The Evaluation of the Continuity of Care at the Group Health Centre, A Unique Multi-specialty, Multi-disciplinary Health Service Organization

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This report is dedicated to Dr. Hui Lee. Dr. Lee was a champion for the development and evaluation of interventions that were practical for people in their everyday lives. Dr. Lee initiated this set of studies to examine the concept of continuity of care with the aim of identifying ways to improve healthcare delivery and health outcomes. It is hoped that the results have furthered his goals.
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Key Implications for Decision Makers

This project was conducted with patients at a multi-disciplinary, multi-specialty health services organization serving 44,000 rostered patients in Northern Ontario. It investigated continuity of care for patients with diabetes in several areas of barriers and potential solutions to continuity; correlates of continuity; and variability in costs associated with continuity of care and patient outcomes.

Key factors that enhanced continuity of care included:
- the physician is able to provide services that are regular, timely, and efficient;
- the physician is able to provide clear and relevant information;
- most healthcare providers are at the same location;
- healthcare providers give individualized, realistic information; and
- patient feels respected, listened to, and understood.

Key factors that detracted from continuity of care included:
- long waiting times and appointment cancellations;
- lack of available providers;
- physician not knowledgeable about current best practice; and
- patient feels judged or unsupported in self-management strategies.

Most barriers and facilitators of continuity of care that were identified by patients can be modified and so can be addressed by changes in healthcare delivery or patient-provider interactions.

Regular visits were seen by patients to be an essential ingredient in maintaining quality of care.

A 47-item tool, the Diabetes Continuity of Care Survey, was developed with items derived from patient focus group interviews. Testing for reliability and validity and factor analysis was conducted. The measurement of continuity of care using the Diabetes Continuity of Care Survey could help predict those who are receiving good or poor quality of care and will allow healthcare providers to focus attention where needed to improve quality of care.

Increases in continuity of care were associated with increases in quality of care. There was also a direct correlation between patient rating of continuity of care and reported patient satisfaction. Continuity of care was not associated with changes in healthcare costs.
Executive Summary

Continuity of care is a concept that has been garnering increased attention in the last few years. There have been multiple methods proposed by researchers for measuring continuity of care, most of which are based on proportions or ratios of visits to the same healthcare provider or centre. While a consistent method for measuring continuity of care is lacking, increased continuity of care using various definitions and measurement tools has been related to better well-being, lower healthcare costs, better glucose control, and higher satisfaction, but has also not been found to improve health outcomes in other scenarios. Whether a patient is better served by high sequential access to one provider or any provider within the same system or management team is controversial. Finally, patients’ perceptions of continuity of care have not been generally evaluated or correlated with current measurement methods. This project was conducted with patients at the Group Health Centre in Sault Ste. Marie, Ontario, a multi-disciplinary, multi-specialty health services organization serving 44,000 rostered patients.

Questions:

1. Does continuity of care correlate with quality of healthcare, patient satisfaction, patient quality of life, or clinical outcomes?
2. What differences in healthcare costs are associated with variation in continuity of care and variation in outcomes?
3. What are the reasons for variation in continuity of care, how can they be described and/or quantified, and how might improvements be made?
4. How does the movement from a fee-for-service system to a capitated system affect a provider’s perception of the provision of continuity of care?

Three sub-studies were conducted to answer the above questions. A qualitative study using a phenomenological approach was employed to gather patients’ lived experience of continuity of care and identify the barriers to continuity of care from the patient perspective and to identify
potential solutions to these barriers. The next study utilized the qualitative data gathered from
the focus groups to develop a questionnaire, the Diabetes Continuity of Care Survey, measuring
continuity of care from the perspective of patients with diabetes. The questionnaire was
administered at one point in time for initial validity testing and administered two weeks later for
test-retest reliability. Finally, a cross-sectional study was carried out to examine the
relationships between continuity of care and quality of care, patient satisfaction, quality of life,
and costs based on the data gathered from the pre-post study. In the end, we were not able to
answer the question about provider perceptions of impact on continuity of care when moving
from a fee-for-service to a capitated system, because the number of providers who changed
payment mechanism was too small to support the analysis.

Results

A: Continuity of care - Barriers and Solutions

Patients see continuity of care broadly as five separate but related factors: 1) access to services;
2) interactions with physician; 3) interactions with other healthcare professionals; 4) personal
self-responsibility; and 5) communication. They identified factors that both enhance and detract
from continuity of care within these factors.

Factors that enhanced of continuity of care included:

- physician is able to provide services that are regular, timely, and efficient;
- physician is able to provide clear and relevant information;
- most healthcare providers are at the same location;
- healthcare providers give individualized, realistic information;
- patient is able to access tests and specialists when needed;
- patient feels respected, listened to, and understood;
- patient feels able to advocate for self; and
- patient receives feedback regarding medical tests.

