalize to all sectors. Of particular interest here,
36 organizations in which humans are the raw material²² rely on processes that are not easily
37 standardized. Those organizations (healthcare, education, social services, etc.) thus tend to rely on a
38 highly trained and specialized workforce responsible for handling the inherent unpredictability of the
39 production.²³
40

41 In the late 1970s, Henry Mintzberg deeply influenced the field by synthesizing contingency theory
42 findings into a configurational approach.²⁴ He offered five ideal types of potential fit between well-
43 documented contingency factors and organizational structures. One ideal type, the professional
44 bureaucracy, was coined to describe organizations that, on one hand, are forced to decentralize the
45 control of production processes to relatively autonomous professionals and, on the other, rely on
46 formalization and standardization for all the predictable portions of their operations. The poster
47 child of a professional bureaucracy is the acute care hospital.
48
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50 Because of their organizational simplicity and small size, other care provision structures such as
51 private clinics, physicians' offices, and the like were usually described as "simple structures" in
52 Mintzberg's terms. In those, a few professionals would rely on self-adjustment and direct control to
53

54 ^{*}NPs' training and legal scope of practice varies from one jurisdiction to the next. We use the term here to refer to nurses
55 with graduate level university training and an extended scope of practice, including some prescribing rights, such that
56 they are allowed to diagnose autonomously and treat a variety of common conditions.
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run the operations. However, today the independent small-scale physician's office is a near-extinct species as a care delivery model. Primary care production is increasingly in the hands of larger, multiprofessional structures⁷ dealing with many of the characteristic contingencies of professional bureaucracies (e.g. size, age, vertical integration, division of labour among professionals and unpredictable production processes)²⁵.

Given the current evolution in primary care production structures, we believe a conceptual lens derived from contingency theory might help deepen our understanding of their optimal functioning parameters. Moreover, building upon results from the above-mentioned narrative review,¹² we will focus mainly on formalization and professional autonomy as the two core contingency parameters to be considered.

Defining formalization

Formalization can be conceived as both a process and an outcome. As an outcome, it is the extent to which behaviour within a team is prescribed by explicit procedures and rules.^{26,27} This has to do with what Dalton, et al.²⁸ call the *structuring*—as opposed to the *structural*—components of organizational structure.²¹ Structural components describe the arrangements (such as size, subunit sizes, span of control, etc.) through which participants are formally interconnected. Structuring components are more processual in nature and refer to elements such as policies and activities aimed at codifying the behaviour of participants. As a process, formalization is therefore defined as efforts to increase the structuring of behaviours in order to strengthen the predictability of actions and decrease role ambiguity.²⁹ This definition emphasizes the existence of a deliberate intention, whether of a person or a group, to increase predictability. Formalization conceived as a process is also logically linked to its conception as an outcome. Procedures aimed at increasing behaviour predictability are likely to lead to given behaviours. We do acknowledge that strong macro-systemic, non-deliberate formalization forces exist that exert influence through the social processes described, for example, in the neo-institutional organizational literature³⁰⁻³². Our emphasis here on deliberate interventions was adopted because of the specific objectives of the study and not the relative importance of the micro/macro formalization pressures.

Defining professional autonomy and subordination

As stated earlier, the results from the narrative review suggest that two professional groups are commonly found at the centre of any primary care delivery model: physicians and nurses. However, despite its seemingly dichotomous nature, we argue this characteristic of primary care models should be conceived on a continuum of professional autonomy and subordination³³.

Historically, the medical profession has been very successful at claiming and protecting a monopoly over the provision of most human healthcare. However, to deliver the care while relying on a relatively scarce workforce, the medical profession has delegated a significant portion of the day-to-day work to “subordinate” professional groups, among which nursing is the most important.³⁴ For members of those historically subordinated professions, practical professional autonomy is highly dependent on the level of subordination of processes in their work environment.

Nurses are the most commonly found non-physician professionals in primary care and play a significant role in almost all primary care models. In teams where the core professional is a physician, nurses' level of professional autonomy varies greatly. At one end of the spectrum are physician-centric models in which nurses are highly subordinated, with a limited scope of practice and little autonomy. At the other end are nurse-centric models, such as *nurse-led clinics*, like those existing in Ontario or in the United States³⁵⁻³⁷, where nurses have almost complete autonomy. In between lies a

vast array of configurations, including inter-professional teams in which nurses enjoy varying levels of autonomy regarding the care they provide to their patients.

Data and methods

The results presented here are part of a larger project whose complete research protocol is described in Contandriopoulos, et al.¹⁷ The general objective of that project is to understand the characteristics of high-performance primary care teams and to assess their outcomes through a two components mixed method study design. The data used here were derived from the qualitative first component, which was an implementation analysis based on developmental evaluation principles.^{38,39} The project, as well as all consent forms and research tools, was accepted by the University of Montreal Health Sciences Research Ethics Committee (CERES) and the Research Ethics Committee of the Centre de santé et de services sociaux de la Montagne.

