

www.chsrf.ca

Defusing the Confusion:

Concepts and Measures of Continuity of Healthcare



Canadian Health Services Research **Foundation**
Fondation canadienne de la recherche sur les services de santé

*...making research work
...pour que la recherche porte ses fruits*

**DEFUSING THE CONFUSION:
CONCEPTS AND MEASURES OF CONTINUITY OF HEALTHCARE**

Final Report

Robert Reid MD PhD^{1,2}
Jeannie Haggerty PhD^{3,4}
Rachael McKendry MA¹

March 2002

Prepared for the Canadian Health Services Research Foundation, the Canadian Institute for Health Information, and the Advisory Committee on Health Services of the Federal/Provincial/Territorial Deputy Ministers of Health

¹Centre for Health Services & Policy Research, University of British Columbia

²Departments of Health Care & Epidemiology and Family Practice, University of British Columbia

³Départements de Médecine familiale & Médecine sociale et préventive, Université de Montréal

⁴Unité de Recherche Evaluative, Centre de recherche du CHUM, Hôpital Notre-Dame

Contents

Main Messages	i
Executive Summary	ii
Concepts of Continuity	ii
Measures of Continuity	iii
Conclusions.....	iv

Context and Background	1
Approach	1
Concepts of Continuity	2
Core Elements	3
Types of Continuity	4
Summary	9
Measures of Continuity	9
Measurement Approaches and Available Tools	10
General Conclusions on Measurement	13
Conclusions.....	15

Reference List

Appendix A - Summary of Abstraction Results

Appendix B - Catalogue of Continuity Measures & Measurement Approaches

Appendix C - Recommendations for Measuring Continuity Within and Across Health Care Sectors

The following are available (in English only) on the CHSRF website (www.chsrf.ca):

Appendix D –Bibliography of Academic and Grey Literature

Appendix E –Abstraction Tool for Systematic Review of Continuity of Care

Appendix F –Search Strategy and Results

Appendix G –Summary of Definitions of Continuity of Care

Appendix H –List of Participants, Workshop on Concepts and Measures of Continuity of Care

Appendix I – Summary, Workshop on Concepts and Measures of Continuity of Care

Main Messages

Continuity of care is how one patient experiences care over time as coherent and linked; this is the result of good information flow, good interpersonal skills, and good coordination of care.

Continuity of care occurs when separate and discrete elements of care are connected and when those elements of care that endure over time are maintained and supported.

Definitions of continuity are often presumed rather than stated, and it is not possible to measure what is not clearly defined.

Continuity of care means different things to different types of caregivers, but all recognize three types: continuity of information, of personal relationships and of clinical management. The type of continuity should be agreed to before discussions or planning begin.

Informational continuity means that information on prior events is used to give care that is appropriate to the patient's current circumstance.

Relational continuity recognizes the importance of knowledge of the patient as a person; an ongoing relationship between patients and providers is the undergirding that connects care over time and bridges discontinuous events.

Management continuity ensures that care received from different providers is connected in a coherent way. Management continuity is usually focused on specific, often chronic, health problems.

Multiple measures are needed to capture all aspects of continuity; no single measure is able to reflect the whole concept. Some measures are more useful in some contexts than others.

More emphasis is needed on the development and application of direct measures of continuity from the patient's perspective and to measure continuity across organizational boundaries.

Measures based on patterns of health service use should be used with caution as indicators of continuity until researchers have tested implicit assumptions that they reflect informational, relational, and/or management continuity.

Executive Summary

When patients receive care from a variety of sources, connecting that care into a smooth trajectory becomes increasingly difficult. Policy reports worldwide urge a concerted effort to avoid fragmentation and enhance continuity of care. But efforts to describe the problem or formulate solutions are hampered because continuity has been defined and measured in myriad ways.

This report was commissioned by the Canadian Health Services Research Foundation, the Canadian Institute for Health Information and the Conference of Deputy Ministers of Health's Federal/Provincial/ Territorial Advisory Committee on Health Services. The mandate was to survey how continuity has been used and measured in order to develop a common understanding of the concept and to recommend measures for health system monitoring. We did a systematic survey of how the phrase "continuity of care" was used in the literature, and then presented the results to 59 researchers and decision-makers in a discussion paper and two-day workshop in June 2001.

CONCEPTS OF CONTINUITY

Continuity of care is conceived differently in primary care, mental-health care, nursing, and condition-specific literature but its meaning is more often presumed than defined. However, there are two core elements and three types of continuity that bridge the domains of health care.

