Defining and Measuring Interpersonal Continuity of Care

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ABSTRACT

BACKGROUND In an effort to learn more about the importance of continuity of care to physicians and patients, I reviewed the medical literature on continuity of care to define interpersonal continuity and describe how it has been measured and studied.

METHODS A search of the MEDLINE database from 1966 through April 2002 was conducted to find articles focusing on the keyword “continuity of patient care,” including all subheadings. Titles and abstracts of the resulting articles were screened to select articles focusing on interpersonal continuity in the physician-patient relationship or on the definition of continuity of care. These articles were systematically reviewed and analyzed for study method, measurement technique, and research theme.

RESULTS A total of 379 original articles were found that addressed any aspect of continuity as an attribute of general medical care. One hundred forty-two articles directly related to the definition of continuity or to the concept of interpersonal continuity in the physician-patient relationship. Although the available literature reflects little agreement on how to define continuity of care, it is best defined as a hierarchy of 3 dimensions; informational, longitudinal, and interpersonal continuity. Interpersonal continuity is of particular interest for primary care. Twenty-one measurement techniques have been defined to study continuity, many of which relate to visit patterns and concentration rather than the interpersonal nature of the continuity relationship.

CONCLUSIONS Future inquiry in family medicine should focus on better understanding the interpersonal dimension of continuity of care.

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INTRODUCTION

Continuity of care is considered to be a defining characteristic of family practice and has been defined by the Institute of Medicine as a core attribute of primary care. Even before the birth of family practice as a specialty, continuity of care was mentioned in the 3 influential reports of 1966 — the Folsom Report, Millis Report, and Willard Report — as a need to be addressed by the new field. For family physicians, continuity implies a longitudinal relationship between patients and those who care for them that transcends multiple illness episodes and includes responsibility for preventive care and care coordination. In the ideal case, this longitudinal relationship evolves into a strong bond between physician and patient characterized by trust, loyalty, and a sense of responsibility.

Changes in American health care during the past 2 decades have undermined the ability of patients to choose and remain with an individual physician. Health plans sometimes change physician panels, which might require patients to change physicians from year to year. Medical groups have become larger and have organized into networks, so that call
arrangements and clinic schedules make personal relationships between individual physicians and patients more difficult than ever to establish and maintain.2-9 As these changes have occurred, there has been disagreement but little informed debate about what might be lost as care becomes more technical and efficient, but less intimate and personal.9-12 What proof is there that lost as care becomes more technical and efficient, but less intimate and personal?9-12 What proof is there that continuous longitudinal relationship improves the quality of health care? What aspects of continuity matter most to physicians and patients?

To learn more about the importance of continuity of care to physicians and patients, a comprehensive literature review was conducted to examine evidence regarding the value of continuity as a characteristic of physician-patient relationships. From the outset, this review was complicated by the lack of consensus regarding how to define and measure continuity. For example, many studies in the nursing literature have studied how information should be transmitted from one nursing shift to another or from hospital nurses to nursing home nurses. Other references address continuity of outpatient medical or psychiatric follow-up after hospital discharge without regard to who actually provides this follow-up. These articles tend to define continuity of care as the availability of clinical information to any provider who cares for the patient. The goal of this review was to examine continuity as a characteristic of the relationship between physician and patient, a concept that may be called interpersonal continuity. Thus, this review was limited to 2 types of articles: those written to define the concept of continuity, and those that address interpersonal continuity in the physician-patient relationship as a characteristic of health care delivery. The purposes of this article are to describe how continuity has been defined and how various investigators have tried to measure interpersonal continuity. A new conceptual definition of continuity is proposed based on this review. Future articles will outline evidence regarding the benefits of interpersonal continuity and will describe what remains to be learned as a research agenda for primary care and health policy researchers.

METHODS

A search of the medical literature from January 1, 1966, to April 30, 2002, was undertaken using the MEDLINE database. A subject search of “continuity of care” generated the medical subject heading “continuity of patient care.” The search was limited to articles focusing on this subject heading, including all possible subheadings. This search produced 2,424 citations in the English language. The titles and reference citations of each of these articles were reviewed, and references were eliminated if they were letters to the editor, if they addressed health professions other than medicine, or if they addressed only aspects of continuity other than interpersonal continuity. Most of these eliminated references focused on communication of information among various health professionals in various settings. Many of the more recent references have focused on the development of comprehensive health information systems in managed care settings. Excluding these articles left 379 citations that appeared to address continuity as an attribute of the relationship between providers and patients in general medical care. I obtained and read full-text copies of each of these articles. In addition, I scanned the bibliographies of each article to find references that were missed by the MEDLINE search.

