Defining Measures of Panel Size

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FINDINGS

Result: Panel size can be measured using health Administrative data. One can:

1. Identify with reasonable confidence the patients who are receiving care from a family physician working in a patient enrolment model but who are not formally registered to them based on their pattern of care.
2. Identify those family physicians who are working full time equivalent based on billing data.
3. Determine Panel size based on these two factors as follows:

$$\frac{\text{Number of patients under the care of a provider}}{\text{Full Time Equivalent}}$$

Implication:

- ⇨ There is currently insufficient data to allow provincial health ministries or physician governing bodies to establish benchmarks or recommendations for the optimal range of panel size for which family physicians should be responsible.
- ⇨ This approach to measuring panel size will allow us to conduct a population based study in which we will measure the relationship between panel size and quality of care using health administrative data. That study will allow us to provide the Ministry of Health and Long Term Care with evidence based recommendations for benchmarks for optimal panel size ranges in primary care.

Background

The last 20 years have seen an increasing recognition of the importance of quality primary care to population health,[1-3] including improved health status,[4,5] reduced mortality,[6,7] and improved preventive care.[8] Effective primary care also reduces the burden on other health care sectors.[5]

The effectiveness of primary care is maximized when it is optimally organized. There is considerable variability in the number of patients for which family physicians care. There is also good evidence that large patient loads are associated with reduced accessibility,[9-15] continuity,[16] comprehensiveness,[17] and preventive care.[8] However, there is insufficient data to allow provincial health ministries or physician governing bodies to establish benchmarks or recommendations for the optimal range of patient numbers for which family physicians should be responsible. Studies that have attempted to establish such guidelines were based on workload formulas that relied on estimates of the number of visits required by patients each year in relation to the number of daily visits a physician can provide (# of days worked per year * # of visits per day ÷ # of patient visits per year).[16, 18] This approach is flawed because it only considers output and not quality. Benchmarks should consider the impact of patient numbers on the quality of care delivered. The few studies reporting on this subject were designed to meet other objectives, reported on the association between patient number and only one or two measures of quality, or contained a limited number of patients.[10-12, 14-17, 19-26]

We are planning a study that relies on data housed at the Institute for Clinical Evaluative Sciences (ICES) to assess the relationship between the number of patients cared for by a family physician and the quality of care delivered by that physician for six essential primary care attributes.

Because providers vary in the amount of time they spend in clinical care, we will use a measure of patient load that is adjusted for the amount worked termed **Panel Size.** This is further defined below.

The use of health administrative data strengthens the statistical power of the study because of the large number of records available. However, the use of health administrative data also contributes to the limitation of the study because the data must be confined to pre-existing data. The study relies on two measures: performance and panel size. Several ICES primary care indicators have been used and are accepted measures of quality of care performance level. In that study we rely on 19 indicators to measures 6 dimensions of care. However, there are no existing measures of panel size measures in these data.

Research objective

The objectives of this study were to:

1. demonstrate that establishing panel size measures using health administrative data is feasible,
2. Allow us to determine the most appropriate approach to measuring panel size using health administrative data.

Study design

This cross sectional study covered the period spanning April 1st 2008 through March 31st 2010.

Study sample

Family Physician Inclusion: All family physicians working in a patient enrolment model and providing general care were included. We limited the evaluation to patient enrolment models for two reasons: 1. Establishing the panel list in these practices is likely to be more accurate because the majority of patients for whom the physician cares are enrolled to him/her. 2. Any policies resulting from the proposed work can likely only be applied to models in which patient enrollment is required.

Because of the variability in the organization of patient enrolment models, we grouped the data into three groups based on the model's remuneration and staffing structure:

1. Reformed Fee For Service (Family Health Group – FHG);
2. Non-Multidisciplinary Capitation (Family Health Networks or Family Health Organizations);
3. Multidisciplinary Capitation (Family Health Teams - FHTs) practices.

Other enrolment models that are uncommon were excluded.

