Creating a Composite indicator for Comprehensive Primary Care
Dorval Medical's Experience

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Starfield and Hollander's Observation

There is a compelling association between comprehensive primary care and system efficiency and effectiveness. The lifelong work of Barbara Starfield observed that an investment in primary care was associated with improved system quality, equity and efficiency (reduced cost) [1,2,3,4]. In British Columbia this efficiency was quantified by Marcus Hollander. The total cost of care was measured for the sickest patients. Patients without close alignment to primary care had a system cost of $30,000/patient/year. Patients with close alignment to primary care had a system cost of $12,000/patient/year [5].

Association or Causation

The observation that robust comprehensive primary care is associated with system efficiency, effectiveness and equity does not prove causation. Causation requires the measurement of comprehensive primary care, observing interventions and looking for corresponding impact on system benefits.

Benefit?

If it were shown that system benefit arises from performance in comprehensive primary care, system management options would expand to mobilize comprehensive primary care to benefit system performance.

Description vs Measurement

There are many ways in which comprehensive primary care practices can be described. Descriptions can include narratives, testimonials, and multiple indicators of the myriad of services and attributes.

Measurement differs from description in the ability to compare. The ability to compare two practices providing comprehensive primary care and the ability to compare a practice over time is essential to improvement. Without the ability to compare, quality improvement will be blind and will not be able to determine improvement of the practice's purpose of delivering comprehensive primary care.

Descriptions using multiple indicators can measure at the level of the individual indicator but are not able to measure the complex relationship of comprehensive primary care.

Performance

Performance measurement in Comprehensive Primary Care describes what is provided, how many people receive this service, and what the financial implications are. The Starfield Model describes the measurement of value of all services and attributes as *Quality*, the measurement of the quantity of the valued service is referred to as *Capacity*, and the monetary implications for achieving the valued services for patients as *Cost*. The full performance measurement is discussed in the paper "Measuring Comprehensive Primary Care for System Benefit".

This paper focuses on the measurement of *Quality* in Comprehensive Primary Care and the need for a Composite Indicator (CI). It describes the rationale and steps used by Dorval Medical in the creation of its Composite Indicator.

Rationale for a Composite Indicator

The traditional approach to measuring quality in primary care is to establish and implement a process for the careful selection of indicators related to the various services and attributes associated with the discipline. This process had resulted in indicator sets produced by McMaster University (5 volumes Quality in Family Practice), the Canadian Institute of Health Informatics (2 iterations of indicators), the Quality Outcomes Framework of the United Kingdom, and a similar process in underway within Health Quality Ontario.

As described above multiple indicator scores don't allow comparison between practices at the scope of Comprehensive Primary Care. Different practices can be compared at the level of any one indicator but it is impossible to consistently compare practices using all indicators together unless additional steps are taken.

Measuring and comparing comprehensive primary care required the creation of a Composite Indicator (CI) which incorporates all individual indicators into a single measurement.

Creating a Composite Indicator (CI) can follow the methodology described by the OECD Handbook on Constructing Composite Indicators[6]. An example of a commonly used composite indicator is the Consumer Price Index (CPI). A composite indicator which uses quality indicators in primary care is the United Kingdom's Quality Outcomes Framework (QOF)[7]. A composite indicator requires explicit measurement methods for each indicator, and an explicit weighting relationship between all indicators.

Comparing Different Populations

All individuals and all populations are different. Ignoring this fact would make any measurement by a Composite Indicator meaningless.

As described in "Measuring Comprehensive Primary Care for System Benefit", it is possible to adjust the population number from simple headcount, to a number which reflects age, health status and social determinants of health. This adjusted population count would describe the number in the population in terms of "average patients". For example a population of disadvantaged people with acuity of twice average might only be 1,000 people, but would also represent 2,000 "average patients". This correction allows different populations to be compared in the practice wide measurements of Cost per Patient and Capacity.

Quality indicators and the Composite Indicator can't have their scores adjusted in the manner just described. It will be possible to observe the correlation between populations and their achievable Composite Indicator score. As more practices participate in the Model, this correlation will allow practices to demonstrate the assurance of reasonable Quality by comparing their Composite Indicator to other similar practices. For example even if the provincial average Composite indicator is a score of 500,

if disadvantaged populations average a score of 300, these practices can assert a claim of assured quality even in the presence of a lower score.

What Can This Composite Indicator Achieve?

This paper describes the creation of a Composite Indicator from the multiple indicators available in comprehensive primary care. This CI has limitations and benefits which need to be understood to avoid creating unachievable expectations.