Factors that detracted from continuity included:

- long waiting times and appointment cancellations;
lack of available providers;
- physician not knowledgeable about current best practice;
- physicians do not offer treatment options;
- healthcare providers do not communicate with each other;
- patient feels judged or unsupported in self-management strategies; and
- patient feels she/he is doing all she/he can to manage diabetes, but does not see this reflected in results

**B: Development of a scale to measure continuity of care from patient perspective**

A 47-item tool was developed with items derived from patient focus group interviews. It was tested for reliability and validity and was factor analysed. Called the Diabetes Continuity of Care Survey, it was used in subsequent parts of this project.

**C. Relationship between continuity of care and other outcomes**

There was a direct correlation between the measurement of continuity of care (measured by the Diabetes Continuity of Care Survey) and the process and outcome of diabetes care, such that if the patient rating of continuity was high, so was the score on their process and outcome of care. That is, they were more likely to have had their blood pressure checked, metabolic control, foot and eye exams done, and that the results of their blood pressure and blood tests were in a range indicating better control. There was also a direct correlation between patient rating of continuity of care and reported patient satisfaction. Continuity of care was not associated with changes in healthcare costs. Increases in continuity of care were associated with increases in quality of care. In exploring further the relationship between continuity of care and quality of care, other factors were explored such as age, quality of life, status as a native Canadian, income, and gender. None of these factors was associated with quality of care; only continuity of care remained predicting quality of care. There were no correlations found among continuity of care measures (Diabetes Continuity of Care Survey, continuity of care index, continuity of care ratio).
CONTEXT
Continuity of care is a concept that has been garnering increased attention in the last few years.1-3 This concept has been examined in a number of areas such as nursing, mental health, and primary care.1

There have been multiple methods proposed by researchers for measuring continuity of care, most of which are based on proportions or ratios of visits to the same healthcare provider or centre.4 While a consistent method for measuring continuity of care is lacking, increased continuity of care using various definitions and measurement tools has been related to better well-being,5 lower healthcare costs,6 better glucose control,4 and higher satisfaction7 but has also not been found to improve health outcomes in other scenarios.8,9 Whether a patient is better served by high sequential access to one provider - “high-site/high-provider continuity” - or any provider within the same system or management team - “high-site/low-provider” - continuity is controversial.3,10-13

Finally, patients’ perceptions of continuity of care have not been generally evaluated or correlated with current measurement methods.9,14-16 The patient perspective on continuity of healthcare has begun to receive more attention.17,18 However, most research that has elicited patient views has been conducted using researcher-based definitions of continuity of care. For example, a recent study asking patients about their attitudes towards continuity of care focused on provider continuity by asking how many primary care providers they had in the past five years and how important it was to see the same provider for their care over time.19 While these studies offer helpful insights regarding patient’s perception of traditional definitions of continuity of care, we propose that a researcher-focused definition of continuity of care may be missing other important aspects that patients define as continuity of care. This study evaluated these key issues pertaining to the appropriate measurement and delivery of continuity of care.

The increasing prevalence and chronic nature of diabetes and its consequences suggests that continuity of care would be an important factor in managing this disease. Patients with diabetes have multiple and complex complications and often receive care from numerous medical and allied healthcare providers. Better understanding of the meaning of and how to measure continuity of care for patients with diabetes might enhance effective management of this disease. The objectives of this set of multiple studies were:

1. to define the barriers to continuity of care from health services delivery and patient/provider perspectives;
2. to determine potential solutions to these barriers;
3. to determine if continuity of care affects quality of healthcare; and
4. to determine costs associated with variation in continuity of care.

A series of research questions was generated to address the study objectives. These questions were:
1. What are the reasons for the variation in the continuity of care, how can they be described and/or quantified, and how might improvements be made?
2. Does continuity of care correlate with quality of healthcare, patient satisfaction, patient quality of life, or clinical outcomes?
3. What differences in healthcare costs are associated with variation in continuity of care and variation in outcomes?
4. How does the movement from a fee-for-service system to a capitated system affect a provider’s perception of the provision of continuity of care?

As work on the project progressed the research questions were modified in the following ways:
- Question 1 was divided into three separate questions in recognition that further work on developing a measurement approach to capture the patient’s perspective on continuity of care would provide additional insight into understanding and measuring continuity of care.
- Question 4 was not addressed, as fewer than expected (three) physicians moved from a fee-for-service environment to the capitated system. It was felt it would not be possible to properly measure provider perception from such a small sample.

