Effects of practice setting on GPs' provision of care

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Abstract

Objective To define a physician classification system based on practice settings and to analyze the service provision associated with those classifications.

Design A cross-sectional, retrospective study.

Setting Province of Quebec.

Participants All GPs in Quebec in 2002 who had been practising for at least 2 years.

Main outcome measures Practice setting variables were based on physician income in the different settings. Service provision was assessed using indicators related to continuity, comprehensiveness, accessibility, and productivity of services provided by the GPs. A multiple correspondence analysis with ascending hierarchical classification was conducted to construct the taxonomy of GPs based on their practice settings.

Results Our study produced 7 practice setting models. Two were essentially single-practice models. The 5 others combined several settings. Service provision varied from one model to another. Continuity was greater in the private practice model, in which older GPs were predominant, while accessibility was greater in multi-institutional practice models, in which younger GPs were more active.

Conclusion To ensure balance between continuity, accessibility, and comprehensiveness in primary care services provided by GPs, it is important to consider the service provision associated with different practice models.

EDITOR'S KEY POINTS

• This study defined 7 practice setting models based on different organizational contexts of practice in Quebec (ie, local community health centre, mixed ambulatory, multi-institutional community centre, multi-institutional private practice, hospitalist, less-active model, and private practice) and revealed differences in service provision (ie, continuity, accessibility, comprehensiveness, and productivity) among the groups.

• Accessibility was higher in both multi-institutional practice models and lower in the private practice and less-active models. Continuity was higher in the less-active and private practice models. Productivity was higher in both multi-institutional models and in private practice groups.

• The private practice model ensures the greatest continuity of care and it is gradually disappearing, as young physicians gravitate toward models that offer less continuity and comprehensiveness. Development of incentives to encourage GPs to adopt the more effective practice setting models or to modify their service provision to be more responsive to population needs is required, otherwise there is a risk of inadequate service provision in Quebec.

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Effets du contexte de pratique sur les soins dispensés par le MF

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Résumé

Objectif Élaborer un système de classification des médecins en fonction du contexte de leur pratique et déterminer l'offre de services associée à cette classification.

Type d'étude Étude rétrospective transversale.

Contexte La province de Québec.

Participants Tous les omnipraticiens (OP) du Québec qui, en 2002, avaient au moins 2 ans de pratique.

Principaux paramètres à l'étude Les variables pour établir les modèles de pratique étaient basées sur le revenu des médecins dans les différents contextes. La dispensation des services était évaluée à l'aide d'indicateurs de continuité, d'intégralité, d'accessibilité et de productivité des services rendus par les OP. On a utilisé une analyse de correspondance multiple avec une classification hiérarchique ascendante pour créer une classification des OP fondée sur leurs modèles de pratique.

Résultats Notre étude a produit 7 modèles de pratique. Deux étaient des modèles de pratique solo. Les 5 autres combinaient différents contextes. La dispensation des services variait d'un modèle à l'autre. La continuité était meilleure dans les modèles de pratique en solo où les OP plus âgés prédominaient, tandis que l'accessibilité était meilleure dans les modèles de pratique multi-institutionnels dans lesquels les OP plus jeunes étaient plus actifs.

Conclusion Pour s'assurer d'un équilibre entre la continuité, l'accessibilité et l'intégralité des soins de première ligne dispensés par les OP, on devra tenir compte des services offerts par les différents modèles de pratique.

POINTS DE REPÈRE DU RÉDACTEUR

• Cette étude a décrit 7 modèles de pratique dans différents types d'organismes au Québec (c.-à-d. centre de santé communautaire local, type mixte ambulatoire, centre communautaire multi-institutionnel, pratique privée multi-institutionnelle, mode hospitaliste, modèle moins actif et pratique privée) et a révélé certaines différences entre ces groupes dans la dispensation des services (c.-à-d. la continuité, l'accessibilité, l'intégralité et la productivité).