Data

The eight primary care teams included in the study are all located in Quebec (Canada) and within either urban (Montreal or Quebec) or dense suburban settings (Montreal South-shore). They were selected on the basis of preliminary analysis showing they were all highly interprofessional (at least half of the professional workforce is composed of non-physicians)¹⁶ and likely characterized by high levels of effectiveness and efficiency (according to the opinion of regional and provincial experts collected during pre-selection interviews). The sample is thus deliberately not representative of the average primary care team in Quebec. The sampling logic is in line with the goal of the study, which is to understand the characteristics of high-performance primary care teams.

In each of the eight primary care settings, semi-structured interviews were conducted with various informants (physicians, nurses, administrators, etc.) to identify the characteristics of the care structures and processes. The conceptual framework used for this is available in Contandriopoulos, et al.¹² A total of 73 interviews were conducted with a total of 53 informants (15 physicians, 9 NPs, 18 RNs and LPNs, 4 administrators, 8 other professionals such as social workers and psychologists). Interviews lasted between 45 minutes and two hours and were conducted by experienced researchers. The focus of the interviews was on the evolution of the practice model, the way professional roles were structured and evolved, the ways in which professional roles and patient flow interact, professional communication processes, administrative and decision-making processes, etc. Non-participant observation was also conducted in most settings to document team dynamics and organizational culture.

Patient and Public Involvement

There was no direct patient or public involvement in the research component whose results are discussed here. However, this component is part of a larger project in which 3000 patients and users are being followed longitudinally to analyze the evolution of their satisfaction regarding services, unmet needs, etc. in the 8 pilot sites.

Measuring formalization and autonomy

We found no scales of formalization or autonomy that could be applied directly to our object. In both cases we relied on adaptations of existing tools.

The starting point of the scale we used to measure formalization is based on the seminal work of Hall, et al.²⁵ which provides five dimensions, each appraised through two or three criteria (11 in

total)¹⁸. Hall typology relies on the causal assumption that rules and procedures aimed at increasing behaviour predictability are a good proxy of actual human processes and therefore a predictor of formalization outcomes. To use this scale in our study, we had to edit it in two ways. First, we edited the criteria to make them more primary care specific. Second, we edited some items to remove conceptual overlap with the notion of subordination. For example, in the context of primary care teams, the existence of a “clear definition of the hierarchy of authority”, as per Hall, et al.²⁵ would be largely overlapping with the concept of physician subordination as defined earlier. As we discuss below, the data used here were derived from in-depth qualitative interviews. Some elements of Hall, et al.²⁵ typology were not documented in the interviews and therefore were not included. Table 1 presents the selected criteria from Hall, et al.²⁵ and the way we operationalized them.

Table 1: Operationalization of the measure of formalization

<i>Hall et al 1967 Typology</i>	<i>Operationalization in this study</i>
A. Roles	
The degree to which the positions in the organization are concretely defined.	Non-physicians' professional roles are divided according to "care modules" mostly based on diseases. For example, diabetes, mental health, etc. (Yes = 2, To some extent = 1, No = 0)
B. Authority Relations	
The degree to which the authority structure is formalized (clear definition of the hierarchy of authority).	There are formal rules that specify which patients will be treated by which professional (Yes = 2, To some extent = 1, No = 0)
C. Communications	
The degree of emphasis on written communications.	An electronic health record (EHR) system is used to communicate patient information between professionals within the team (Yes = 2, EHR exists but isn't the main communication tool = 1, No = 0)
The degree of emphasis on going through established channels in the communications process.	Professionals will have team discussions on complex patients (Systematically = 2, If needed = 1, Informal chats only = 0)
D. Norms and Sanctions	
The number of written rules and policies.	Collective prescription rules are in place to structure non-physicians' capacity to provide drugs to patients they treat (Yes = 2, Some = 1, None = 0)
E. Procedures	
The degree of formalization of orientation programs for new members (systematic socialization for all new entrants).	Work within the team is structured according to formal teamlets (Yes = 2, Yes, but with flexibility = 1, No = 0)

For the autonomy/subordination scale, we mostly relied on the work of Adamson, et al.⁴⁰ and Hojat, et al.⁴¹ In those two scales, we selected items based on two criteria. First, an item had to have obvious conceptual ties with the concept of subordination in primary health care delivery. Second, the item had to be focused on actual practices or processes rather than on perceptions. Table 2

presents the selected criteria from Adamson, et al.⁴⁰ and Hojat, et al.⁴¹ and how we operationalized them.