Family Physician Exclusion: Family physicians having specialized practices (having NOT billed at least 8 of the 18 standard primary care fee schedule codes in the period under evaluation or determined by the Ontario Physician Human Resources Data Centre not to be generalists), those with fewer than 100 enrolled patients, and those with a prolonged absence (having not billed for a period exceeding 8 consecutive weeks in the two year period) were also excluded.

Patient Inclusion: We included all patients with a valid Ontario Health Insurance Plan (OHIP) number and who are determined to be receiving care from a family physician working in a FHG, non-multidisciplinary capitation or FHT based practice (see below for details of the approach to identify the family physician).

Patient Exclusion: Individuals were excluded if they did not have at least one primary care visit in the period under evaluation, or were less than 18 years old and had more than three visits to a paediatrician.

Measurement of outcomes and analyses

Panel size is the number of patients cared for by a family physician relative to the amount worked in one year. Panel size estimates require that the providers' panel list (list of patients for whom they care) be identified and that a measure of their work be estimated.

$$\frac{\text{Number of patients under the care of a provider}}{\text{Full Time Equivalent}}$$

In this pilot evaluation, we explored the impact of assumptions we need to make to determine panel size.

Assumption #1: Virtual Roster appropriately identifies providers

A family physician's panel list size is composed of patients formally enrolled to him/her and those receiving care from him/her but not officially enrolled. The large majority of patients receiving care from a family physician working in a patient enrolment model are enrolled to that doctor. That data is available in the Client Agency Enrolment Program (CAPE) database housed at ICES. Patients not enrolled to a family physician can be attributed to a family physician based on their pattern of care. The Ministry of Health and Long Term Care, a main stakeholder in this study, accepts the "Virtual Rostering" approach to assigning non enrolled patients to family physician.[27, 28] In that approach, patients are attributed to the family physician having billed (or "*Shadow* billed" in capitation models) the largest dollar amount of services (based on the fee for service schedule) for that patient (Source: OHIP) in the previous two years.

⇨ **How valid is the assumption that the Virtual Roster approach identifies the appropriate provider?**

We performed analyses to help us determine whether it is reasonable to assume that patients attributed to a physician through this "Virtual Roster" method belong to that physician.

We determined the extent to which "Virtual Rostering" attributes patients to the correct family physician when it is applied to the patients who ARE formally enrolled to a family physician (in the CAPE tables).

We report on the proportion of patients amongst those formally enrolled to a family physician who are assigned to another family physician using the "Virtual Roster" approach.

The approach will be deemed appropriate if at least 80% of patients who are registered with a provider are correctly virtually attributed to that same provider.

Assumption #2: The number of visits per day can be used to estimate FTE

There is no measure of amount worked by a family physician that can be exactly related to Full Time Equivalent (FTE). FTE estimates need to be derived from the number of days worked weekly. That, in turn, is sensitive to how a days' work is defined.

The only available measure of work in health administrative data is billings activity. We want to determine what the appropriate threshold for the number of daily visits (based on billings submitted) required to determine whether a day was worked for the purpose of estimated FTE.

⇨ **How sensitive is the measure of FTE to changes in the number of visits established in the definition of a day worked?**

The objective here is to establish a reasonable definition of a day worked that is based on the data available – billing data. In preliminary analyses we evaluated the distribution of the number of daily visits in the three Models (Figure 1).

From these results we conclude that

1. Models differ in the distribution of the number of daily visits. Therefore any definition that will be applied to all three models must take this into consideration so as not to introduce bias.
2. There is no apparent threshold in the number of daily visits that reflects full time work, so there is no obvious cut off in the number of visits per day that can be used to establish a threshold beyond which that day can be deemed worked.

The appropriateness of the threshold is critical. For example, if it is set too low the derived FTE will be too high and the estimated panel size will in turn be too low. In that case, a drop in performance that in fact occurs around panel size of 1,600 will be observed at a lower panel size, and panel size recommendations will be set too low.