• Les deux modèles de pratique multi-institutionnels offraient une meilleure accessibilité alors que cet aspect des soins était plus faible dans la pratique privée et les modèles moins actifs. La continuité était meilleure pour les modèles moins actifs et pour la pratique privée. La productivité était meilleure pour les deux modèles multi-institutionnels et pour les groupes de pratique privée.

• Le modèle de pratique privée est celui qui assure la meilleure continuité, mais ce modèle est en voie de disparition, puisque les jeunes médecins se tournent vers des modèles qui offrent moins de continuité et d'intégralité des soins. Il faudrait instaurer des mesures pour inciter les omnipraticiens (OP) à adopter des modèles de pratique plus efficaces ou à modifier leur offre de services de façon à mieux répondre aux besoins de la population, sinon on risque d'avoir une offre de services inadéquate au Québec.

Because GPs are key players in the health care system,[1] a good understanding of their practice settings and the effect those settings have on the provision of health care services is essential for improving the organization of health care. According to Landon et al, the practice setting is a very good indicator of a physician's behaviour in clinical decision making.[2] Several components of practice settings (ie, attributes related either to organization or to type of remuneration) might explain variations in service provision. Organization-related attributes can refer to working solo or in teams (multidisciplinary or not), to organizational culture,[3] or to interprofessional collaboration,[3] each of which has its particular characteristics depending upon the organization. For example, solo practice is generally associated with increased use of services (eg, tests, referrals, hospitalizations) by patients and less awareness of care protocols by GPs.[4,5] Attributes related to type of remuneration are well known in the scientific literature. For example, fee-for-service models are associated with higher levels of service use,[6-8] whereas salary-based remuneration models are associated with fewer procedures per patient, fewer patients per physician, longer consultations, and more preventive care than in other modes of payment.[6,8]

In the literature, studies on GP service provision fall into 2 streams. In the first, service provision is studied by looking at physicians as the unit of analysis and assessing their individual characteristics. Eisenberg's studies, for instance, highlighted the individual attributes of GPs that affected on the use of services.[9] Studies in the second stream have examined the models of care in which physicians practise and have analyzed service provision using organizational variables. An example of this is the work of Pineault and colleagues, who developed 5 primary care models and evaluated the service use associated with each of them.[10,11] Along the same lines, Freidson, a pioneer in this field, analyzed service provision by highlighting types of practice settings, such as solo practice or group practice.[12] Williams et al went further, explaining that the conventional distinction between solo practice and group practice was no longer adequate; other practice settings had to be taken into account, and particularly the combination of different settings.[13]

Each of these 2 streams has its shortcomings. In the first case, the physician is analyzed in isolation without taking into account the organizational context, while in the second, service provision is analyzed in relation to an organizational model without considering the other organizational settings in which the physician practises. Both approaches completely overlook the idea that medical practice is organization based (ie, that a physician could work in several professional settings and that this configuration of settings could have an effect on service

provision). Practice settings extend beyond any single setting, leading us to use the term *practice setting model,* which takes into account the configuration of practice settings and the number of practice settings that can influence the provision of services.

To our knowledge, no study has analyzed GPs' different configurations of practice settings in relation to the associated provision of health care services.

Quebec's physician-distribution policies, which have been in place for several decades, require all physicians, and especially younger physicians, to work in multiple settings.[14] The Quebec context therefore offers a unique opportunity to analyze GPs' service provision in relation to practice setting configurations.

The objective of this article is to define a physician classification system based on practice settings and to analyze service provision associated with those classifications.

METHODS

Study design and data source
Our design was cross-sectional and retrospective. We linked data produced by the Collège des médecins du Québec (Quebec College of Physicians) and the Régie d'assurance maladie du Québec (RAMQ, Quebec's health insurance board). The data were denominalized as we received authorization to use them from the Access to Information Commission. The data included detailed information on physicians' practices for each of their practice settings: number of patients and visits by setting and by patient age groups, and income coming from various practice settings and different modes of payment.