Therefore, the research questions addressed in this report are the following:
1. What are the barriers and potential solutions to continuity of diabetes care?
2. What are the facets of continuity of care from the perspective of patients with diabetes?
3. How does the patient perspective of continuity of care, measured using a validated questionnaire, correlate with conventional measures of continuity of care (continuity of care index, continuity of care ratio) in patients with diabetes?
4. How does continuity of care correlate with quality of healthcare, patient satisfaction, patient quality of life, or clinical outcomes in patients with diabetes?
5. How do changes in continuity of care, measured from the patient’s perspective using a validated questionnaire, affect quality of healthcare in patients with diabetes?
6. What differences in healthcare costs are associated with variation in continuity of care and variation in outcomes?
IMPLICATIONS

1. For practice:
   - Most barriers and facilitators of continuity of care that were identified by patients can be modified and so can be addressed by changes in healthcare delivery or patient-provider interactions.
   - The measurement of continuity of care using the Diabetes Continuity of Care Survey could help predict those who are receiving good or poor quality of care and allow healthcare providers to focus attention where needed to improve quality of care.
   - Regular visits were seen by patients to be an essential ingredient in maintaining quality of care. Healthcare providers need to be responsive to patient perspectives on frequency of regular visits.
   - Patient perception of the quality of the interaction with their primary physician was seen as a key factor that enhanced or detracted from continuity of care. Healthcare providers cannot underestimate the impact of the quality of their relationship on patient satisfaction and how patients estimate quality of their care.
   - Patients also recognized the need for their own self-responsibility in caring for themselves and their condition. Discouragement arose where they felt they were doing everything possible but their diabetic control was not improving. Healthcare providers need to be sensitive to the progression of the disease and acknowledge when patients are doing an appropriate job with self-management. Otherwise, patients reported feeling unheard, unacknowledged, discouraged, and dissatisfied with care.

2. For decision makers
   - Most barriers and facilitators of continuity of care that were identified by patients can be modified and so can be addressed by changes in healthcare delivery or patient-provider interactions.
   - The measurement of continuity of care using the Diabetes Continuity of Care Survey could help predict those who are receiving good or poor quality of care and allow healthcare decision makers to focus attention where needed to improve quality of care.
   - The continuity of care index may not always provide useful information as a measure of continuity of care.

APPROACH
This set of three studies utilized a number of research designs to address the study objectives and research questions. A qualitative study using a phenomenological approach was employed to gather patients’ lived experience of continuity of care and identify the barriers
to continuity of care from the patient perspective and to identify potential solutions to these barriers. The next study utilized the qualitative data gathered from the focus groups to develop and validate a questionnaire, the Diabetes Continuity of Care Survey, which measures continuity of care from the perspective of patients with diabetes. Finally a cross-sectional study was carried out to examine the relationships between continuity of care and quality of care, patient satisfaction, quality of life, and healthcare costs.

**Setting:**
This set of studies took place at the Group Health Centre, a not-for-profit, multi-specialty, multi-disciplinary health service organization, in Sault Ste. Marie, Ontario serving 44,000 rostered patients. Thirty-three family physicians and 31 specialists were associated with the centre at the time of the study. Distinguishing features of the centre are multiple types of healthcare providers at one location, physician payment through a stipend with additional payment for productivity, and an electronic medical record system. The centre’s structure is akin to health maintenance organizations in the United States. Its funding is based on capitation and there is an electronic medical record system in place.

**Sampling:**

*Qualitative study: barriers and solutions and item generation for questionnaire*
Forty-six patients volunteered to participate in seven patient focus groups. Purposeful sampling was used to reflect the range of patients with diabetes at the Group Health Centre, and the final group composition included 1) patients with caregivers; 2) working patients; 3) patients of Italian descent; 4) patients of First Nations descent; 5) patients at high risk for organ damage; 6) patients who had previously been patients of fee-for-service physicians; and 7) an undifferentiated group. Patients were invited to participate in focus groups if they were older than age 18, had a diagnosis of diabetes (except gestational diabetes) in their electronic medical record, and could speak English, French, or Italian. A convenience sample of Group Health Centre physicians and allied healthcare professionals also participated in the focus groups. The number of healthcare provider participants was much smaller than the patient sample but was included to broaden insight into patient-focused continuity of care issues from the provider perspective.

*Developing a scale to measure continuity of care from the patient perspective*
All rostered patients over the age of 18 were eligible to participate. Inclusion criteria consisted of a diabetes diagnosis recorded in their electronic medical record based on predefined criteria and informed consent. Patients were excluded if they had gestational diabetes, could
not communicate in English, or had a life expectancy or residency expectancy in Sault Ste. Marie of less than three years.