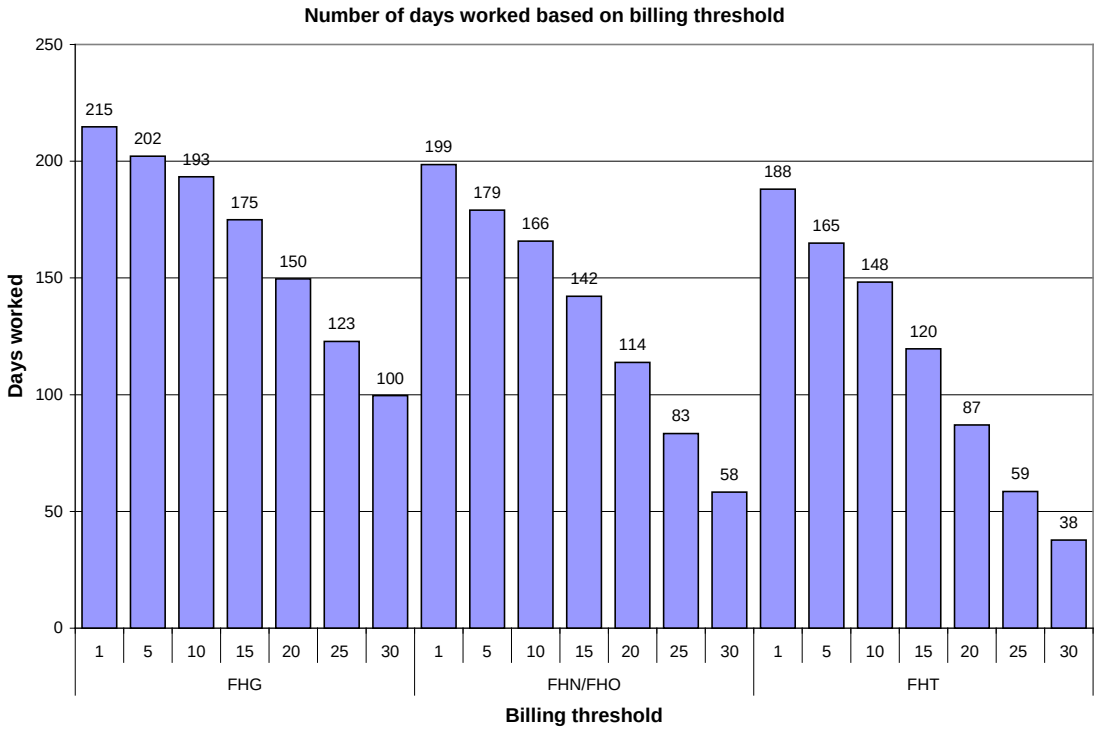

Figure 1: The impact of the definition of day worked on the estimated number of days worked

The number of days worked varied with different number of visits per day set as a definition of day worked.

We used a two step approach to assess our assumption.

1. First we assessed the impact of different cut off marks for the number of visits per day to deem that day worked on the number of physicians deemed to work full time in each model to determine which had the **minimal differential** impact across model. According to Employment Ontario[29] and Manitoba Job Futures,[30] 90% and 94% of general practitioners/family physicians,

respectively, work full time. The College of Physicians and Surgeons of Ontario reported that, in 2008, 83% of primary care physicians provide primary care on a fulltime basis.[31] These numbers will be used to help guide the range where thresholds may be established.

We defined one FTE as 160 days worked per year. This was derived from, on average, 4 days worked weekly * 40 weeks. We felt that this allowed for vacation, professional development and personal days). We assessed the impact of establishing the minimal number of billings per day in the definition of day worked at: 0 (i.e. includes all family physician meeting the eligibility criteria, regardless of their amount worked), 5, 10, 15, and 20 visits per day. We then assessed the ensuing proportion of physicians deemed to work full time.

Because our preliminary analyses shows that the number of visits varies per model, these were assessed within each models separately. This allowed us to establish a cut off that would have the same impact on all models.