Table 2: Operationalization of the measure of nurses' autonomy versus subordination

<i>From Heinemann et al 1999</i>	<i>Operationalization in this study</i>
The physician should not always have the final word in decisions made by health care teams	Nurses and other non-physician professionals are involved in clinical decisions regarding their patients (Yes, all the time = 2, Sometimes = 1, Rarely = 0)
The physician has the ultimate legal responsibility for decisions made by health care teams.	A physician has to be physically present in the clinic at all times for services to be delivered (No = 2, Yes, but exceptions apply = 1, Yes = 0)
<i>From Hojat et al 1999</i>	<i>Operationalization in this study</i>
Physicians and nurses should contribute to decisions regarding the hospital discharge of patients.	Nurses can treat and send a patient back home without asking permission from a physician (Yes = 2, In some circumstances = 1, No = 0)
Nurses should be involved in making policy decisions concerning the hospital support services on which their work depends.	Nurses and other non-physician professionals are involved in organizational/managerial decisions (Yes, all the time = 2, Sometimes = 1, Rarely = 0)
The primary function of the nurse is to carry out the physician's orders.	Nurses and other non-physician professionals are involved in supervision and training activities (Yes, all the time = 2, Sometimes = 1, Rarely = 0)

Score attribution

Interviews were recorded and transcribed and then analyzed both by site and cross-sectionally. The analysis was based on discourse analysis techniques.⁴²⁻⁴⁶ The end product was an in-depth narrative profile of each site. Draft versions of each profile were discussed at research team meetings and adjusted until they were perceived as being both accurate in relation to the interview transcripts and comprehensive in regard to available information. At that point, profiles were sent to each informant for validation and then further edited based on their feedback.

For the purpose of the present analysis, preliminary scores for each criterion of the formalization and autonomy/subordination scales were established independently by two researchers based on each site's profile. Every criterion (see tables 1 and 2) is phrased as a descriptive claim regarding observable characteristics of the team. Ordinal scores of either 0, 1 or 2 were attributed depending on the claim being true, sometimes true, or false. Those preliminary scores were then discussed in team meetings involving the researchers who conducted the interviews. There was an initial discrepancy in 6 of the 132 items (4.5%). As scores were based on descriptive claims, the discrepancies were all resolved by identifying whether the interview data supported the claim or not.

However, those team discussions also made it clear that some larger primary care sites in our sample actually consisted of distinct submodels of practice. Specifically, in some settings, the practice model was different depending on whether the core professional was a nurse practitioner or a physician. We

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3 therefore divided four of our sites into two subsites with different scores. This produced a total of 12
4 sites or subsites. For confidentiality purposes, sites were identified only through a two-letter code.
5 Sites that were subdivided have either an -MD or -NP after their code names.
6

7 Having divided primary care sites according to such logic, it followed that what was meaningful for
8 assessing the functioning of the team was not the formal organizational boundaries. First, Quebec's
9 care delivery organizations have, in recent years, experienced large forced mergers, such that some of
10 our study settings are now part of huge structures that include acute care hospitals, long-term care
11 facilities, and others. Obviously, those formal boundaries do not constitute a coherent measure of
12 primary care team size. Second, according to the headcounts in the various physical locations, some
13 of our study settings are quite large, with a total workforce of over 100 persons, while others have
14 less than 10. In larger teams' daily work, the professionals function within more circumscribed work
15 environments. Nevertheless, being a small subteam within a large structure necessitates coordination
16 mechanisms with the rest of the organization that a small-scale practice does not require. This is
17 contingent, however, on the actual level of interdependence of the organizational components,
18 which in turn depends on the practice model. For these reasons, properly assessing team size was not
19 as straightforward as might have been expected.
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22 Based on the elements discussed above we estimated practical team size based on three factors: size
23 of the overall organization (0-10 FTE =1; 20-50 FTE =2; 50 and more FTE =3); size of the care
24 delivery site (0-5 FTE =1; 5-15 FTE =2; 15 and more FTE =3) and level of interdependency in daily
25 practice within the team (minimal=1; moderate=2; high=3). Size scores were established and
26 validated according to the same approach described earlier. Initial discrepancies in 3 items out of 36
27 (8.3%), all related to the interdependency dimension, were resolved by identifying whether interview
28 data supported the claim or not.
29
30

31 *Analysis*

32 Based on the conceptual framework presented earlier we sequentially assessed the covariation
33 between size and formalization and between formalization and autonomy. For each three
34 dimensions, we relied on site total scores based on the sum of each criterion for each dimension.
35

36 Given the exploratory nature of this study and the data used, we limited ourselves to simple Pearson
37 correlation coefficients. We conducted sensitivity analyses by removing settings with the highest and
38 lowest scores. The covariation between the dimensions studied was also visually analyzed on scatter
39 graphs including a linear regression.
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42 **Results**