The experience of care by a single patient with his or her provider(s) is the first core element of continuity; the second is that the care continues over time (which is

sometimes referred to as longitudinal or chronological continuity). Both elements must be present for continuity to exist, but their presence alone does not constitute continuity.

There are three types of continuity: *informational continuity*; *relational continuity*; and *management continuity*. These are closely related attributes that vary in importance depending on providers or the process of care. Every discipline has recognized all of these features, and all are important in ensuring high quality care. Continuity can be viewed from either a person-focused or disease-focused perspective.

Informational continuity is the use of information on prior events and circumstances to make current care appropriate for the individual and his or her condition. Information is the common thread that links care from one provider to another and from one health event to another. Information transfer has been most emphasized in nursing literature. Documented information tends to focus on specifics of the health condition, but knowledge about the patient's values, preferences, and social context developed through a stable provider-patient relationship, is equally important and has been most emphasized in primary care and mental-health care.

Relational continuity refers to an ongoing therapeutic relationship between a patient and one or more providers. It not only bridges past and current care, it provides a link to future care. An ongoing patient-provider relationship is highly

valued in primary care, where it translates into an implicit contract of patient loyalty to the provider and ongoing provider responsibility to the patient. Even where there is little expectation of establishing relationships with caregivers, such as homecare and in-hospital care, a consistent core of personnel can give patients a sense of predictability and coherence in their care. In mental health care, sometimes providers take responsibility to maintain contact with patients to ensure relational and management continuity.

Management continuity refers to the provision of timely and complementary services within a shared management plan. Disease-specific literature emphasizes the content of care plans to ensure consistency. Nursing and mental-health literature goes further, emphasizing the importance of consistent implementation, especially when patients cross-organizational boundaries. However, flexibility in adapting to changes in an individual's needs is equally important, especially in mental-health care.

MEASURES OF CONTINUITY

Just as the literature is replete with different concepts of continuity, so it is with ways of measuring them. Most measures were developed with a single aspect of continuity in mind, which means few examine continuity across care settings or professional domains and until recently, little attention has been paid to the patient's perspective.

The vast majority of measures examine the chronology of a patient's contact with healthcare providers over time. Continuity is inferred from the duration of patient-provider affiliation and from the concentration and sequence of care among different providers. The assumption is that enduring contact with a single provider is

linked with stronger relationships, better information transfer and uptake, and more consistent management. However, there is remarkably little evidence for these assumptions. Formal testing of these assumptions should be a research priority before chronological measures can be used as indicators of continuity care.

Measures of informational continuity relate to the availability of documentation, the completeness of information transfer between providers, and to the extent to which existing information is acknowledged or used by a provider or patient.

Relational continuity is usually measured by using either the affiliation between patient and provider, or how long their relationship has lasted as a proxy for continuity. There is a growing impetus to evaluate ongoing relationships by asking patients and providers directly how strong their ties are.

Measures of management continuity focus on the delivery of one aspect of care in the continuum of the management plan, most commonly whether follow-up visits are made when care crosses organizational boundaries. Measures of compliance with management protocols blur the boundary between assessment of continuity and quality of medical care.

Clearly no single measure captures the whole concept of continuity. The choice of one or more measures will depend on the types of continuity that are pertinent in a given context. Existing measures that focus on chronology need to be validated against direct measures from the patient or provider. New measures are needed for continuity across organizational and disciplinary boundaries, in particular for informational and management continuity.

CONCLUSIONS

Continuity is the result of a combination of adequate access to care for patients, good interpersonal skills, good information flow and uptake between providers and organizations, and good care coordination between providers to maintain consistency. For patients, it is the experience of care as connected and coherent over time. For providers, it is the experience of having sufficient information and knowledge about a patient to best apply their professional competence and the confidence that their care is recognized and pursued by other providers.

There are substantial gaps in the range of instruments to measure continuity. This is particularly true of instruments that measure the transfer and use of information (whether medical or contextual) by providers in most care contexts as well as those that measure consistency of care among providers and across organizational boundaries. Many measures have focused on mechanisms thought to foster continuity rather on the direct experience of patients and providers. There was general consensus at the June 2001 workshop that it is premature to recommend any measures for use as wide-scale performance indicators.