Following this process, I found 142 articles that directly related to the concept of interpersonal continuity. Forty-one were review articles or theory articles dealing with continuity of care in general. The remaining 101 were original research reports. All of the citations were entered into a bibliographic database. I then classified each by study method, primary research question(s), and measurement technique, and this information was recorded in the database for each article. Study method and measurement techniques were determined by reading the methods section of each article and either recording the method cited by the authors or assigning the method based on its description by the authors. Reading the introduction of each article and recording the author’s stated purpose of the study determined the primary research questions. The database could then be sorted in turn by research question(s), study methodology, and measurement technique.

RESULTS

Fundamental Themes About Continuity of Care

Listing the specific research questions for each reference in the database allowed the questions to be grouped into the 13 categories listed in Table 1 based on the theme(s) of the articles. After the themes were determined, the reference database was updated with information about the theme of each reference, thereby allowing the articles to be sorted in this way. Table 1 also lists the references addressing each broad theme. Some references address more than one theme. To clarify the difference between the concept of broad themes and the specific research questions addressed by each article, Table 2 lists the 17 references that relate to a theme regarding the measurement of continuity of care. The remainder of this article will focus on themes 1 and 2, definition and measurement. Future articles will address the other themes.
### Table 1. Continuity of Care Research Themes

| No. | Research Theme                                                                 | Papers Reviewed No. | Reference Citations |
|-----|--------------------------------------------------------------------------------|---------------------|---------------------|
| 1   | What is the best conceptual definition of continuity?                           | 17                  | 10, 13-28           |
| 2   | What is the best way to measure continuity of care?                            | 17                  | 13, 14, 20-22, 29-40|
| 3   | Are patients who receive interpersonal continuity more satisfied with their care? | 31                  | 12, 14, 16, 33, 41-67|
| 4   | What patient characteristics correlate with choosing an interpersonal continuity model? | 20                  | 36, 44, 46, 48, 49, 51, 52, 58, 62, 68-78 |
| 5   | Is health care better in any measurable way when delivered in interpersonal continuity? | 54                  | 5, 6, 13, 14, 17, 25, 35, 36, 42, 45, 53-56, 60, 61, 64, 66-68, 74, 79-110 |
| 6   | Are physicians more satisfied with practice when an interpersonal continuity model is followed? | 12                  | 14, 16, 42, 52, 53, 55, 61, 62, 67, 111-113 |
| 7   | Is health care less expensive when delivered in interpersonal continuity?       | 20                  | 42, 53, 54, 57, 61, 66, 80, 72, 84, 88, 90-92, 108, 114-119 |
| 8   | Can interpersonal continuity be improved by organizing a practice in a particular way? | 22                  | 12, 17, 33, 46, 52-55, 59, 63, 69, 76, 94, 120-128 |
| 9   | Why do patients leave the care of a physician with whom they have interpersonal continuity? | 13                  | 4-6, 58, 69, 71, 73, 126, 129-133 |
| 10  | What do primary care physicians value regarding continuity of care?            | 21                  | 10, 13, 16, 17, 23, 26, 27, 33, 52, 61, 62, 77, 85, 112, 122, 134-139 |
| 11  | What do patients value regarding continuity of care?                           | 18                  | 16, 17, 33, 44, 46, 49, 51, 52, 59, 60, 62, 65, 69, 70, 104, 131, 136, 140 |
| 12  | Does geographic continuity matter to patients?                                  | 10                  | 28, 41, 70, 79, 80, 135, 141-144 |
| 13  | How are changes in the health care system affecting continuity?                | 16                  | 4-6, 9-12, 61, 76, 114, 120, 133, 141, 142, 144, 145 |

### Theme 1: What is the Best Conceptual Definition of Continuity?

There is little uniformity in how continuity of care has been defined by different authors. Several authors defined multiple dimensions of continuity.2,13-22 Among these dimensions are informational continuity,13,14,21 chronologic or longitudinal continuity,2,13-24 interpersonal continuity,13,18-19,21 23-27 geographic continuity,2,14,19,21 interdisciplinary or team-based continuity,2,10,14,19,21 and family continuity.3,29

Informational continuity implies that each provider caring for a patient has access to comprehensive information about the patient’s previous health care encounters even if different providers in different locations provide the care. There is a huge volume of medical literature about this issue, most of which was systematically excluded from this review. A common methodologic problem in continuity research is confusion about the difference between knowledge of the patient and a relationship with the patient. One can know about a patient by reading a medical history, but knowing a patient’s medical history does not imply any relationship with that patient.