The Starfield Model CI for Quality enables the observation of outcome achievement in comprehensive primary care practices. It will allow observation of normal achievements and range of achievements for individual indicators, attributes and overall quality. These observations will be dependent on the explicit weighting methodology.

Once normal achievement is understood, it is possible to exercise judgement on the fundamental question: what is the minimally acceptable level of achievement. Such a judgement gives practices and the system the ability to achieve assurance of reasonable achievement of quality, attributes of quality and indicators.

Using this CI to assure quality is beneficial to practices and the system by avoiding strategies which would exhaust resources. Huge costs are at risk if the perspective for quality assurance is distracted toward the heroic achievement in a single indicator. Such risk is avoided in this methodology by maintaining a rational relative value that each indicator contributes to overall quality.

By allowing practices to assure quality at a reasonable level, practices can safely engage in an effort to improve their efficiency. Efficiency (at a practice level) can be improved by caring for more patients with the same resources, or using fewer resources to achieve the same level of care. In the Starfield Model, efficiency is measured by Capacity and Cost (described in "Measuring Comprehensive Primary Care for System Benefit").

What This CI is Unlikely to Achieve

It is probably overly optimistic to assume that a CI of Quality in comprehensive primary care will result in constantly improving system level health outcomes. System levels of health outcomes include: Life Expectancy, premature mortality, mortality from heart disease, cancer, transport accidents and suicide, infant mortality, rate of low birth weight, perceived health and others[8].

Comprehensive primary care undoubtedly plays a significant role in the medical system's achievement of system level health outcomes. There are two sobering additional observations: the medical system contributes only a small part to overall health when compared to the social determinants of health, and there is little evidence to suggest that comprehensive primary care's benefit is without limits.

The social determinants of health contribute about 55% of the factors which make us healthy. The medical system contributes only about 20%.

While comprehensive primary care benefits the medical system, there are likely limits to its achievements. Most economic interventions achieve most of their benefit with a modest effort.

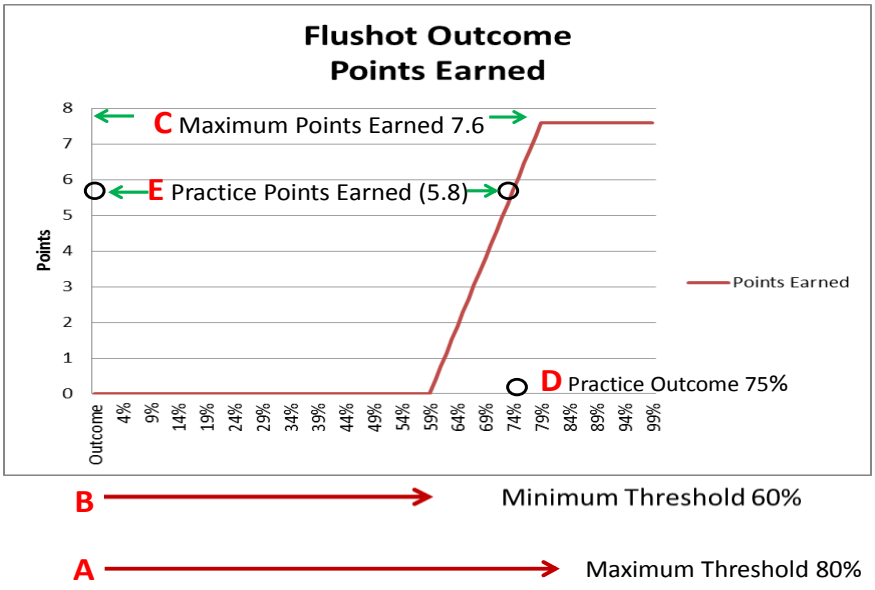
Progressive heroic efforts and resources result in diminished return. To illustrate, the benefit achieved by cardioprotection (e.g. lowering high blood pressure) is observable to a point but as interventions become more and more aggressive the cost increases and the benefit diminishes.

The result of this diminished return is that practices achieve most of their quality benefit as they assure reasonable outcomes. After the assurance of reasonable quality, practices would achieve more if they were to focus on issues of efficiency (Capacity and Cost).

The bottom line for expectations from the Starfield Model's CI of o quality is the assurance of reasonable outcomes and the freedom to focus on efficiency without compromising quality.

Scoring Individual Indicators

Each individual indicator is scored using the methodology in the United Kingdom's Quality Outcomes Framework. This section reviews the methodology. The following illustration describes the key concepts. The indicator illustrated is the proportion of patients age 65 or older with a flu immunization in the last 12 months. Potential outcomes are along the horizontal (X) axis and point achievement is along the vertical (Y) axis.