Participant selection
Our database included all GPs in Quebec in 2002. We excluded GPs aged 70 years and older, GPs whose annual nonclinical income was greater than $25 000, GPs who had been licensed for less than 2 years, and GPs trained in other countries who had restricted permits. (The exclusion criteria are explained in detail elsewhere.[15]) Our sample population consequently consisted of 5217 GPs from the 7461 GPs registered with the RAMQ in 2002.

Construction of variables
Practice settings. In Quebec, GPs can practise in various settings: private practice; centre local de services communautaires (CLSC), or local community health centres; centre d'hébergement de soins de longue durée (CHSLD), or long-term care hospitals; centre d'hébergement et de soins de courte durée (CHSCD), or acute care hospitals; emergency departments; and

outpatient clinics. All GPs work in the public system and are remunerated by the provincial government. They are all paid by fee for service except for those in CLSCs who are salaried.

To define the physicians' practice settings, we used the income received by GPs in each of these practice settings in 2002. We combined each of the income variables into 2 or 3 practice models. The models were selected taking into account the natural cutoff points of the distributions.

Provision of services. Health care services can be assessed from the perspectives of the patient or the physician. The patient's perspective is somewhat subjective, as it is based on patient-reported services. The physician's perspective is more objective, as it hinges on volume of medical services offered by physicians to patients and recorded in databases. It is this perspective that we used in this study. Based on the evaluation framework developed in a study by Borgès Da Silva and Pineault,[14] inspired by the work of Starfield,[1] we assessed service provision by constructing indicators related to the comprehensiveness, continuity, accessibility, and productivity of services provided by the GPs to their patients. Comprehensiveness was assessed in terms of the scope of services provided by the GPs. Continuity was constructed based on the number of visits per patient per year. Accessibility was measured in terms of fees charged for services provided outside of normal office hours. Productivity was calculated based on hourly salary. A detailed description of the construction of these indicators has been published elsewhere.[16]

Data analysis

Our goal was to obtain a physician classification system that would group GPs based on their practice settings. The method used involved exploratory multi-dimensional statistical analyses carried out in 2 stages. First, we performed a multiple correspondence analysis to identify the most important data structures or factors.[17-19] Then we performed an ascending hierarchical classification (AHC) analysis (Ward method[20]) based on the most important factors. The AHC technique has been shown to be effective in partitioning groups for which the intraclass variance is minimal and the interclass variance is maximal. We used SAS and SPAD software.

RESULTS

Table 1 describes the variables used to construct the GP taxonomy. From the multiple correspondence analysis we retained the 2 first factors, which explained 41.45% of the cumulative inertia (ie, a kind of cumulative explained

Table 1. Income variables that were used to construct the GP taxonomy: $N = 5217$.

INCOME VARIABLES, $	GPs, N (%)
ED	
• 0	3647 (69.9)
• >0	1570 (30.1)
Ambulatory clinic	
• 0	4067 (78.0)
• >0	1150 (22.0)
CHSLD	
• 0	4066 (77.9)
• >0	1151 (22.1)
CLSC	
• 0	3817 (73.2)
• >0	1400 (26.8)
CHSCD	
• 0	2814 (53.9)
• 0-40 562.50	1241 (23.8)
• >40 562.50	1162 (22.3)
Private practice	
• 0	1187 (22.8)
• 0-100 000	3074 (58.9)
• >100 000	956 (18.3)

CHSCD—centre d'hébergement et de soins de courte durée, CHSLD—centre d'hébergement et de soins de longue durée, CLSC—centre local de services communautaires, ED—emergency department.

variance). The AHC, done on both axes, produced a tree structure of interesting partitions. We decided to use a 7-category partition based on the dendrogram and the graph of the inertia quotient (interinertia/total inertia).[17-19]

Table 2 presents the 7 categories with the most discriminant variables for each group. The first (CLSC) and last (private practice) categories are essentially or almost entirely single-setting models. The other categories are models made up of several practice settings. The less-active model is made up of physicians whose private practice income is between $0 and $100 000 and who provide a certain amount of home care. In the 2 multi-institutional models, physicians spread their practice across hospitals, emergency departments, and CLSCs or private practices.