43 Table 3 presents the score for each criterion from the two scales for each site or subsite. The settings
44 were sorted according to their formalization scores.
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Table 3: Formalization and autonomy scores for each primary care setting

SITES ABBREVIATED NAMES		SA	PX-NP	VA	FA-NP	SP	ND-NP	JU-NP	BA	FA-MD	PX-MD	ND-MD	JU-MD	Average	Std-dev
SIZE	Overall organization size (0-10 =1; 10-50=2; +50 =3)	1	3	3	3	2	3	2	2	3	3	3	2	2.5	0.7
	Local care team size (0-5 =1; 5-15=2; +15 =3)	1	2	2	1	2	2	2	2	3	3	3	2	2.1	0.7
	Interdependency in daily practice (minimal=1; moderate=2; high=3)	2	1	1	2	3	2	1	2	1	2	2	2	1.8	0.6
SIZE SCORE		4	6	6	6	7	7	5	6	7	8	8	6	6.3	1.2
LEVEL OF FORMALIZATION	Non-physicians' professional roles are divided according to "care modules" mostly based on disease, e.g. diabetes, mental health, etc. (Yes = 2, To some extent =1, No = 0)	0	2	1	2	0	0	2	2	2	2	1	2	1.3	0.9
	There are formal rules that specify which patients will be treated by which professional (Yes = 2, To some extent = 1, No = 0)	1	1	2	0	0	1	2	2	0	2	2	2	1.3	0.9
	An EHR (electronic health record) system is used to communicate patient information between professionals within the team (Yes = 2, EHR exists but isn't the main communication tool = 1, No = 0)	0	0	0	1	1	2	2	0	0	0	2	2	0.8	0.9
	Professionals will have team discussions on complex patients (Systematically = 2, If needed = 1, Informal chats only = 0)	0	0	0	0	2	1	0	2	1	1	1	1	0.8	0.8
	Collective prescriptions rules are in place to structure non-physicians' capacity to provide drugs to patients they treat (Yes = 2, Some = 1, None = 0)	0	0	1	1	2	0	0	0	2	2	1	2	0.9	0.9
	Work within the team is structured according to formal teamlets (Yes = 2, Yes, but with flexibility =1, No = 0)	0	0	0	0	0	2	0	0	1	0	2	2	0.6	0.9
FORMALIZATION SCORE		1	3	4	4	5	6	6	6	6	7	9	11	5.7	2.6
NURSES' AUTONOMY vs SUBORDINATION	Nurses and other non-physician professionals are generally involved in significant clinical decisions (Yes, all the time = 2, Sometimes = 1, Rarely = 0)	2	2	0	1	2	2	2	1	1	0	1	1	1.3	0.8
	A physician has to be physically present in the clinic at all times for services to be delivered (No = 2, Yes, but exceptions apply = 1, Yes = 0)	2	1	1	2	1	0	0	2	2	1	0	0	1.0	0.9
	Nurses can treat and send a patient back home without asking permission from a physician (Yes = 2, In some circumstances = 1, No = 0)	2	2	1	2	2	2	2	2	1	1	1	1	1.6	0.5
	Nurses and other non-physician professionals are involved in organizational/managerial decisions (Yes, all the time = 2, Sometimes = 1, Rarely = 0)	2	1	0	1	2	1	0	1	0	1	1	0	0.8	0.7
	Nurses and other non-physician professionals are involved in supervision and training activities (Yes, all the time = 2, Sometimes = 1, Rarely = 0)	2	1	0	1	2	2	0	1	0	2	1	0	1.0	0.9
AUTONOMY SCORE		10	7	2	7	9	7	4	7	4	5	4	2	5.7	2.6

We found a positive covariation between team size and formalization (see Figure 1). The Pearson correlation coefficient is 0.55. Sensitivity tests show that the relation remains when the smallest site is removed (0.30), when the largest site is removed (0.78), and when both are removed (0.63)

INSERT FIGURE 1

We also found a negative covariation between formalization and autonomy (see Figure 2). The Pearson correlation coefficient is -0.64). We conducted sensitivity analyses by removing either the settings with the highest and lowest formalization scores or those with the highest and lowest autonomy scores. In both cases the correlation decreased (respectively to -0.26 and -0.47) but the direction of the covariation remained. Similarly, we tried merging back the primary care settings we had subdivided based on the training of the core professional by averaging their scores, and the same association remained (correlation score of -0.52).

INSERT FIGURE 2

Discussion

The results showed a negative covariation between the level of care process formalization and the level of nurses' autonomy/subordination. Such a relationship validates the idea that those two dimensions should be analyzed conjointly and is coherent with our suggestion that a conceptual framework inspired by a contingency approach makes sense.