The indicator's parameters of Maximum Threshold **A**, Minimum Threshold **B**, and Maximum Points Earned **C**, are determined by polling experts from the patient population. In this illustration, the practice achieves an outcome of 75% **D** which corresponds on the graph to 5.8 points earned **E**. The Maximum Points which an indicator can earn **C** is also the weighting of the indicator as it relates to all other indicators.

The indicator score can be expressed by the Excel formula:

=IF(**D**>**B**,0,IF(**D**<**A**,**C**,(**C**/(**A**-**B**))*(**D**-**B**)))

Indicator Choice

Comprehensive primary care embraces multiple services with many characteristics (attributes). The 15 service baskets described by PCCCAR (also in Appendix D of most primary care enrollment model contracts) and the 9 attributes of an effective health system described by Health Quality Ontario are a logical starting point for indicator selection. The purpose of indicator selection is to be comprehensive, touching on the many aspects of comprehensive primary care. Dorval Medical's indicator choices are a reflection of its participation in a number of quality initiatives in the past. These choices are somewhat arbitrary but provide a starting point for the iterative process described in the creation of the Composite Indicator.

A more rigorous indicator selection process is underway at Health Quality Ontario. The process followed by the Primary Care Performance Measurement project is an excellent example of indicator selection.

Meaningful Feedback

Creating a Composite Indicator for comprehensive primary care depends on the purpose the measurement is to achieve. Dorval Medical took the position that the feedback should motivate the practice's providers to assure and improve the practice's quality as judged by patient expectations.

Motivation

Factors influencing motivation are well described in the works of Daniel Pink. The three key factors are Purpose, Mastery and Autonomy.

The term "Purpose" refers to the need for feedback to reflect the provider's sense of purpose.

The term "Mastery" refers to the need for feedback to accurately describe progress toward achievement of the purpose.

Autonomy refers to the desirability to allow providers to innovate and create their own solutions as they progress toward their purpose. Autonomy is already a part of our healthcare system in Ontario.

Accurately interpreting primary care providers' sense of purpose is the key to motivation as it will also shape "mastery" measured by a composite indicator which incorporates aspects of "purpose".

Providers in comprehensive primary care generally believe that their service is characterized as a long term relationship with specific patients providing a broad range of services. Starfield and Hollander both hypothesized that it is the primary care patient provider relationship which leads to significant system benefit (improved quality, improved equity, and reduced cost).

Dorval Medical decided the patient provider relationship best reflected patient and providers' sense of purpose. The relationship is the key to creating a meaningful composite indicator. The Composite Indicator seeks to provide feedback to providers and patients to the question "How well is the relationship maintained from the perspective of the patients we serve?"

Describing the Relationship?

The traditional description of provider patient relationship in comprehensive primary care has been Accessibility, Affability, and Ability. Dorval Medical modified this this description as displayed in the following table.

Traditional Description	Dorval Medical Description
Accessibility	Access
Affability	Sensitivity
Ability	Knowledge
	Trust

- **Access** – access to provider time or patient information;
- **Knowledge** – current comprehensive patient record which tells the story of the patient. It also includes knowledge transfer (patient health education);
- **Trust** – trust that expected services will be provided to the expectation of the patient population;
- **Sensitivity** – sensitivity to the emotional component of the relationship.

Patient Polling

There are two separate and distinct functions for patient polling in Dorval Medical's method for creating a Composite Indicator of Quality:

1. Scoring Indicators, and
2. Determining patient expectations to determine the value of indicators.

1. Scoring Indicators

Some of the indicators in the framework are scored by polling the patient population. Of the 60 indicators, 13 are scored by patient opinion polled on a monthly basis. Patients participate in a survey in the month of their birth, and the score is the cumulative scores for the past 12 months.

2. Valuing Indicators

To create a Composite Indicator (CI), all indicators are assigned a relative value (weighting). The logic for this process should be transparent and resonate with providers. Anything else risks being viewed as being arbitrary, losing credibility as a measurement of the provider's purpose.

Dorval Medical developed the methodology where patient polling occurred in two steps.

A. Firstly, the patient population is polled on their opinion of the relative value of the four Relationship characteristics (Access, Knowledge, Trust and Sensitivity).
B. Secondly, each indicator is evaluated on how it contributed to the overall relationship, then each of the four characteristics.

The data from these two steps is entered into a spreadsheet which calculates the contribution each indicator makes to the total relationship and to each of the four characteristics. This spreadsheet is available from the practice*.