2. Once we identified which definitions had minimal differential impact across model on the definition of FTE, we assessed the impact of these definitions on panel size. When these were established we then determined the impact of this threshold for the number of visits daily on panel size.

Results

Assumption #1: Virtual Roster appropriately identifies providers

- ⇨ This evaluation assesses how valid is the assumption that the Virtual Roster approach identifies the appropriate provider

To determine the panel size measures, we assumed that virtual roster appropriately identifies providers if patients who are in fact registered to a provider and who were subjected to virtual rostering were correctly attributed to the provider to whom they were registered at least 80% of the time.

The proportion of patients that make up the total panel of a physician who are actually registered with their provider (vs those who are attributed using the virtual rostering approach described earlier) is shown in Table 1. Overall, in the patient enrollment models eligible for this study, 72% of patients are formally registered with their provider. This differed considerably between the FFS model and the capitation models.

Model	# Physicians	# Patients Registered	# patients Virtually Rostered	Total # Patients	% Registered
FFS	3,104	3,695,325	1,948,008	5,643,333	66%
NMC	1,153	1,626,315	359,714	1,986,029	82%
MC	1,000	1,368,125	333,584	1,701,709	80%
All	5,257	6,689,765	2,641,306	9,331,071	72%

Table 1: The average proportion of individuals virtually attributed to a provider
FFS: Fee For Service; NMC: Non multidisciplinary capitation; MC: Multidisciplinary capitation

Therefore, the assessment we performed was on the 72% of patients already registered with their provider. The results of the virtual attribution of these patients show that, overall, 85% of enrolled patients are appropriately assigned to the physician to whom they are registered.

We conclude that the approach is appropriate because no less than 80% of patients who are registered with a provider are correctly virtually attributed to that same provider.

We assumed that the chance of incorrectly assigning a patient who is not registered to a provider is the same as the chance of incorrectly assigning patients who are registered (i.e. 15%) and estimated the impact of the 15% error level on panel size estimates. This error level would be highest for FHGs where more patients are virtually rostered. We estimated that 15% of the 35%, or 5% of all patients in a FFS panel, who are virtually rostered are correctly attributed to their provider. For capitation models, the error level is 3%.

The expected error level is shown in Table 2:

Model	Registered (%)	Virtually rostered (%)	Anticipated error in virtual assignment (%)
FFS	66%	34%	5%
NMC	82%	18%	3%
MC	80%	20%	3%

Table 2: Anticipated error level in virtual attribution of patients across models
FFS: Fee For Service; NMC: Non multidisciplinary capitation; MC: Multidisciplinary capitation

Assumption #2: The number of visits per day can be used to estimate FTE

⇨ This evaluates how sensitive is the measure of FTE to changes in the definition of the minimum number of visits required to determine that a day is worked

First we assessed the impact of different cut off marks for the number of visits per day to deem that day worked on the number of physicians deemed to work full time in each model to determine which had the **minimal differential** impact across model. We investigated the impact of defining a "day worked" as 0, 5, 10, 15, or 20 visits per day. This is shown in Table 3.

The results indicate that:

- The impact of establishing the cut off at 5 or 10 visits is similar across models. That is, there is up to a 3% difference in the number of physicians deemed to work full time in each model (10% - 13%, and 11% - 14% of providers are excluded under the 5 and 10 visits criteria, respectively).
- When the cut off is established at 15 or 20 visits, there is a considerable differential impact across models. There is a 9% and 20% difference between models (15% - 24%, and 24% - 44% of providers are excluded under the 15 and 20 visits criteria, respectively).
- The 5 or 10 visit criteria yield the proportion of full time equivalent expected from other studies. According to Employment Ontario[29] and Manitoba Job Futures,[30] 90% and 94% of general practitioners/family physicians, respectively, work full time. The College of Physicians and Surgeons of Ontario reported that, in 2008, 83% of primary care physicians provide primary care on a fulltime basis.[31]

We conclude the 5 or 10 visit criteria are the most appropriate criteria to use because they have the least differential impact across models and because they yield a proportion of providers working full time that is consistent with reports from other studies.