**The relationship between continuity of care and other outcomes**

Two subsets of patients were utilized for this cross-sectional study. The first set of patients were those who completed the Diabetes Continuity of Care Survey as part of another study that was examining a diabetes quality improvement initiative at the Group Health Centre (n=342) [see Appendix 1 for initial results of the effectiveness and costs of the quality improvement initiative]. The second set of patients (n=136) was taken from a planned set of patients with differing physician payment characteristics. Eighty patients who had an ex-fee-for-service physician were matched by sex to 80 patients who were cared for by a salaried physician from the capitated system. Complete physician visit information was used to derive the continuity of care index and continuity of care ratio for these patients.

**Data Collection Process and Measurement Tools:**

**Qualitative study: barriers and solutions**

A semi-structured interview guide consisting of 13 questions and sub-questions was used to facilitate the focus groups. Participants were asked to think about and describe the concept of continuity of care and to elaborate on aspects of their healthcare they felt facilitated and detracted from continuity of care. All focus groups were audio taped and transcribed verbatim. All transcripts were read by two research team members to determine initial codes. A standard process for phenomenological data analysis was followed. Transcripts, focus group notes, and debriefing notes were all examined. A qualitative software program, NUD*IST, was used to help organize the data (QSR NUD*IST (4.0), 1997, Qualitative Solutions and Research Pty. Ltd. Australia).

**Developing a scale to measure continuity of care from the patient perspective**

Scale items were generated from focus group transcripts. During the process, categories were considered in broad terms to allow for the future differentiation of domains. The broad categories of potential items were then read independently by three people to determine main domains. Domains were considered to be specific and homogeneous categories. In many cases, items were direct quotes from the focus group participants. Like items within each domain were combined and restated into items that connoted distinct ideas. Potential questionnaire items were then written out as declarative statements. The final list of items was derived via verbal discussion and final consensus by three item reviewers. A mixture of positively and negatively keyed statements was used to minimize the acquiescence bias. Patients were asked to score
each item on a five-point scale that ranged from strongly disagree to strongly agree. A higher score indicated greater continuity of care. The scale was tested for face validity, readability, content validity, reliability, and construct validity (testing described in Appendix 1).

**The relationship between continuity of care and other outcomes**

**Continuity of Care:**
Continuity of care was measured using (1) the Diabetes Continuity of Care Survey (development described in previous sections of the report and Appendix 2);24 (2) indices adapted from the commonly used continuity of care index7 (see below); and (3) the continuity of care ratio \[a/(a+b+c)\]. The maximum possible score on the Diabetes Continuity of Care Survey is 235.

The continuity of care index is a ratio that compares the number of visits to each type of healthcare provider, with each letter representing a different healthcare provider:

\[
\text{Continuity of Care Index} = \frac{(a^2+b^2+c^2)-(a+b+c)}{(a+b+c)(a+b+c-1)}
\]

**Quality of Care:**
Quality of care was collected using the Good Health Outcomes in Diabetes Index (Appendix 3)25. This nine-point index was developed at the Group Health Centre to examine evidence-based clinical and process outcomes related to diabetes. The Good Health Outcomes in Diabetes Clinical Scale consists of three items: 1) blood pressure done and < 140/85 mmHg; 2) hemoglobin done and < 0.07; and 3) low density lipoprotein (“bad” cholesterol) checked and < 3.0 mmol/L. The Good Health Outcomes in Diabetes Process Scale consists of six items: 1) blood pressure done within six months; 2) hemoglobin done within six months; 3) lipids done within one year; 4) foot exam done within six months; 5) eye exam done within two years; and 6) albumin and proteinuria checked within one year. Each item is dichotomous and reflects whether that outcome was achieved or not. The Good Health Outcomes in Diabetes Index contains values from both the process and clinical scales and scores range from zero to nine.

**Quality of Life:**
Quality of life was measured using the SF-36.26;27 SF-36 was administered between January and April 2000.
**Patient satisfaction:**
Patient satisfaction was measured using the Group Health Centre continuous quality improvement patient satisfaction survey. The maximum possible score is 36.

**Costs:**
The cost of family physician visits, administering injections (such as immunizations, chemotherapy), and specialist visits were taken from the Ontario Health Insurance Plan (OHIP) fee guide. Costs varied slightly over the course of time according to OHIP fee adjustments. The cost of an inpatient hospital admission was calculated based on the average cost per hospital day for fiscal year 2000/2001 (total expense includes direct expenses and overhead) for the hospital where the patient was admitted as reported by the Ontario Ministry of Health and Long-Term Care (personal communication, Michael Byrnes, MOHLTC Information Analysis Unit) multiplied by the length of stay for that patient. The costs of medications based on prescription, over-the-counter, and herbal medications were gathered from patient interview and pharmacy records. The costs to the patients as well as the cost to their public or private drug plan were included. The costs of laboratory tests and procedures were calculated based on the cost associated with the OHIP code for each test.