The empirical data we used cannot inform on the plausibility of a causal relationship. However, conceptually, the hypothesis of a causal relationship in which an increased level of formalization leads to a drop in nurses' autonomy has much face validity. As mentioned earlier, based on the literature, formalization was defined as efforts made to strengthen the predictability of actions and decrease role ambiguity. We believe a partial explanation for the correlation found between the level of formalization and nurses' professional autonomy is that efforts made by the teams to decrease role ambiguity tend to formalize roles in ways that restrict nurses' professional autonomy.

Our data also showed a great deal of variation in nurses' levels of autonomy for similar levels of formalization. We interpret this variation as a sign that the relationship between formalization and nurses' autonomy is far from direct and mechanical. For formalization scores near the middle of the scale, no covariation existed with the level of nurses' autonomy. In-depth analysis of each practice setting also suggested teams have a great deal of agency in articulating their model of practice. We understand this as suggesting that, unless formalization is pushed to extremes in any given direction, autonomy/subordination remains a dimension over which teams can have significant control.

However, according to a contingency theory approach, the optimal level of formalization is not something organizations can fully decide on their own. There are parameters (e.g. size, age, environmental predictability, managerial style, etc.^{18 24 47}) that set a range of plausible levels. And indeed, the rough measure of organizational size we applied did correlate with our measure of formalization. This suggests there would be some merit in conceptualizing primary care teams' structural and process optimization in a systemic way. The optimal choice for any given team is likely to be contingent on a set of interconnected parameters. For example, if team size is indeed positively

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3 associated with formalization and, in turn, if high levels of formalization tend to limit nurses'
4 autonomy, then team size and nurse autonomy should be seen as interdependent. Such an
5 observation is especially timely given that the current trend toward a more diverse and
6 interprofessional workforce in primary care goes hand in hand with increasingly large practice size⁷.

7
8 Similarly, given the results obtained, we believe that if a primary care team aims to increase nurses'
9 and other non-physicians' professional autonomy, it should be very careful about the extent to which
10 it formalizes its processes. This advice is also worth considering in relation to the avalanche of
11 recommendations in the nursing literature suggesting that role clarification through formal
12 definitions is the way forward to increase nurses' autonomy and scope of practice.⁴⁸⁻⁵⁰

13 14 15 *Limitations*

16 This study has a few limitations worth discussing. First, the analysis was based on secondary analysis
17 of existing data. The hypothesis about a potential link between formalization and autonomy emerged
18 during the discussions about site descriptions. Therefore, the data collection was not initially aimed
19 at measuring those dimensions. The data are nevertheless rich and detailed, and we are confident in
20 their validity. However, the results presented here remain mostly exploratory, and further studies on
21 the topic would be needed.

22
23 Second, our sample was limited to Quebec and deliberately skewed towards well-functioning teams
24 whose care delivery processes relied to a large extent on non-physician professionals. It would be
25 interesting to study the topic in other jurisdictions and with a more diverse sample of primary care
26 teams, and especially teams with some variability in funding mechanisms^{51 52}.

27
28 Finally, the third element of note here has to do with the nature of the data, but is not a limitation
29 per se. Given the two limitations identified above, it would be tempting to measure formalization
30 and autonomy in a much larger sample of primary care teams using a quantitative survey instrument.
31 However, we are not aware of any survey instrument that would provide a satisfying level of
32 construct validity to be usable for such a purpose.

33 34 35 **Conclusion**

36
37 Our earlier narrative review of the literature showed that the level of formalization and the training
38 of the team's core professional are central parameters by which to classify and describe
39 multiprofessional primary care teams. The exploratory analysis conducted here suggests those
40 dimensions should be analyzed together from a contingency perspective.

41
42 While most jurisdictions internationally try to identify and implement coherent and efficient ways to
43 strengthen their primary care capacities, there is little evidence-informed advice in the literature about
44 the parameters for doing so. The present study suggests that adopting a contingency perspective
45 might be an interesting way to disentangle some parameters of primary care team optimization. We
46 also believe the covariations we found between team size, formalization, and nurses' autonomy could
47 have a practical value for many teams currently grappling with the best way to rethink roles and
48 processes.

49
50 Finally, at the time of writing this article we do not have the data needed to assess whether there is a
51 link between level of professional autonomy and a team's performance. On one hand, contingency
52 theory suggests that under some circumstances it might make sense to restrict workers' autonomy.
53 On the other, the consensus in most nurse-based literature is that increased nurse autonomy
54 improves quality of care quality and efficiency. We believe this could be an interesting focus for
55 further research.