Table 3 presents the characteristics of the GPs in each of the 7 categories. The 2 multi-institutional models attracted primarily younger GPs, whereas the less-active and private practice models attracted primarily older GPs. The GPs of the 2 multi-institutional groups worked more hours per year than the others did. The private practice group had the highest number of patients and provided the largest number of services.

Table 2. Practice setting models, income variables, and proportion of physicians who fall into the categories

INCOME VARIABLES, BY PRACTICE SETTING MODEL	INCOME, $	PROPORTION OF PHYSICIANS WHO BELONG TO THE PRACTICE SETTING MODEL AND RECEIVE THE INCOME VARIABLE VALUE*	PROPORTION OF PHYSICIANS RECEIVING THE INCOME VARIABLE VALUE WHO BELONG TO THE PRACTICE SETTING MODEL[†]	TEST VALUE (TO ASSESS THE MOST DISCRIMINANT VARIABLES)
CLSC				
• Private practice	0	100.0	42.3	41.0
• CLSC	>0	100.0	35.9	38.2
• CHSCD	0	86.4	15.4	16.2
• Ambulatory clinic	0	99.2	12.2	14.9
• ED	0	93.0	12.8	13.3
• CHSLD	0	83.7	10.3	3.3
Mixed ambulatory				
• CLSC	>0	86.7	32.1	30.5
• CHSCD	0	99.8	18.4	25.9
• ED	0	100.0	14.2	19.7
• Ambulatory clinic	0	100.0	12.8	16.3
• Private practice	0-100 000	77.1	13.0	9.1
• CHSLD	>0	35.3	15.9	7.2
Multi-institutional (CLSC)				
• ED	>0	83.0	32.0	29.0
• Private practice	0	63.0	22.8	22.9
• Ambulatory clinic	>0	59.1	31.1	21.3
• CHSCD	0-40 562.50	55.3	31.1	17.9
• CLSC	>0	52.3	22.6	14.2
Multi-institutional (private practice)				
• ED	>0	77.0	54.5	37.2
• Ambulatory clinic	>0	64.5	62.3	35.8
• CLSC	0	99.8	29.1	27.7
• Private practice	0-100 000	88.9	32.1	24.5
• CHSCD	>40 562.50	49.4	47.3	23.0
• CHSCD	0-40 562.50	47.3	42.4	19.7
Hospitalist (private practice)				
• CHSCD	>40 562.50	42.2	28.9	13.8
• Ambulatory clinic	0	93.7	18.3	12.9
• CLSC	0	84.3	17.6	8.0
• ED	0	80.0	17.5	6.9
• Private practice	0-100 000	69.6	18.0	6.7
Less active (private practice)				
• CHSCD	0	90.9	33.7	28.7
• CLSC	0	99.6	27.2	26.3
• ED	0	98.3	28.1	26.2
• Private practice	0-100 000	87.1	29.5	21.9
• Ambulatory clinic	0	97.9	25.1	20.4
Private practice				
• Private practice	>100 000	100.0	67.0	51.8
• CHSCD	0	100.0	22.7	29.3
• ED	0	100.0	17.6	22.1
• CLSC	0	100.0	16.8	20.6
• Ambulatory clinic	0	100.0	15.7	18.3
• CHSLD	0	91.4	14.4	9.5

CHSCD—centre d'hébergement et de soins de courte durée, CHSLD—centre d'hébergement et de soins de longue durée, CLSC—centre local de services communautaires, ED—emergency department.
*For example, 99.2% of physicians who belong to the CLSC model have no income from ambulatory clinics.
[†]For example, 12.2% of physicians who receive no income from ambulatory clinics belong to the CLSC model.