Context and Background

Healthcare providers, policy-makers and patients are increasingly expressing concern about fragmentation of care. Rapid advances, new treatments and shifts in care from institutional to outpatient and home settings mean that patients may see an ever-expanding array of different types of providers in a variety of organizations and places; connecting the components into a smooth care trajectory is increasingly difficult.

Recent policy reports and charters worldwide urge a concerted effort to maintain and enhance continuity.¹⁻⁴ In 1998 and again in 2001, with input from more than 500 health-sector stakeholders, the Canadian Health Services Research Foundation, in cooperation with other national bodies, identified continuity of care as a priority for research in Canada.^{5,6}

But efforts to describe the problem or formulate solutions are complicated by the apparent lack of consensus on what is meant by continuity. Some definitions reflect a very restricted view of continuity, while others are so over-inclusive that they encompass almost all aspects of service delivery.⁷ In addition, the methods to measure continuity are varied making comparisons between settings and over time difficult.^{8,9} Appreciation of the need for clarity and consistency in definition and measurement is not new. Barbara Starfield, of the Johns Hopkins University, said over 20 years ago that the lack of a commonly-accepted definition with appropriate measures was getting in the way of understanding the importance of continuity.¹⁰

To add to the confusion, other terms such as ‘continuum of care,’ ‘coordination of care,’ ‘discharge planning,’ ‘case management,’ ‘continuing care,’ and ‘seamless care’ are often used interchangeably with continuity. The overlap between continuity and these terms is not exact; often vague themselves, none captures all the attributes of continuity and some encompass other concepts. In addition, the borders between continuity and other concepts (such as access or quality of care) are often blurred.

This report presents the results of an overview of academic and grey literature¹ and a consultation with researchers and policy-makers to explore different concepts of continuity, their common themes, and measurement approaches. The work was commissioned by the Canadian Health Services Research Foundation, together with the Canadian Institute for Health Information and the Advisory Committee on Health Services of the Conference of Federal/Provincial/Territorial Deputy Ministers of Health for the purpose of gaining consensus on the definition and approaches to measurement of this valued concept.

APPROACH

The results presented here come from a review of the published literature on continuity of care and from a consultation workshop with researchers, content experts, and Canadian policy-makers. The literature review was broad and systematized, with the

¹ Grey literature is material not published in peer-reviewed journals, ranging from newsletters to dissertations.

objective of synthesizing how the term 'continuity of care' is used and measured across the range of healthcare professionals. We restricted our literature search to documents where the principal focus, according to key words, was 'continuity of patient care' or 'continuity.' We did not search for other commonly used synonyms such as case management, care planning, team care, care process, or transitions because our focus was on how the term continuity has been used and measured. This may have limited our identification of pertinent tools developed to measure related concepts.

In addition to identifying scientific publications in the databases, we also systematically searched for grey literature using a variety of commercial databases, web library catalogues, peer-reviewed web sites, Internet search engines, and several in-house databases. After scanning 2,439 titles and abstracts for potential relevance, 583 documents were retrieved and reviewed. Each document was read by one team member and summarized using a data extraction tool. Relevant articles from reference lists were also retrieved and abstracted. All team members read key documents. A summary of the abstraction results is provided in Appendix A.

Because the concept of continuity of care has been defined largely in relation to health disciplines, we initially examined how continuity was conceived (either explicitly or implicitly) in four key areas: primary care, mental health care, nursing care and care for specific conditions. (Ten percent [69] of the received documents fell outside these domains and 4% [21] focused solely on the development of measures.) This exercise highlighted the differences in how the term continuity is used, but also helped us identify common themes that

extended across disciplines. We then categorized the measurement approaches and proposed tools across these common themes (Appendix B).

We presented the results of the literature review in the form of a discussion paper to 59 invited researchers and decision-makers at a two-day workshop held in Vancouver B.C. on June 17 & 18, 2001. After lengthy small-group discussions and plenary sessions, the participants felt it was premature to make specific recommendations about the application of specific performance indicators, but they were able to achieve consensus relating to the principles of measurement and further research needs. (Appendix C)

Appendices D through I (available from the CHSRF website www.chsrf.ca) provide details on our bibliography, abstraction tool, search strategy and results, and various definitions of continuity of care. In addition, a summary and list of participants for the Vancouver workshop on Concepts and Measures of continuity of care are provided.