Figure legends

Figure 1: Relationship between team size and level of formalization

Figure 2: Relationship between formalization and nurses' autonomy

Original protocol for the study

This study is part of a larger project whose detailed protocol was published and is in open access.¹⁷

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Competing interests statement

The authors declare no competing interests.

Authors' contributions

MP had the initial idea to study the link between formalization and autonomy and wrote the first drafts. DC developed the conceptual framework, analyzed the data, and wrote most of the paper. AD was involved in the team discussion at all steps and contributed to the final paper.

Data sharing statement

The data used here is composed of interview verbatims that can't be shared due to confidentiality issues

Bibliography

1. Clavet N-J, Duclos J-Y, Fortin B, et al. Les dépenses en santé du gouvernement du Québec, 2013-2030 : projections et déterminants. Montreal, QC: CIRANO Scientific Series 2013s-45, 2013.
2. Commission on Social Determinants of Health. *Achieving Health Equity: From Root Causes to Fair Outcomes. Interim Statement.* Geneva. Geneva: World Health Organization,, 2007.
3. Rittenhouse DR, Shortell SM, Fisher ES. Primary care and accountable care -- two essential elements of delivery-system reform. *N Engl J Med* 2009;**361**(24):2301-03.
4. Ham C, Dixon A, Brooke B. Transforming the Delivery of Health and Social Care: The Case for Fundamental Change. London, UK: King's Fund, 2012.
<https://www.kingsfund.org.uk/publications/transforming-delivery-health-and-social-care> (accessed 15 Feb 2017).
5. Starfield B, Yushi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q* 2005;**83**(3):457-502.
6. Donaldson MS, Yordy KD, Lohr KN, et al. Primary Care: America's Health in a New Era (Committee on the Future of Primary Care, Institute of Medicine). Washington, DC: National Academies Press, 1996.
7. Bauer L, Bodenheimer T. Expanded roles of registered nurses in primary care delivery of the future. *Nursing Outlook* 2017;**65**(5):624-32.

- 1
- 2
- 3 8. Feachem RG, Sekhri NK, White KL, et al. Getting more for their dollar: a comparison of the NHS with
- 4 California's Kaiser Permanente. *BMJ* 2002;**324**(7330):135-43.
- 5
- 6 9. Haggerty J, Pineault R, Beaulieu M-D, et al. Practice features associated with patient-reported accessibility,
- 7 continuity, and coordination of primary health care. *Ann Fam Med* 2008;**6**(2):116–23.
- 8
- 9 10. Hutchison B. From Hall to now: reflections on Canadian Medicare from a primary care perspective.
- 10 Emmett Hall Memorial Lecture. Vancouver: Canadian Association for Health Services and Policy
- 11 Research (CAHSPR), 2013.
- 12
- 13 11. Macinko J, Starfield B, Shi L. The contribution of primary care systems to health outcomes within
- 14 Organization for Economic Cooperation and Development (OECD) countries, 1970–1998. *Health*
- 15 *Serv Res* 2003;**38**(3):831-65.
- 16
- 17 12. Contandriopoulos D, Perroux M, Cockenpot A, et al. Analytical typology of multiprofessional primary
- 18 care models. *BMC Family Practice* 2018;**19**:44.
- 19
- 20 13. Poghosyan L, Norful AA, Liu J, et al. Nurse Practitioner Practice Environments in Primary Care and
- 21 Quality of Care for Chronic Diseases. *Medical Care* 2018;**56**(9):791–97.
- 22
- 23 14. Poghosyan L, Liu J, Norful AA. Nurse practitioners as primary care providers with their own patient
- 24 panels and organizational structures: A cross-sectional study. *International Journal of Nursing Studies*
- 25 *2017*;**74**:1-7.
- 26
- 27 15. Auerbach DI, Staiger DO, Buerhaus PI. Growing Ranks of Advanced Practice Clinicians — Implications
- 28 for the Physician Workforce. *New England Journal of Medicine* 2018;**378**(25):2358-60.
- 29
- 30 16. Wagner EH, Flinter M, Hsu C, et al. Effective team-based primary care: observations from innovative
- 31 practices. *BMC Family Practice* 2017;**18**(1):13.
- 32
- 33 17. Contandriopoulos D, Duhoux A, Roy B, et al. Integrated Primary Care Teams (IPCT) pilot project in
- 34 Quebec: a protocol paper. *BMJ Open* 2015;**5**(e010559).
- 35
- 36 18. Donaldson L. The normal science of structural contingency theory. In: Clegg SR, Hardy C, Nord WR, eds.
- 37 *Handbook of Organization Studies*. Thousand Oaks, CA: SAGE Publications, 1996:57-76.
- 38
- 39 19. Norful AA, Jacq Kd, Carlino R, et al. Nurse Practitioner–Physician Comanagement: A Theoretical Model
- 40 to Alleviate Primary Care Strain. *Annals of Family Medicine* 2018;**16**(3):250-56.
- 41
- 42 20. Fayol H. *General and Industrial Management*. London: Pitman, 1949.
- 43
- 44 21. Taylor FW. *The Principles of Scientific Management*. New York: Harper, 1911.
- 45
- 46 22. Hasenfeld Y. *Human Services as Complex Organizations*. 2nd ed. Thousand Oaks, CA: Sage Publications, 2010.
- 47
- 48 23. Abernethy MA, Stoelwinder JU. The role of professional control in the management of complex
- 49 organizations. *Accounting, Organizations and Society* 1995;**20**(1):1-17.
- 50
- 51 24. Mintzberg H. *The Structuring of Organizations: A Synthesis of the Research*. Englewood Cliffs, N.J.: Prentice-Hall,
- 52 1979.
- 53
- 54 25. Hall RH, Johnson NJ, Haas JE. Organizational size, complexity, and formalization. *American Sociological*
- 55 *Review* 1967;**32**(6):903-12.
- 56
- 57 26. Fredrickson JW. The strategic decision process and organizational structure. *The Academy of*
- 58 *Management Review* 1986;**11**(2):280-97
- 59
- 60 27. Hage J, Aiken M. Routine technology, social structure and organizational goals. *Administrative Science*
- Quarterly 1969;**14**(3):368-79.
28. Dalton DR, Todor WD, Spendolini MJ, et al. Organization structure and performance: a critical review.
- The Academy of Management Review* 1980;**5**(1):49-64.