Table 3. Characteristics of the GPs in the various practice settings

CHARACTERISTICS	CLSC	MIXED AMBULATORY	MULTI-INSTITUTIONAL (CLSC)	MULTI-INSTITUTIONAL (PRIVATE PRACTICE)	HOSPITALIST (PRIVATE PRACTICE)	LESS ACTIVE (PRIVATE PRACTICE)	PRIVATE PRACTICE
No. of physicians (%)	502 (9.6)	519 (9.9)	606 (11.6)	1111 (21.3)	796 (15.3)	1043 (20.0)	640 (12.3)
Sex, %							
• Female	64.5	47.8	43.4	35.9	43.7	38.9	20.6
• Male	35.5	52.2	56.6	64.1	56.3	61.1	79.4
Age, %*							
• <35 y	14.3	9.4	22.4	13.4	11.2	1.3	0.6
• 35-44 y	39.8	36.2	45.7	46.2	36.9	22.6	14.5
• 45-54 y	32.1	37.8	23.9	30.5	34.0	47.6	54.2
• 55-70 y	13.7	16.6	7.9	9.9	17.8	28.5	30.6
Practice, no.							
• Hours per year	1703	1907	2104	2235	2003	1868	2085
• Services	487	3147	4592	6489	3348	4199	7191
• Patients	481	1243	1653	2259	1519	1611	2945
Mean income by setting, $							
• Ambulatory clinic	153	0	4084	3826	1948	244	0
• CHSCD	5353	1	40 702	43 492	39 524	1906	0
• CHSLD	3503	11 449	2116	2918	3508	7407	1579
• CLSC	64 229	36 534	11 835	42	5267	36	0
• ED	2509	0	54 571	32 489	17 277	543	0
• Home care	56	3707	1338	3030	2505	6236	2713
• Private practice	0	44 579	15 244	58 168	35 330	67 101	123 461
• Total	75 803	96 270	129 890	143 965	105 359	83 473	127 753

CLSC—centre local de services communautaires, ED—emergency department.
*Not all percentages add to 100 owing to rounding.

Figure 1 presents the 7 practice setting models with the average levels of associated service provision for our 4 indicators (ie, continuity, accessibility, comprehensiveness, and productivity). To facilitate presentation and interpretation of the data, the indicators are presented as standardized indices rescaled to a scale of 100.

Accessibility in the multi-institutional models was very high (values of 84 and 100). Conversely, the private practice (value of 21) and the less-active models (value of 32) presented very low accessibility. Productivity was higher for GPs in private practice (value of 100) and in the 2 multi-institutional practice setting models (value of 99) than in the CLSC (value of 64) and the less-active models (value of 72). Compared with the 2 preceding indicators, there was less variation in continuity from one model to another (range from 73 to 100). Nevertheless, continuity was higher in the less-active (value of 100) and private practice models

(value of 88). Comprehensiveness was highest in the multi-institutional (private practice) (value of 100), CLSC (value of 99), and less-active models (value of 95).

DISCUSSION

Our study defined 7 practice setting models based on different organizational contexts of practice and revealed differences in service provision among the groups. The practice setting models were constructed based on GPs' incomes in the different settings. Accessibility was higher in both multi-institutional practice models and lower in the private practice and less-active models. Continuity was higher in the less-active model. Productivity was higher in both multi-institutional models and private practice groups. Our study showed that provision of care differed depending on the practice setting models of care.

Figure 1. Average levels of service provision for the 4 indicators (continuity, accessibility, comprehensiveness, and productivity) in the practice setting models:
Indicators are presented as standardized indices rescaled to a scale of 100.