Chronologic or longitudinal continuity of care refers to an ongoing pattern of health care interaction that occurs in the same place, with the same medical record, and with the same professionals, so that there is a growing knowledge of the patient by those providing the care. Longitudinal continuity implies a pattern of visits but does not directly address the nature of the relationship between patient and provider. Interpersonal continuity refers to a special type of longitudinal continuity in which an ongoing personal relationship between the patient and care provider is characterized by personal trust and responsibility.

Geographic continuity relates to care that is provided with continuity regardless of the location of the patient (office, home, hospital, etc.). The volume of literature addressing this type of continuity has increased considerably during the past 5 years as hospitalist programs have developed in many large hospitals.41,79,80,141-144 Interdisciplinary or team-based continuity, also referred to as the conti-
Table 2. References Addressing Theme 2: What Is the Best Way to Measure Continuity of Care?

| Reference                  | Primary Research Question                                                                 |
|----------------------------|-------------------------------------------------------------------------------------------|
| Bice & Boxerman, 1977      | How can continuity of care best be measured?                                               |
| Ejlertsson & Berg, 1984    | How do the quantitative measures of continuity compare with one another?                   |
| Eriksson & Mattsson, 1983  | How can continuity of care be defined and measured?                                         |
| Godkin & Rice, 1984        | How consistent are three measures of continuity?                                            |
| Hansen, 1975              | How can continuity of care be defined?                                                     |
| Magill & Senf, 1987        | How can continuity of care be measured?                                                    |
| Murata, 1993              | How can family continuity be measured?                                                     |
| Patten & Friberg, 1980     | How can continuity of care be measured in a residency program?                             |
| Pereira Gray, 1979        | How can personal patient lists assure ongoing personal care in a group practice?          |
| Rogers & Curtis, 1980      | How can continuity of care best be defined?                                                |
| Roos et al, 1980           | Is objectively measured continuity of care associated with any measurable improvement in outcome quality? |
| Shortell, 1976            | How can continuity of care best be defined and measured?                                   |
| Smedby et al, 1986         | Do various methods of measuring continuity correlate with one another?                     |
| Starfield et al, 1976     | What can be done to improve coordination as measured by recognition of patient information?|
| Steinwachs, 1979          | Do various methods of measuring continuity of care correlate with one another?             |
| Wall, 1981                | How can continuity of care best be defined and studied?                                     |

Longitudinal continuity creates a familiar setting in which care can occur and should make it easier for patients to access care when needed, but it does not assure a relationship of personal trust between an individual physician and patient. Many articles in the primary care literature have addressed the concept of interpersonal continuity, but several different measurement methods have been used, and few conclusions are applicable to health care in general.

By arranging these concepts as a hierarchy, it is implied that at least some informational continuity is required for longitudinal continuity to be present and that longitudinal continuity is required for interpersonal continuity to exist in a physician-patient relationship. This hierarchy does not include the concepts of geographic, interdisciplinary, or family continuity, which can be considered aspects of 1 or more of the 3 basic concepts.

If we define continuity as a hierarchy, then several important researchable questions come into focus. Consider the following examples of such questions: To what extent does a pattern of longitudinal continuity add to the availability of informational continuity about the patient? In an era of electronic medical records and integrated health systems, can enough information be recorded in the electronic record to allow patients to seek care in many different sites without loss of information? What is the relationship between longitudinal continuity and the development of interpersonal continuity? How many times does a patient need to see a physician before the relationship takes hold? If a strong interpersonal continuity relationship exists between physician and patient, for how long and under what circumstances will the relationship tolerate a visit pattern without longitudinal continuity? None of these questions can be addressed if we are not clear about which variable is being considered and measured. Many of the most important questions about continuity of care actually deal with the relationship among these parameters.

Theme 2: How Can Continuity of Care Be Measured?