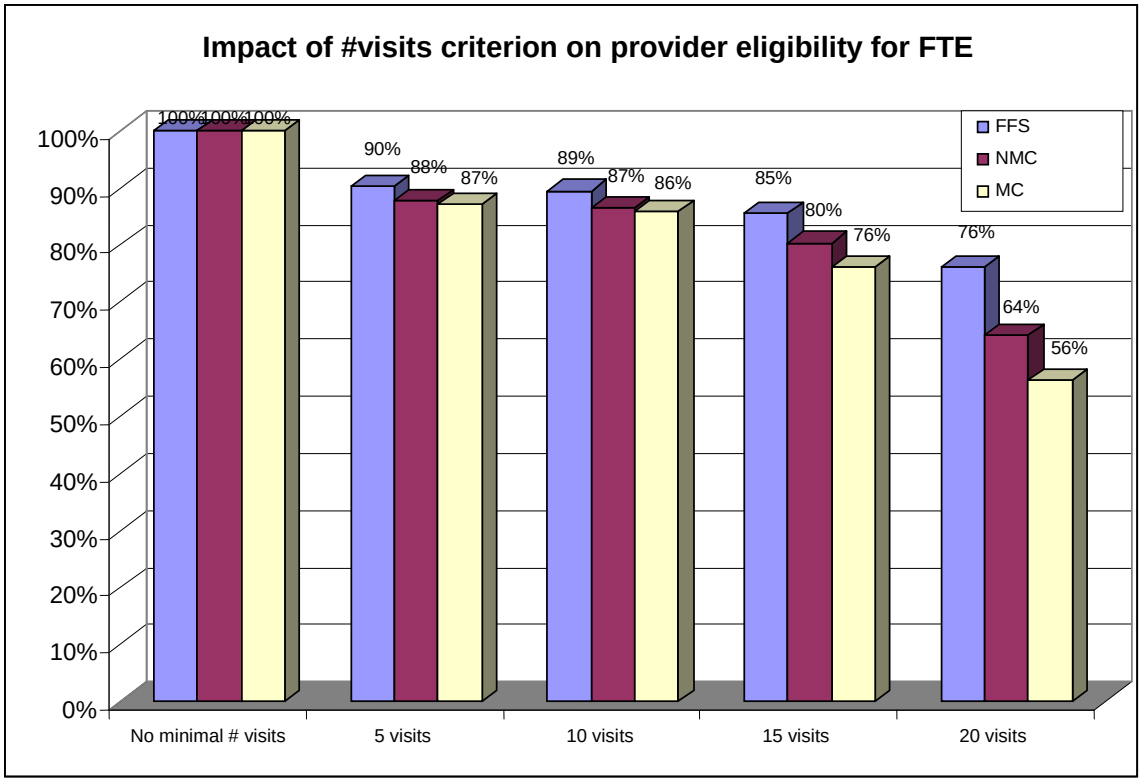

Table 3: Impact of changing the definition of day worked on the number of physicians working one FTE.

FFS: Fee For Service; NMC: Non multidisciplinary capitation; MC: Multidisciplinary capitation

We then assessed the impact of these definitions (5 visits vs 10 visits) on panel size. The estimated panel size for providers working in each model given a definition of 5 visits and 10 visits are shown in Table 4. We find that selecting 10 visits per day reduces the panel size estimates 2.9%, 3.5%, and 4.8% in the Fee for Service, Non multidisciplinary capitation and multidisciplinary capitation, respectively

Billing criterion	**Estimated Mean Panel Size**		
	FFS	NMC	MC
5 visits/day	1,879	1,784	1,784
10 visits/day	1,826	1,723	1,702
Impact of selecting 10 visits/day on panel size	- 2.9%	-3.5%	-4.8%

Table 3: Impact of changing the definition of day worked on the number of physicians working one FTE.
FFS: Fee For Service; NMC: Non multidisciplinary capitation; MC: Multidisciplinary capitation

The impact of selecting 5 vs 10 visits on the distribution of panel size in each model is shown in Figure 2.