CLSC—centre local de services communautaires.
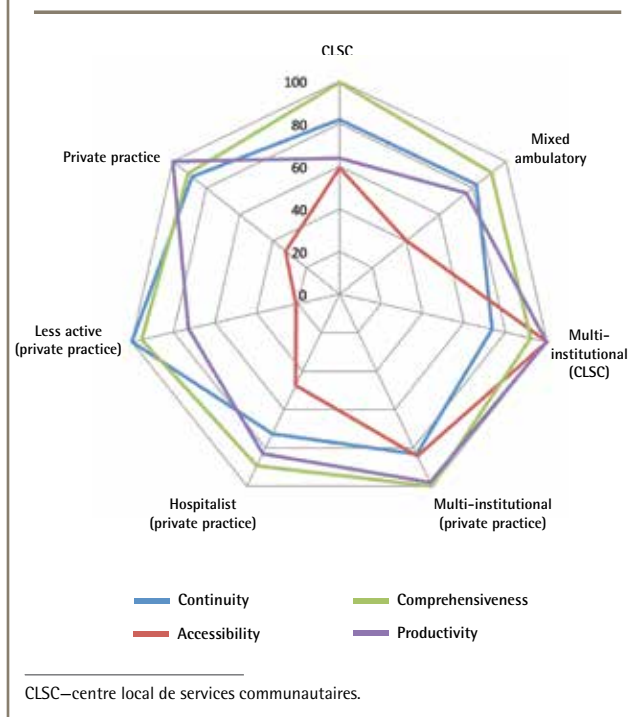
Our study is a first in the literature, in that it links GPs' practice setting configurations to the associated provision of services. Only a study by Contandriopoulos et al comes close, as it incorporates diversity of practice settings among the variables used to group GPs. The practice profiles that emerged from that study showed that the types of service provision were associated with different practice models.[15] Continuing along the lines of that study, and to compensate for that partial vision of service provision, we created the concept of the practice setting model, which allows practice setting configurations to be taken into account in the analysis of service provision.

The results of our study show that service provision differs according to the practice setting model. Some of our findings are documented in the literature, specifically with regard to single-setting practice models. However, service provision in practice configurations involving multiple settings has not been documented in the literature. The mixed ambulatory, hospitalist, and multi-institutional models of practice appear to be the models of the future, as they are attracting increasing numbers of young GPs. On the other hand, some practice setting models that promote very strong continuity, such as the private practice model, could gradually disappear because they are composed primarily of older GPs.

Given population aging and the prevalence of chronic illnesses, both continuity and care management are important, and it is reasonable to wonder whether primary care GPs of the future will be able to offer these types of care.

Limitations and strengths

Because the data were aggregated by physician, our capacity to analyze service provision was limited on several levels. Our databases included no variables regarding morbidity. Because we had no variables for patients and were dependent on the variables in the databases, the indicators that emerged were unidimensional and did not track the associated concepts in their entirety. We are aware that the indicators provide only a partial picture of the associated concept. However, we validated the indicators with a population survey (results not presented).[21] This helped make the indicators more robust and ultimately was a strength of this study. Another strength of the study was that we were able (subject to the previously mentioned exclusion criteria) to work with the entire population of Quebec GPs who provide clinical services, thereby avoiding sampling bias. Our study can also be generalized to other contexts, such as other Canadian provinces or developed countries experiencing the same concerns about GPs' service provision and where GPs can work in different practice settings.

Conclusion

Our study shows that GPs' provision of services varies according to their practice setting models. This study is part of a broader study that also has demonstrated differences in service provision according to geographic context. Based on the health needs of populations in the different regions, it would be advisable to consider which practice setting models should be encouraged to ensure a balance between productivity, accessibility, continuity, and comprehensiveness of care.

It is therefore important to develop incentives either to encourage GPs to adopt the more effective practice setting models that are currently at risk, or else to encourage them to modify their service provision to be more responsive to population needs. In effect, if no measures are taken to change the current trend, there is a risk that service provision in Quebec will become inadequate as young physicians gravitate toward models that offer less continuity and comprehensiveness. The practice setting model that ensures the greatest continuity of care (ie, private practice) is gradually disappearing, as it is generally the older GPs who practise in that model.

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Contributors
Dr Borgès Da Silva applied the methods, did the analysis, and wrote the paper. **Drs Contandriopoulos** and **Pineault** acted as doctoral thesis supervisors throughout the process. **Dr Tousignant,** as an expert in medico-administrative data analysis, participated in the design and commented on the manuscript.

Competing interests
None declared

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