CONCEPTS OF CONTINUITY

The survey of the literature confirms that 'continuity of care' is conceived differently in primary care, mental health care, nursing, and condition-specific care. Most often, the meaning is presumed rather than defined. Of the 583 documents reviewed, continuity of care was explicitly defined in 32%, implicitly defined in 48% and, in 20%, it was impossible to infer the authors' concept of continuity! Where continuity is not explicitly defined, it's usually treated as a self-evident concept of unquestionable good.

Reliable and valid measurement demands conceptual clarity. Nuances in how continuity is understood translate into a range of measures of continuity that underline differences, while some common ways of measuring continuity cloud conceptual understanding. However, the literature synthesis showed several recurring themes across disciplines. We have broken these down further into two core elements and three major types of continuity. We are aware of few other attempts to examine the concepts of continuity across the different domains of health care.

Core Elements

There are two central elements that define continuity of care and form the base for understanding its three types. Continuity can only exist as an aspect of care:

- that is experienced by an individual; and
- that is received over time.

Both elements must be present for continuity to exist, but their presence alone is not sufficient to constitute continuity. Their importance as core elements lies in their capacity to distinguish continuity from other healthcare processes and to set explicit guidelines for the measurement of continuity.

The first element, care experienced by an individual, emerges as a common theme in the literature and was strongly endorsed by the participants at the workshop, despite the fact it has rarely been identified explicitly as an attribute of continuity. George Freeman of London's Imperial College School of Medicine emphasized at the workshop that care must be *experienced* as smooth and coordinated for continuity to exist. Whether viewed from

the perspective of the provider or the patient, continuity pertains to the interaction between a single patient and one or more providers. While patients' individual experiences with care can be aggregated to the group level — such as doctors' practices, hospital wards or healthcare organizations — continuity is not, fundamentally, a characteristic of providers or organizations.

The core element of the interaction between an individual and health care providers helps distinguish continuity from other concepts that are often used synonymously. For instance, if the focus is on the interaction among providers, then the concept reflects co-ordination and integration not continuity. As Carol Adair, Director of Research at the Alberta Mental Health Board and one of the workshop's invited speakers, said: "Continuity is how patients experience integration of services." By extension, it's also how they experience co-ordination between providers.

The second core element, care provided over time, is sometimes referred to as longitudinal or chronological continuity. Although consistently identified as a *dimension* of continuity¹¹⁻¹³, it is, in fact, essential to it and helps distinguish continuity from other related concepts. For instance, it's time that separates interpersonal communication during a single encounter from relational continuity, which refers to the establishment of a therapeutic relationship. The time frame can vary from relatively short periods, such as a single hospitalization, to open-ended long-term relationships as in primary care or long-term care.

Time is a necessary element for continuity but is not meaningful unless it is linked to the *types* of continuity described below. This point is critical because many

measures focus on just the chronological aspects of care, without directly measuring those aspects of care over time (such as the stability of support or the transfer and use of information) that are known or hypothesized to improve patient outcomes. Unless the mechanisms through which care delivered over time improves outcomes are understood, continuity interventions may be misdirected or inappropriately evaluated.

Types of Continuity

In addition to the necessary core elements of continuity, our review and consultation delineated three types of continuity that capture the essence of the concept: *informational continuity*; *relational continuity*; and *management continuity*. (Figure 1) Barbara Starfield, one of the workshop’s invited speakers, pointed out that each type of continuity can be viewed from a disease-focused or person-focused perspective that highlights distinct aspects of informational, relational, or management continuity.