**Data collection:**
Data were collected by patient self-report (continuity of care survey, quality of life, patient satisfaction); from the Group Health Centre electronic medical record (continuity of care index, continuity of care ration, Good Health Outcomes in Diabetes score, healthcare resource utilization); from the Sault Area Health records system (healthcare resource utilization); and from pharmacy records (medications).

The Diabetes Continuity of Care Survey, SF-36, and Group Health Centre continuous quality improvement survey were administered between January and April 2000. The continuity of care index and ratio were calculated from July 2001 retrospectively for one year. Good Health Outcomes in Diabetes scores were collected based on data retrospectively from July 2001 (to reflect the time period of two years prior, depending on indicator). Costs were calculated for services between January and July 2001.

**Data Analysis:**

*Qualitative study: barriers and solutions*
All focus groups were audio taped and transcribed verbatim. All transcripts were read by two research team members to determine initial codes. A standard process for phenomenological
data analysis was followed. Transcripts, focus group notes, and debriefing notes were all examined. A qualitative software program, NUD*IST, was used to help organize the data (QSR NUD*IST (4.0), 1997, Qualitative Solutions and Research Pty. Ltd. Australia). Lists of significant statements were developed and statements were then grouped into main themes or meaning units. At each stage of the analysis, the data were checked for disconfirming evidence by rereading the transcripts and summaries of each node category. Theoretical saturation was used as a guide to determine whether enough data were generated from the focus groups. Data triangulation occurred through member checking whereby all participants who attended the groups were sent a summary of their group for comment, and through consensus of the main themes generated by the multi-disciplinary research team.

The relationship between continuity of care and other outcomes

Pearson’s correlation coefficients were calculated to determine if there were relationships between continuity of care (Diabetes Continuity of Care Survey, continuity of care index and ratio) and quality of care (Good Health Outcomes in Diabetes), quality of life (SF-36 [physical health] and SF-36 [mental health]), and patient satisfaction (Group Health Centre continuous quality improvement survey).

An analysis using forwards and backwards stepwise multiple linear regression was conducted using the Good Health Outcomes in Diabetes total score as the dependent variable and quality of life, Diabetes Continuity of Care Survey scores, status as a native Canadian, income, and age as the independent variables. Each independent variable was tested in a univariate analysis, and all variables that attained statistical significance in univariate analysis were entered into the multiple linear regression.

An analysis using forwards and backwards stepwise multiple linear regression was conducted using the total healthcare costs as the dependent variable and quality of life, quality of care, Diabetes Continuity of Care Survey scores, status as a native Canadian, income, and age as the independent variables. Each independent variable was tested in a univariate analysis and then all variables that attained statistical significance in univariate analysis were entered into the multiple linear regression.

RESULTS

Qualitative study: barriers and solutions

Fifty-four percent of the 46 participants were female. The average age of participants was 59 years (SD=12). Sixty-one percent were retired and nine percent were on disability.
Approximately 20 percent of patients had an income of less than $20,000 per year. Twenty-eight (61 percent) were retired. Patients had a median number of two physicians (range one to five). Eight physicians participated in the physician focus group (five general practitioners, one emergency physician, one internal medicine specialist, and one surgeon) and 10 allied healthcare workers (including seven nurses, one chiropodist, one nutritionist, and one optometrist) participated in the healthcare provider focus group.

The findings indicated that patients’ conceptualization of continuity of care was broader and more comprehensive than traditional definitions of continuity of care. Patients indicated that continuity of care consisted of five separate, but related factors: 1) access to services; 2) interactions with physician; 3) interactions with other healthcare professionals; 4) personal self-responsibility; and 5) communication. Within each factor, there were two main barriers and two main facilitators to continuity of care. These are summarized in Appendix 4. Descriptive quotes to illustrate each of the five factors are included in Appendix 5 (Tables A to E).