- 1
2
3 29. Rizzo JR, House RJ, Lirtzman SI. Role conflict and ambiguity in complex organizations. *Administrative Science Quarterly* 1970;**15**(2):150-63.
- 4
5
6 30. Meyer JW, Rowan B. Institutionalized organizations: formal structure as myth and ceremony. *American Journal of Sociology* 1977;**83**(2):340-63.
- 7
8 31. Powell WW, DiMaggio PJ. *The New institutionalism in organizational analysis*. Chicago: University of Chicago Press, 1991.
- 9
10
11 32. Scott WR. *Organizations: Rational, Natural and Open Systems*. Upper Saddle River, NJ: Prentice Hall 2003.
- 12
13 33. Liberati EG. Separating, replacing, intersecting: The influence of context on the construction of the medical-nursing boundary. *Social Science & Medicine* 2017;**172**:135-43.
- 14
15 34. Abbott A. *The System of Professions*. Chicago, IL: The University of Chicago Press,, 1988.
- 16
17 35. Heale R, Butcher M. Canada's first nurse practitioner-led clinic: a case study in healthcare innovation. *Nurs Leadersh* 2010;**23**(3):21-9.
- 18
19 36. Martínez-González NA, Djalali S, Tandjung R, et al. Substitution of physicians by nurses in primary care: a systematic review and meta-analysis. *BMC Health Services Research* 2014;**14**(1):214.
- 20
21 37. Wong FKY, Chung LCY. Establishing a definition for a nurse-led clinic: structure, process, and outcome. *J Adv Nurs* 2006;**53**(3):358-69.
- 22
23 38. Patton MQ. *Developmental Evaluation: Applying Complexity Concepts to Enhance Innovation and Use*. New-York, NY: The Guilford Press, 2011.
- 24
25 39. Patton MQ. Developmental Evaluation. *Evaluation Practice* 1994;**15**(3):311-19.
- 26
27 40. Adamson BJ, Kenny DT, Wilson-Barnett J. The impact of perceived medical dominance on the workplace satisfaction of Australian and British nurses. *Journal of Advanced Nursing* 1995;**21**(1):172-83.
- 28
29 41. Hojat M, Fields SK, Veloski JJ, et al. Psychometric properties of an attitude scale measuring physician-nurse collaboration. *Evaluation & the Health Professions* 1999;**22**(2):208-20.
- 30
31 42. Hardy C, Palmer I, Philips N. Discourse as a strategic resource. *Human Relations* 2000;**53**(9):1227-48.
- 32
33 43. Chouliaraki L, Fairclough N. *Discourse in Late Modernity: Rethinking Critical Discourse Analysis*. Edinburgh: Edinburgh University Press, 1999.
- 34
35 44. Moch MK, Fields WC. Developing a content analysis for interpreting language use in organizations. *Research in the sociology of organizations* 1985;**4**:81-126.
- 36
37 45. Kirsch C, Bernier B. Le sens du discours écrit: propos méthodologiques à partir de deux recherches. *Culture* 1988;**8**(1):35-47.
- 38
39 46. Bourdieu P. *Ce que parler veut dire: l'économie des échanges linguistiques*. Paris: Fayard, 1982.
- 40
41 47. Lawrence PR, Lorsch JW. Differentiation and integration in complex organizations. *Administrative Science Quarterly* 1967;**12**(1):1-47.
- 42
43 48. American Medical Directors Association. Collaborative and supervisory relationships between attending physicians and advanced practice nurses in long-term care facilities. *Geriatric Nursing* 2011;**32**(1):7-17.
- 44
45 49. Bush NJ, Watters T. The emerging role of the oncology nurse practitioner: a collaborative model within the private practice setting. *alternate J* 2001;**28**(9):1425-31.
- 46
47 50. DiCenso A, Matthews S. *Report of the Nurse Practitioner Integration Task Team submitted to the Ontario Minister of Health and Long-Term Care*. Toronto, ON: Ministry of Health and Long-Term Care, 2007.
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3 51. Poghosyan L, Aiken LH. Maximizing Nurse Practitioners' Contributions to Primary Care Through
4 Organizational Changes. *The Journal of Ambulatory Care Management* 2015;**38**(2):109-17.
5
6 52. Wranik WD, Haydt SM, Katz A, et al. Funding and remuneration of interdisciplinary primary care teams
7 in Canada: a conceptual framework and application. *BMC Health Services Research* 2017;**17**(351):1-
8 12.
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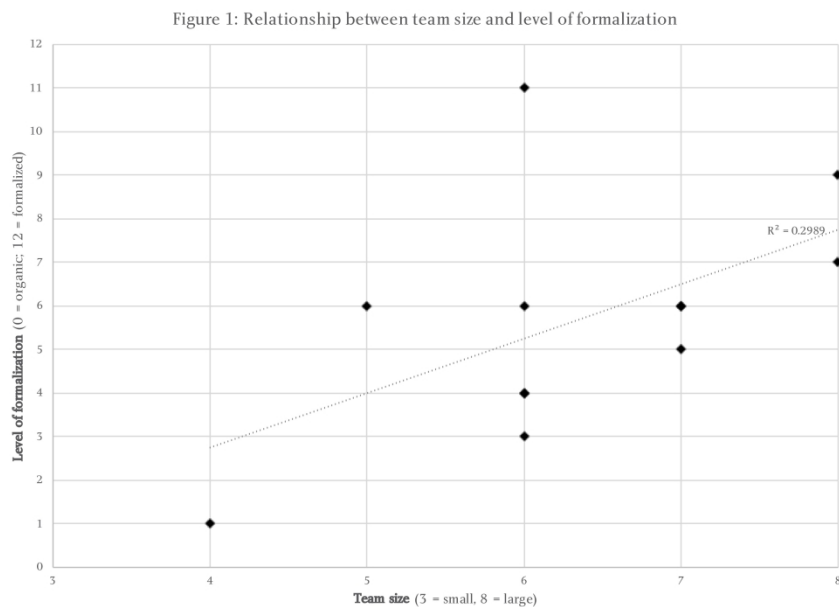