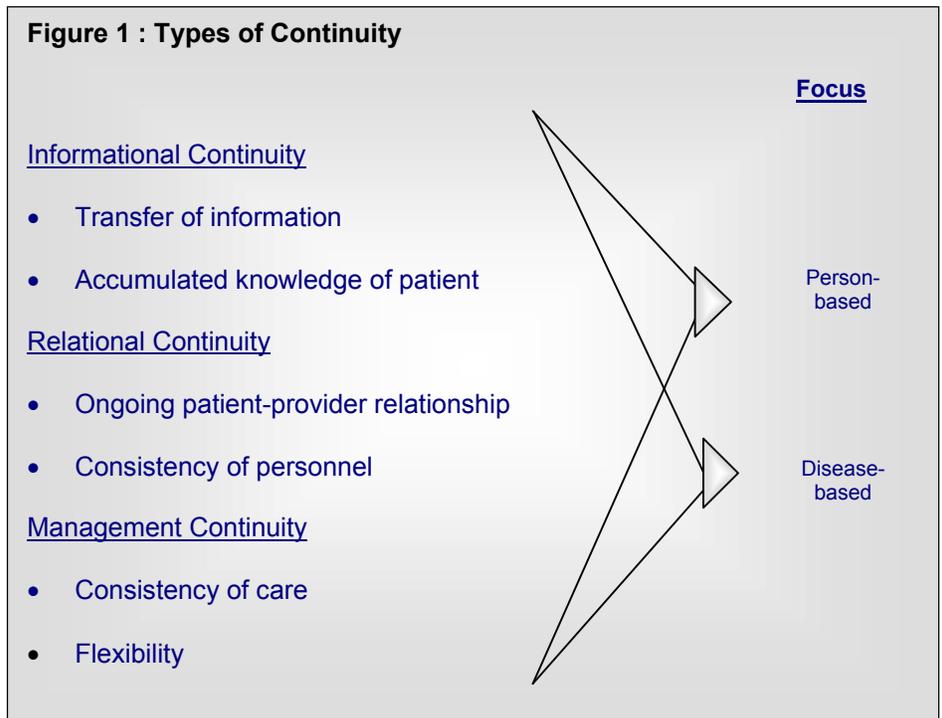
The literature has typically referred to *dimensions* of continuity. However, in our consultations, many people expressed discomfort with the term dimension because the components of continuity are often parallel, closely related concepts that assume a different degree of importance depending on the situation or set of providers. For instance, having information from past health care events (informational continuity) and having a long-term patient provider relationship (relational continuity) are not so much distinct dimensions of continuity as intertwined

processes which link events into a coherent whole.

In order to encourage more focused research and relevant application of measures, we believe that the communication between different disciplines can be improved by specifying the type of continuity under discussion rather than simply using the generic term “continuity of care.”

Informational Continuity

The availability and use of information on prior events and circumstances – be it other visits, laboratory results, referral recommendations, or informal care – is called informational continuity (as Hennen does¹¹). The ways providers use information is critical in relating past healthcare events to present ones and in adapting care to meet patient needs. Information is the common thread linking care from one provider to another, and from one health service to another. Information may be paper-based, electronic



or contained in a provider's memory. Information transfer alone is not sufficient to link components of care; this information must be taken up and interpreted.

Information Transfer

The transfer of documented patient information from one provider to another bridges separate elements of care over time and is a prerequisite for coordination of care.¹⁴ Transferring information becomes more challenging as patients go from seeing the same provider over time, to seeing multiple members of the same team, to seeing multiple providers in different organizations.

Nursing literature puts the most emphasis on information transfer being critical to continuity (especially on inpatient care). Patient care is regularly handed off from one nurse to another, whether in hospital, between the hospital and other settings, or in homecare. Communication is very important to ensure that needs are recognized and care is consistent. Nursing initiatives to improve continuity have most often focused on improving information transfer or communication between nurses. Information transfer and using that information to coordinate care is also emphasized in mental health care, and extends beyond the scope of traditional medical and psychiatric care to a broad range of services such as housing and employment.^{7,15} In primary care, the notion of information transfer is often embedded in emphasis on seeing the same provider over time as one way to facilitate the availability of relevant documented information from one visit to the next and to allow for the accumulation of relevant contextual knowledge.

Accumulated Knowledge

Written documentation tends to focus on the biomedical or problem-related details. Research on information transfer shows that non-medical information about patients (such as personal impressions) are the least likely to be transferred between different care providers and organizations.¹⁶ The participants at the workshop felt it was important to recognize that knowledge about the patient as a person was an equally important mechanism for bridging separate care events and ensuring that services are responsive to the patient's needs. Knowledge of a patient's values, preferences, social context and support mechanisms has an impact on the appropriateness of care plans for the patient, and has been related to higher satisfaction with care.¹⁷

Stable provider-patient relationships lead to providers knowing more about the patient than is written in medical records. The primary nursing approach, where one nurse is responsible for formulating the care plan and coordinating nursing services during a patient's stay, increases this aspect of continuity. The primary nurse's knowledge of the patient is thought to lead to more effective and individualized care.