Although many of the articles included in this review used a measurement tool to quantify continuity, 17
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Table 3. Hierarchical Definition of Continuity of Care

| Level of Continuity | Description |
|---------------------|-------------|
| 1. Informational    | An organized collection of medical and social information about each patient is readily available to any health care professional caring for the patient. A systemic process also allows accessing and communicating about this information among those involved in the care. |
| 2. Longitudinal     | In addition to informational continuity, each patient has a "medical home" where the patient receives most health care, which allows the care to occur in an accessible and familiar environment from an organized team of providers. This team assumes responsibility for coordinating the quality of care, including preventive services. |
| 3. Interpersonal    | In addition to longitudinal continuity, an ongoing relationship exists between each patient and a personal physician. The patient knows the physician by name and has come to trust the physician on a personal basis. The patient uses this physician for basic health services and depends on the physician to assume personal responsibility for the patient's overall health care. When the personal physician is not available, a coverage arrangement assures that longitudinal continuity occurs. |

articles discussed or reviewed the advantages of various measurement techniques (Table 2). Several approaches have been used in designing these instruments. Some have been based on visit patterns only, whereas others have required an individual provider to be defined as the “usual” or “primary” provider for each patient. For example, formulas that measure the concentration of visits with various providers, such as the Continuity of Care Index, do not require a registry that assigns a physician for each patient. These indices simply measure the number of providers seen and reflect a higher continuity score when there are larger numbers of visits with a smaller number of providers. In contrast, other measures, such as the Usual Provider Continuity Index, have been designed to quantify how visit patterns relate to the patient’s assignment to a usual provider.

Some authors have distinguished between visit-based measures and individual-based measures. Doing so has presented a common methodologic problem in designing continuity studies, because many medical offices do not have functional and accurate patient assignment data systems. Some investigators have attempted to overcome this problem by arbitrarily assigning either the first provider seen or the most frequently seen provider as the usual provider. This method might work for studies examining longitudinal care patterns, but these measures might not tell us anything about the nature of the physician-patient relationship. In fact, many of these studies are measuring longitudinal continuity even though they are trying to make inferences about interpersonal continuity.

No studies found in this review were specifically designed to compare visit patterns with the strength of interpersonal continuity, but 31 studies examined the relationship between continuity of care and patient satisfaction. Some of these studies included aspects of the physician-patient relationship, such as duration, loyalty, and trust as part of the assessment of satisfaction, but the focus of these articles was on satisfaction rather than the strength of the relationship. Only 7 studies specifically compared visit patterns to any aspect of patient loyalty or trust. Could it be that a patient might have a strong personal identification with one provider characterized by loyalty and trust, but still see several different providers during the period being examined by a particular study? Is this not what happens when a physician goes on vacation or is absent because of illness?

Table 4 lists various indices that have been created to measure continuity of care and the studies addressing interpersonal continuity that have used each measurement technique. Some of the measurement techniques listed in Table 4 have never been used in any of the studies reviewed in this article. These instruments might have been used in research addressing other aspects of continuity. The mathematical formulas for these instruments can be found in several review articles and texts on this subject.

The measurement tools in Table 4 are separated into 3 groups. The first 12 instruments listed in the table do not require a primary physician to be determined; instead, they examine patterns of visits. Instruments in the second group require a specific individual as the primary provider, although some make this assignment arbitrarily based on visit pattern. For example, the Most Frequent Provider Continuity Index (MFPC) defines the primary provider as the one seen most frequently during the study period, and the Index Provider Identification process defines the first provider seen as the primary provider. Also included in this second group are simple surveys regarding continuity. Some studies have simply asked patients whether they have a usual provider or to report the duration of their relationship with this provider. Others have administered questionnaires to have patients rate their perceptions of continuity.

Measurement instruments in the third group were designed to measure family continuity, a concept that should be important for family medicine. Each of these 3 tools, however, is simply an adaptation of one of the individual measures that examine visit patterns. None of the family continuity instruments were used as a tool...
in any of the articles in this review. In one recent study, Gill et al82 examined family continuity indirectly by comparing the quality of newborn care when babies receive care from the same provider who cared for their mothers with the quality of newborn care when babies receive care from a provider different from the provider who cared for their mothers. Family practice is the only medical specialty that provides primary care to entire family groups through the lifespan. Creative research methods will be required to show the value of this model of continuity. This literature review suggests that few of these tools exist today.

**DISCUSSION**

A recently published report from the Canadian Health Services Foundation has addressed the confusion regarding the definition of continuity of care.146 One