**Item generation for questionnaire**

Focus group data resulted in 777 items for consideration. Duplicate items (n=122) were deleted, leaving 655 remaining items that were grouped into 20 initial domains. The largest domains were access to care (n=119), physician-patient relationship (n=90), patient self-responsibility (n=67), follow-up (n=56), and diabetes education/professional support (n=50). The 655 potential items were then further reduced to 76 items by grouping like concepts together. These 76 items resulted in 10 domains: 1) access; 2) communication; 3) relationship with healthcare provider; 4) information; 5) regularity; 6) satisfaction; 7) self-responsibility; 8) consistency of care; 9) consistency of provider; and 10) up-to-date standards. The feedback from face validity, content validity, and readability testing was used to further reduce the scale from 76 items to 56 items. Examination of item-to-item correlations for all 56 Diabetes Continuity of Care Survey items resulted in nine items with correlations above 0.70 being deleted. Cronbach’s alpha was 0.92 prior to deleting the above nine items and 0.89 afterwards. All further analyses occurred with the remaining 47 items (Appendix 6).

**The relationship between continuity of care and other outcomes**

There were 342 patients who completed the Diabetes Continuity of Care Survey. There were 136 patients with physician visit data for whom a continuity of care index and continuity of care ratio could be calculated. Patient characteristics are shown in Table 1.
Continuity of Care
The mean (SD) Diabetes Continuity of Care Scale score at baseline was 181.4 (19.6) [Table 2]. The mean (SD) continuity of care index was 0.64 (0.27) and the mean (SD) continuity of care ratio was 0.16 (0.16). No relationships were found among continuity of care measures. The correlation between the Diabetes Continuity of Care Survey and continuity of care index was r=0.15 (p=0.871). The correlation between the Diabetes Continuity of Care Survey and the continuity of care ratio was r=0.13 (p=0.885). The correlation between the continuity of care index and ratio was r= 0.078 (p =367).

Relationships between continuity of care and other outcomes
There was a correlation [r=0.198 (p>0.001)] between the Diabetes Continuity of Care Survey total score and the Good Health Outcomes in Diabetes score (using n=342 sample). There were no correlations found between the continuity of care index and the Good Health Outcomes in Diabetes score. There were some correlations found between continuity of care measures and SF-36 component scores (Table 3). There were some correlations found between continuity of care measures and the Group Health Centre patient satisfaction questionnaire (Table 4).

Does continuity of care affect quality of healthcare?
Increases in continuity of care measured using the Diabetes Continuity of Care Survey were associated with increases in quality of care (p >0.001, r2=0.45). Age, quality of life, status as a native Canadian, income, and gender were not associated with quality of care; these variables were not left in the final regression model. The only variable predicting quality of care was continuity of care as measured by the Diabetes Continuity of Care Survey. Every increase in this score of one (maximum score 235) was associated with an increase in Good Health Outcomes in Diabetes score of 0.02 (95% CI 0.01 to 0.03).

Costs
The average healthcare costs (including hospitalizations, medications, physician visits, injections, laboratory and diagnostic tests, and procedures) per patient with diabetes over a six month period was $2,161.59 (SD $3,711.22) (Table 5). Multiple regression analysis found that differences in continuity of care were not associated with differences in healthcare costs. The only factor that explained differences in healthcare costs was differences in the physical component score of the SF-36 quality of life measure.
Table 1: Patient Characteristics

<table>
<thead>
<tr>
<th></th>
<th>DCCS sample</th>
<th>CCI sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=342</td>
<td>N=136</td>
</tr>
<tr>
<td>Age at start of study (1999)</td>
<td>60.9 (10.6)</td>
<td>63.5 (10.4)</td>
</tr>
<tr>
<td>[mean, SD]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native n, (%)</td>
<td>2.9%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Sex (% female)</td>
<td>47.1%</td>
<td>47.8%</td>
</tr>
<tr>
<td>Mean years with diabetes</td>
<td>9.3 (8.6)</td>
<td>9.4 (8.7)</td>
</tr>
<tr>
<td>Previous MI</td>
<td>11.1%</td>
<td>12.5%</td>
</tr>
<tr>
<td>History of IHD</td>
<td>25.0%</td>
<td>22.1%</td>
</tr>
<tr>
<td>Previous stroke</td>
<td>7.4%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Ex-fee for service physicians</td>
<td>20.5%</td>
<td>50.7%</td>
</tr>
<tr>
<td>Capitated patients</td>
<td>79.5%</td>
<td>49.3%</td>
</tr>
</tbody>
</table>

DCCS is the Diabetes Continuity of Care Survey; CCI is the Continuity of Care Index