Figure 1: Relationship between team size and level of formalization

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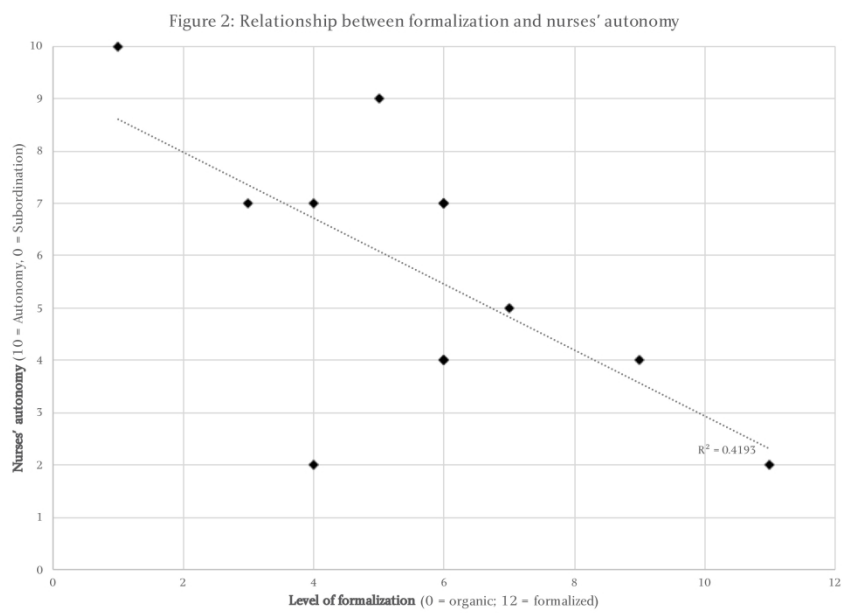


Figure 2: Relationship between formalization and nurses' autonomy
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