### Table 4. Instruments to Measure Continuity of Care

| Instruments | Interpersonal Continuity References Using This Measure |
|-------------|--------------------------------------------------------|
| **Measures that do not require an assigned provider** | |
| Continuity of Care Index (COC)30,32,34,36,40 | Christakis et al, 2000110<br>Christakis et al, 1999118<br>Flynn, 198556<br>Roos et al, 198058<br>Sloane & Eglehoff, 198335<br>Wasson et al, 198440 |
| Number of Providers Seen (NOP)20 | Raddish et al, 199537<br>Shortell et al, 197749 |
| Sequential Continuity Index (SECON)20,34,37,38,40 | Phillips & Shear, 198438<br>Pilotto et al, 199673<br>Shear et al, 198334<br>Wasson et al, 198440 |
| Likelihood of Continuity Index (LICON)20,34,38 | |
| Likelihood of Sequential Continuity Index (LISECON)20,38 | |
| Herfindahl Index (HH)30,38 | |
| Modified Continuity Index (MCI)21,22 | Gill & Mainous, 199840<br>Gill et al, 2000115<br>Neher et al, 2001124<br>Stumberg & Schatten, 2001100 |
| Modified, Modified Continuity Index (MMCI)31 | Gill & Mainous, 199840<br>Gill et al, 2000115<br>Neher et al, 2001124 |
| Index of Concentration (CON)22,38 | |
| GINI Index of Concentration (GINI)32,38 | |
| K Index (K)24,39 | |
| FRAC Index (FRAC)36 | Roos et al, 198056 |
| **Measures that require an assigned provider** | |
| Usual Provider Continuity Index (UPC)20,31,32,34,36,59,120 | Blankfield et al, 1990113<br>Boss & Timbrook, 2001116<br>Breslau & Haug, 197643<br>Breslau & Reeb, 1975120<br>Comelius, 199727<br>Flocke et al, 19975<br>Forrest & Starfield, 1998128<br>Freeman & Richards, 1994105<br>Freeman & Richards, 199434<br>Freeman & Richards, 199056<br>Goldberg & Dietrich, 1985116<br>Kibbe et al, 1993133<br>Mainous et al, 2001106<br>Mainous & Gill, 199851<br>Roland et al, 198612<br>Smith, 199513<br>Wasson et al, 198440 |
| Modified Usual Provider Continuity Index (MUORC)20,31,32,34,36,59,120 | |
| Likelihood of Usual Provider Continuity (LOUPC)30,32,34,36,59,120 | |
| Duration of relationship14 | Hjortdahl, 199283<br>Hjortdahl & Laerum, 199257<br>Love & Mainous, 199939<br>Mainous et al, 2001106<br>Overland et al, 2001106<br>Wiess & Bluestein, 199648 |
| Rate of provider turnover14 | |
| Most Frequent Provider Continuity (MFPC)40,121 | |
| Index Provider Identification15 | |
| Patient survey, interview, or questionnaire | |
| Measures of family continuity | |
| Family Mean Continuity Index (FMCI)27 | |
| Family Continuity of Care Index (FCOC)27 | |

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of the conclusions of the report is that 3 types of continuity of care should be defined, informational continuity, relational continuity, and management continuity. The first 2 concepts are similar to those outlined in this article. Management continuity, however, is different and is defined as "the provision of timely and complimentary services within a shared management plan."

A careful reading of the report suggests these authors might be talking about care coordination rather than continuity of care in defining this concept. But the Canadian report offers additional ideas about how to simplify and clarify a definition of continuity. The hierarchical definition included in Table 3 has an added advantage when compared with that suggested by the Canadian report, because it focuses our attention on the relationship between these various dimensions.

This review of interpersonal continuity raises some interesting questions. Reviews done more than a decade ago called for more research to address these important questions. Is informational continuity sufficient to assure the kind of health care that patients expect and deserve, or is the personal connection inherent in interpersonal continuity an essential element? If this interpersonal intimacy is further eroded, will the essence of the healing relationship be undermined? How can information technology be used to allow interdisciplinary teams of care providers to provide the highest quality of care? Can interpersonal intimacy and trust be preserved in such a team-based model of care?

Research into continuity remains limited by differing definitions and measurement techniques. It is fine to measure patterns and concentrations of visits if we want to understand longitudinal continuity of care, but to examine accurately the outcomes related to interpersonal continuity will require actual measurement of the variable one is trying to study. Measuring these variables should not be as hard as it seems. Some investigators have simply asked patients to name their primary physicians or to characterize the length and quality of their relationships with their physicians as the independent variable in studies examining outcomes from interpersonal continuity of care. Another important line of inquiry could result from examining how measures of longitudinal continuity relate to the duration and quality of this relationship.

In the final analysis, family physicians should be most concerned with proving that strong, enduring physician-patient relationships improve health care. Visit patterns showing longitudinal continuity are a means to an end, they are not ends in themselves. We need to know more about how visit patterns foster strong interpersonal continuity with time. We will not have clarity about understanding the importance of continuity of primary care until these methodological issues are resolved.

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