Table 2: The Diabetes Continuity of Care Scale

<table>
<thead>
<tr>
<th>Scale Domain</th>
<th>Mean (SD score)</th>
<th>Min-Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care by doctor</td>
<td>51.2 (6.8)</td>
<td>21-65</td>
</tr>
<tr>
<td>Care by other healthcare professionals</td>
<td>43.8 (5.7)</td>
<td>12-60</td>
</tr>
<tr>
<td>Access/getting care</td>
<td>39.7 (5.2)</td>
<td>10-50</td>
</tr>
<tr>
<td>Communication between healthcare professionals</td>
<td>19.3 (2.7)</td>
<td>5-25</td>
</tr>
<tr>
<td>Self-care</td>
<td>27.3 (3.6)</td>
<td>11-35</td>
</tr>
<tr>
<td>Total score</td>
<td>181.4 (19.6)*</td>
<td>59-235</td>
</tr>
</tbody>
</table>

*Maximum score = 235
### Table 3: Correlations between continuity of care and quality of life:

<table>
<thead>
<tr>
<th></th>
<th>DCCS</th>
<th>CCI</th>
<th>CCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF-36 PCS P1</td>
<td>0.031</td>
<td>0.038</td>
<td>0.260**</td>
</tr>
<tr>
<td>SF-36 MCS P1</td>
<td>0.032</td>
<td>0.069</td>
<td>0.033</td>
</tr>
<tr>
<td>SF-36 PCS P2</td>
<td>0.032</td>
<td>0.021</td>
<td>0.249**</td>
</tr>
<tr>
<td>SF-36 MCS P2</td>
<td>0.115*</td>
<td>0.190*</td>
<td>0.044</td>
</tr>
</tbody>
</table>

*p>0.5; **p<0.01

### Table 4: Correlation between continuity of care and patient satisfaction

<table>
<thead>
<tr>
<th></th>
<th>DCCS</th>
<th>CCI</th>
<th>CCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHC CQI 1</td>
<td>0.227**</td>
<td>0.25</td>
<td>0.068</td>
</tr>
<tr>
<td>GHC CQI 2</td>
<td>0.359**</td>
<td>0.228*</td>
<td>0.105</td>
</tr>
</tbody>
</table>

*p>0.5; **p<0.01

### Table 5: Six-month cost per patient (January 1, 2001 to June 30, 2001)

<table>
<thead>
<tr>
<th></th>
<th>Per patient costs ($) over six months [mean (SD)]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=377*</td>
</tr>
<tr>
<td>Physician visits</td>
<td>209.58 (246.52)</td>
</tr>
<tr>
<td>Hospitalizations</td>
<td>643.80 (2743.59)</td>
</tr>
<tr>
<td>Procedures</td>
<td>238.65 (599.08)</td>
</tr>
<tr>
<td>Medications</td>
<td>903.30 (1001.08)</td>
</tr>
<tr>
<td>Injections</td>
<td>1.11 (5.73)</td>
</tr>
<tr>
<td>Laboratory/diagnostic tests</td>
<td>165.15 (382.05)</td>
</tr>
<tr>
<td>Total costs</td>
<td>2161.59 (3711.22)</td>
</tr>
</tbody>
</table>

* from the larger study sample taking part in the diabetes quality improvement initiative (Appendix 1); data for n=28 patients not available
ADDITIONAL RESOURCES
Centre for Health Services and Policy Research
http://www.chspr.ubc.ca/Research/hlthhcutil/contcare.htm
Continuity of care research as part of research on patterns of health and healthcare resource utilization

Brown University Centre for Gerontology and Health Care Research
http://www.chcr.brown.edu/pcoc/Contin.htm
Instruments that measure continuity of care as part of the TIME Toolkit of Instruments to Measure End of Life care

Family Medicine
Volume 36, Issue 1
Issue focuses on process of primary care but contains a number of articles about continuity of care

FURTHER RESEARCH
There are numerous areas related to continuity of care that could benefit from further research. These areas include:

- further exploration into the relationship of conventional continuity of care measures with quality of healthcare measures to better elucidate where conventional measures may be helpful and where they are not helpful. This study did not find that conventional measures of continuity of care were associated with other healthcare outcome measures;
- the measurement of the patient perspective of continuity of care for different medical conditions;
- further refinement and validation of the Diabetes Continuity of Care Survey. The domains generated and tested in this analysis may be generalizable to other chronic health conditions. Further testing and refinement of the survey is needed before it can be more widely implemented;
- a greater understanding of the concept of continuity of care from the perspective of healthcare professionals; and
- exploration of the terms continuity of care, quality of care, and satisfaction with care to improve the clarity of these definitions.
DISCUSSION:
The main findings from the set of studies described in this report show that patients were able to articulate numerous barriers to and facilitators of continuity of care and that patient conceptualization of continuity of care was broader and more comprehensive than traditional definitions of continuity of care. Initial testing of the Diabetes Continuity of Care Survey demonstrated that it has promise as a reliable and valid measure. Although it did not correlate well with traditional measures of continuity of care (continuity of care index and ratio), increases in continuity of care measured by the Diabetes Continuity of Care Survey were associated with increases in quality of care but not with healthcare costs. There were some correlations between the Diabetes Continuity of Care Survey or conventional continuity of care measures and other outcomes, but nothing that was striking except for the correlation between continuity of care as measured by the Diabetes Continuity of Care Survey and patient satisfaction.