Dorval Medical's polling of the four relationship attributes shows the contribution of each attribute to total Quality. This currently is Access 23%, Knowledge 26%, Trust 27% and Sensitivity 24%.

The process of indicator weighting can be illustrated by indicator #23 - the proportion of patients 65 or older with a current flu shot. The average value to the relationship was polled as 3.9 out of 5. When compared with all 60 indicators, the value was calculated as 11 points out of 1,000 (1.1% of total Quality). The practice currently scores 7.3 out of 11 points on this indicator.

The indicator was polled to determine its value with respect to Access, Knowledge, Trust and Sensitivity. The attribute contribution from the indicator was Access – 26%, Knowledge-36%, Trust-24%, and Sensitivity-13%. The practice's score for Access is determined by the contribution of all indicators' Access points. Indicator #23 contributed 26% of its score of 7.3 (=1.8 points). The sum of points for Access from all 60 indicators was 153 points of a potential of 230 (23% of 1000) resulting in an access score of 660 of 1000.

In theory, indicators could be assigned a weight directly on their importance to the relationship. This method was rejected by Dorval Medical as it allowed accidental distortion of the CI from the number of indicators selected in an area of comprehensive primary care.

Using the described two-step evaluation, multiple indicators can have a value (weighting) assigned which reflects the providers' and patients' evaluation of the relationship and prevents distortion by choice of indicators.

Dorval Medical's evaluation method respects a limitation described in Cognitive Psychology. The working memory is only able to simultaneously hold 4 concepts. The evaluation of the relationship and the indicators to the four attributes (Access, Knowledge, Trust and Sensitivity) respects this limitation.

Measuring Results

Every month, all indicators are measured and scored. These scores aggregate under the rules of the Composite Indicator to result in a score for each of Access, Knowledge, Trust and Sensitivity as well as an overall value for quality. Dorval Medical calls the total quality score The Starfield Number.

Performance is reported to providers and the practice by measurements of Quality, Cost and Capacity. Quality is reported at the level of total quality (the Starfield Number), as well as the achievement for Access, Knowledge, Trust and Sensitivity. All 60 indicators are also reported.

Providers who engage with the quality measurement should remain aware of the four relationship attributes on a day to day basis. Mindfulness of Quality in the patient provider relationship can easily be achieved by asking:

1. Are we being accessible?
2. Have we got current, accurate knowledge which tells the story of the patient?
3. Are we providing the expected services? And
4. Are we sympathetic to the emotions of the relationship?

Does the Methodology Work?

Dorval Medical's methodology is riddled with subjectivity and there is little in the literature to use in its refinement. Fortunately the test of success is straight forward: does this feedback give meaningful

information to providers and patients and encourage attention to the comprehensive primary care relationship.

As more experience is gained with the model in different practices, the model will be able to be tested by asking providers and patients how well the scores reflect their impression of the value of the relationship, access, knowledge, trust and sensitivity.

Dorval Medical's Methodology
Creating a Composite Indicator of comprehensive primary care using the Relationship Attributes of Access, Knowledge, Trust and Sensitivity

Overview: [*]

- Patient populations are polled to describe value in the patient provider relationship and the relationship's four characteristics of Access, Trust, Knowledge and Sensitivity. **See workbook tab "Survey Blank"**
- Different practice polling can be aggregated to contribute to assessment of Regions, LHINs and the Province.
- The polling is ongoing allowing the CI to always reflect current public value.
- While the indicators, weightings, and measurement rules are dynamic, the CI always reflects public perceptions of value on a measurement out of 1,000.

Patients are polled to express expectations in the following process:

a. Attribute Value
    i. The practice population is polled to determine the relative value of the four main attributes of the relationship: Access, Trust, Knowledge, and Sensitivity. The sum of all four attributes is adjusted to be 1,000 points. This step is ongoing, constantly re-evaluating the value of the four attributes. **See workbook tab "Indicator Details" cells B3-6 and tab "Value" cells F1-4.**

b. Indicator Selection
    i. The initial indicator set for the Dorval Model came from sources including Quality Improvement Innovation Partnership (**QIIP**), the Quality Improvement Plan manual (**QIP**), the Quality Outcomes Framework (**QOF**), and the primary care indicator set of the Canadian Institute for Health Information (**CIHI**).
    ii. Indicators are determined to be redundant if they ask a similar question, receive similar weightings and achieve similar scores. Redundant indicators are removed from the framework.
    iii. After the Indicator Value process (below), only the top 30 indicators for any of the 4 attributes are kept in the framework.
    iv. Potential new indicators (from any source) are subjected to the Indicator Value process and compete with existing indicators for inclusion by being in the top 30 indicators for any of the 4 attributes. This sequence is ongoing.