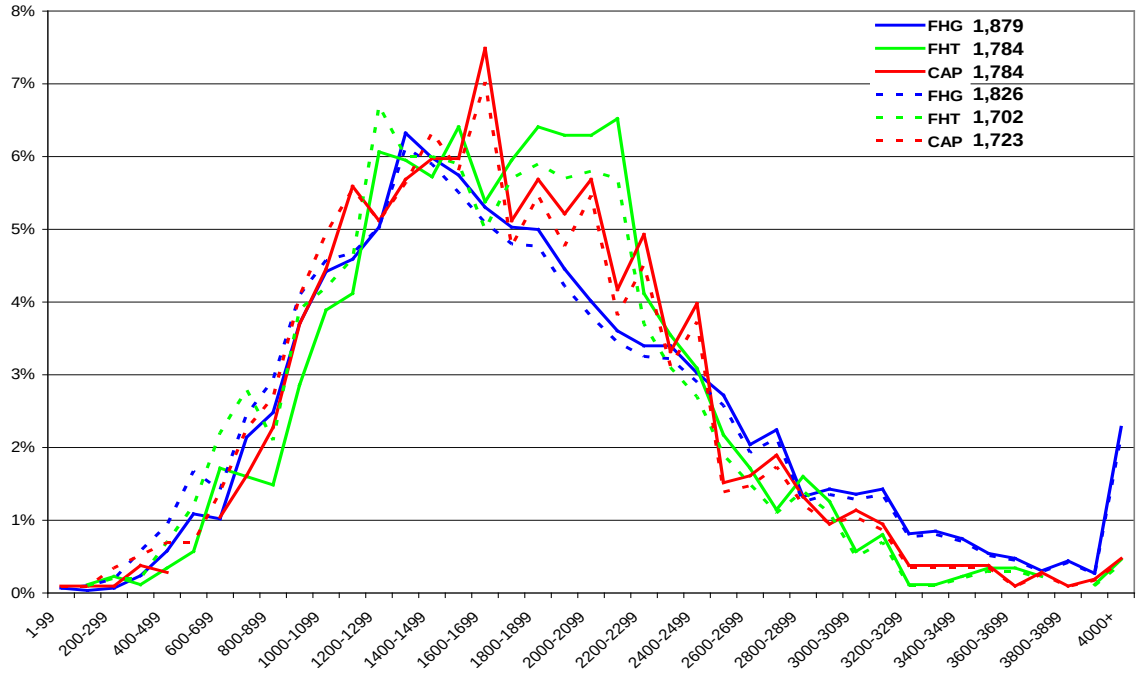

Figure 2: Impact of changing the definition of day worked on panel size.
FHG: Fee For Service model; CAP: Non multidisciplinary capitation model; FHT Multidisciplinary capitation model

Implications for primary care

Health administrative databases can be used to establish the panel size of primary care providers. Health administrative databases provide a reasonable approach to:

1. Identifying the patients who are receiving care from a family physician working in a patient enrolment model but who are not formally registered to them based on their pattern of care.
2. Identifying the family physicians who are working full time equivalent based on billing data.

These factors are essential in establishing the family physician's panel size which is defined as the number of patients under the care of a family physician working full time.

There is currently insufficient data to allow provincial health ministries or physician governing bodies to establish benchmarks or recommendations for the optimal range of panel size for which family physicians should be responsible. In response to this need, we will be conducting a study using health administrative data assessing the relationship between panel size and quality of care in Ontario. Health administrative data is a reliable source of quality of care measures. Prior to this current evaluation, there had been no attempt to measure panel size using health administrative data. Establishing panel size using that data is the first step that will allow us to measure the relationship between panel size and quality of care.

We are working closely with the Ministry of Health and Long Term Care to provide them with evidence based recommendations for benchmarks for optimal panel size ranges in primary care.