Patients indicated that continuity of care consisted of five separate but related factors: 1) access to services; 2) interactions with physician; 3) interactions with other healthcare professionals; 4) personal self-responsibility; and 5) communication. The emphasis on personal self-responsibility by some patients provides a deeper understanding of what patients feel encompasses continuity of care.

Regular visits to healthcare providers were seen as an essential ingredient in maintaining continuity of care. This reinforces the importance of visit frequency but also highlights that frequency and regularity of visits must also coincide with a patient’s life circumstances (that is, seeing their physician when they feel they need to). Interactions with the primary physician were seen as a key factor that enhanced or detracted from continuity of care, which is congruent with existing literature regarding patient-physician relationships.28-31

Additionally, patients emphasized how patient self-care and self-responsibility are integral parts of continuity of care. These recurring comments during the focus group sessions led directly to the inclusion of the self-care domain in the Diabetes Continuity of Care Survey. This domain has not generally been included in previous continuity of care tools. Given that patients with a chronic condition make many healthcare decisions external to the healthcare system and are required to continually and consistently adhere to their decisions to maintain their health, this domain has high face validity for inclusion into a scale measuring continuity of care. Patient self-care is increasingly being recognized as an essential component in the management of diabetes.32-35 Further exploration of the patient notion of self-care across medical conditions and how this integrates and complements the existing care offered by the healthcare system is needed.
The present findings are in keeping with Haggerty et al.’s recent literature review that described two core elements that distinguished continuity of care from other concepts: 1) care of an individual; and 2) care delivered over time, and three major types of continuity of care: 1) relational; 2) informational; and 3) management continuity of care. This review emphasized the experience of care as connected and coherent as a requirement for continuity of care. Another recent review of continuity of care conceptualized continuity of care in terms of three dimensions: 1) informational; 2) longitudinal; and 3) interpersonal continuity of care. Both these comprehensive reviews highlighted the need to consider interactions between patients and their healthcare providers when examining continuity of care. But most relevant is the fact that taken together, these two reviews included four of the five components found in this study, and it was only through discussions directly with patients that the aspect of personal self-responsibility was evidenced.

The Diabetes Continuity of Care Survey did not correlate well with traditional continuity of care indices. This would be expected as these indices only express one component of continuity of care and measure the results using a ratio. A ratio can be misleading, as people with very different experiences can be represented by the same score and people with the same experiences can be represented by different ratios. For example, a person who has one healthcare provider may have two encounters with that provider over a year and experience excellent continuity of care, while someone who has four healthcare providers and sees each of them twice over the same year will not score as well using this type of index, although there are many reasons why they could easily have experienced better continuity of care than the first patient.

The Diabetes Continuity of Care Survey could differentiate between patients who did and did not achieve specific process and clinical indicators of good diabetes care. There was a direct correlation between the measurement of continuity of care using the Diabetes Continuity of Care Survey and the process and outcome of diabetes care such that if the patient rating of continuity was high, so was the score on their process and outcome of care. Increases in continuity of care were associated with increases in quality of care. That is, they were more likely to have had their blood pressure checked, metabolic control, foot and eye exams done, and that the results of their blood pressure and blood tests were in a range indicating better control. The measurement of continuity of care using the Diabetes Continuity of Care Survey could help predict those who are receiving good or poor quality of care and allow healthcare decision makers to focus attention where needed to improve quality of care.
Continuity of care was not associated with changes in healthcare costs. In exploring further the relationship between continuity of care and quality of life, other factors were explored such as age, quality of life, status as a native Canadian, income, and gender. None of these factors was associated with quality of care; only continuity of care remained predicting quality of care.

There were no correlations found among continuity of care measures (Diabetes Continuity of Care Survey, continuity of care index, continuity of care ratio). It is likely the two types of measures (the relative measures [continuity of care index and ratio] and patient perspective measures) address two different approaches to the concept of continuity of care that are sufficiently different from one another such that the results will not be well correlated. Depending on the type of information required and the intent of the evaluator, the continuity of care index may not always provide useful information as a measure of continuity of care or predict changes in quality of care.
REFERENCE LIST


8 Bickman LA. Continuum of Care: More is not always better. American Psychologist 51, 689-701. 1996.