[*] The workbook required for this process is available on the Dorval Medical Web site http://www.dorvalmedical.ca/wp-content/uploads/2013/12/Surveying-for-Domain-and-Indicator-Weighting-of-Quality.xls References in green refer to locations in the workbook

c. Indicator Value

i. Indicator value polling requires some content understanding and repeated iterations of an hour long process. For this reason, this process is performed by a selection of patients willing to participate and devote the time.

ii. Each indicator is evaluated on how well it reflects patient value in the patient provider relationship. Method (Likert scale 0-5). **See workbook tab "Value".**

iii. Each indicator maximum threshold **A**[†] is set by polling opinion of the point that excellence is achieved. Method – patient polling. **See workbook tab "Indicator Details".**

iv. Each indicator minimum threshold **B** is set by polling opinion of the point of minimum achievement. Method – patient polling. This process is ongoing. See workbook tab "Indicator Details".

v. Each indicator is evaluated on how well it reflects each of the four attributes. Method (Likert scale 0-5). **See workbook tab "Value".**

vi. The raw attribute score for each attribute is the product of the Likert scores for the overall relationship and for the attribute. For example if an indicator scores 5.0 on overall relationship and 5.0 for access the access score will be 5.0X5.0=25. **See workbook tabs "Access", "Knowledge", "Trust" and "Sensitivity" column C**. This score is adjusted to reflect the proportion of value which each attribute contributes to overall value. **See the workbooks, same tabs, column D.** For example if Access contributes 233 points out of 1000, then the sum of Access scores from all indicators is adjusted so that they add up to 233. In the case of an attribute who's initial product is 24.7 and the total of all scores is 729.3 is adjusted down according to the proportion of 233/729.3 resulting in an adjusted score of 7.9.

vii. The Indicator Weighting (its Maximum achievable score) **C** is the sum of the four adjusted raw attribute scores. For example, if the adjusted raw score for Access is 7.9, for Trust is 2.7, for Knowledge is 0.2, and for Sensitivity is 4, the raw overall score is 7.9+2.7+0.2+4=14.8.

viii. The overall quality score (The Starfield Number) is the sum of points earned from all indicators (maximum score is 1000). **See workbook, tab "Value", Column I and tab "Indicator Details", column J.**

ix. Each of the four attributes receives points from the indicator's total score. In **vii** above the adjusted raw scores for the four attributes were for Access - 7.9, for Trust - 2.7, for Knowledge - 0.2, and for Sensitivity - 4, with a raw overall score of 14.8. The proportion of each attribute to total score is, for Access 7.9/14.8=53.2%, for Trust 2.7/14.8=18.3%, for Knowledge 0.2/14.8=1.3% and for Sensitivity 4/14.8=27.3%. **See workbook tabs "Access", "Knowledge", "Trust" and "Sensitivity", column E and Tab "Indicator Details", columns M, P, S and V.**

x. The practice score for each attribute is the sum of the attributes points from each indicator. Each of the indicators contributes its own unique proportion to each attribute as described in **ix** above. For example if an practice scores 10 out of a possible 14.8 for the indicator in **ix** above, the contribution of that indicator to the overall Access score would be 10X53.2%=5.23 points. The sum of such

[†] See Illustration Page 4

calculations for all indicators gives the Access score for the practice. **See workbook Tab "Indicator Details", cells D3, D4, D5 and D6.**

[1] Shi L, Starfield B, Kennedy BP, Kawachi I. Income inequality, primary care, and health indicators. J Fam Pract. 48 (1999), 275--84.

[2] Starfield B. Family medicine should shape reform, not vice versa. Fam Pract Man. May 28, 2009; Global health, equity, and primary care. J Am Board Fam Med. 20(6) (2007), 511--13; Is US health really the best in the world? JAMA. 284(4) (2000), 483--4; Research in general practice: co-morbidity, referrals, and the roles of general practitioners and specialists. SEMERGEN. 29(Suppl 1) (2003), 7--16, Appendix D.

[3] Starfield B, Shi L. Policy relevant determinants of health: an international perspective. Health Policy. 60 (2002), 201–18.

4 Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. Milbank Quarterly. 83(3) (2005), 457--502.

5 Increasing Value for Money in the Canadian Healthcare System, Hollander et al. Healthcare Quarterly Vol 12 No. 4 2009

6 OECD Handbook on Constructing Composite Indicators 2008 www.oecd.org/std/clits/42495745.pdf

7 http://www.qof.hscic.gov.uk/

[8] http://www.oecd.org/els/health-systems/49105858.pdf