Relational Continuity

Whereas informational continuity emphasizes linking separate elements of care over time, relational continuity recognizes that sustained contact between a patient and a provider is an undergirding that connects care over time. Seeing the same provider over time encourages informational continuity and is also thought to engender a unique set of benefits such as trust, mutual understanding, and a sustained sense of responsibility toward the patient. It bridges past to current care and provides a link to future care. For instance, in primary care, continuity is facilitated when a patient

knows whom to contact in the event of a new health problem.¹⁸

Ongoing Patient-Provider Relationships

An ongoing relationship between patient and provider helps bridge discontinuous events. The nature of interpersonal relationships between providers and patients, however, depends on the duration and type of care involved. A relationship may arise from a single episode such as an acute-care hospitalization, from specialty medical care for a disease or from long-term comprehensive care such as primary or nursing-home care.

Relational continuity is most emphasized in primary care literature and is often termed provider continuity. Most general physicians understand continuity as an established relationship between a single physician and a patient that extends across illnesses over time.¹⁹ A strong relationship implies that there is a sense of affiliation between patients and their practitioners (“my doctor” or “my patient”). It also implies that patients use their practitioners for most of their needs and that providers have a sense of ongoing responsibility towards them. Indeed, this pattern of patients concentrating their care with a particular provider for long periods has been associated with improvements in care, including better recognition of problems, diagnostic accuracy and medication adherence, as well as reduced hospitalization.¹⁸ However, the mechanisms underlying those benefits remain uncertain. Some researchers have hypothesized that repeated contact gives rise to accumulated medical and contextual knowledge about patients that practitioners store in their memory and medical records.^{20,21} Others believe the benefits of continuous relationships are trust, mutual understanding, effective communication and

ongoing responsibility built over time.²² These notions appear in many descriptions of continuity, but are particularly emphasized in primary and mental-health care.

A strong provider-patient relationship is seen as an unquestioned good in primary care, and is thought to have therapeutic benefit in itself. By contrast, in mental health, where a team approach is often stressed,²⁴ relationships form between patients and several providers.¹⁵ The team approach reduces the risk of patients growing too dependent on a particular provider and is thought to make it easier for others who aren't good at forming close relationships.^{25,26} Nonetheless, stability in providers is important because of the difficulty many mental-health patients have with forming and keeping relationships.

In primary care, relational continuity is often expressed as patient loyalty because visits are largely patient-initiated, making the patient the principal agent of relational continuity; physicians rarely make an effort to contact those who miss follow-up visits. By contrast, mental-health providers view it as their role to be the principal agent of continuity, maintaining contact with patients, monitoring their progress and drawing them back into treatment when necessary. This has been called continuity of contact.⁷ The need for outreach reflects the nature of the chronically mentally ill, who frequently have extreme difficulty negotiating care.¹⁵ Moreover, periodic monitoring is seen as crucial to avoiding the problems of acute instability or crisis that can result when patients lose contact.²⁷

Consistency of Personnel

Consistently seeing the same providers is important even in settings where there is little expectation of establishing

long-term relationships, such as in acute care or homecare. Recent nursing literature emphasizes the importance of “continuity of nurse” and recommends reducing the total number of nurses who provide care to a patient. Having the same nurse is thought to engender consistency of care and responsiveness because the care plan is based on better information.²⁸ Patients, particularly those in fragile health, do not want to repeat their stories and preferences to a multitude of providers, nor become the supervisors of their own care to ensure that care policies are shared and adhered to by different providers. There was a sense among workshop participants that the fragile elderly in particular find it difficult to cope with different people coming to their homes at unpredictable times. Although these patient preferences have not been stated in terms of continuity, their desire for a certain predictability of care relates clearly to relational continuity.

Management Continuity

Continuity is also used to refer to the provision of separate types of healthcare over time in ways that complement each other so required services are not missed, duplicated, or poorly timed. In some disciplines, such as mental health care, the management plan moves beyond traditional medical and nursing care to include social services.

Consistency of care

Creating explicit management plans to ensure consistency during treatment is a recurrent theme in continuity literature. Unlike relational continuity, where the focus is on the patient as a person, management continuity focuses on a particular health problem, particularly those that are chronic or recurrent in nature.

The management plan may cover only one part of an illness — such as a nursing-care plan during hospitalization — or it can span the time from diagnosis through treatment or palliation. Plans for lengthy illnesses are often referred to as a “continuum of care” or “care pathways,” in which the content, timing and sequence of health interventions over time are prescribed. Plans can be for multiple episodes related to the same illness, such as HIV/AIDS, or for managing the different facets of a chronic disease such as diabetes. Management plans are especially relevant when care is delivered by a variety of providers, because goals, treatment approaches and lines of responsibility can be made explicit. The longer the duration of the condition or the more types of care that are required, the more important it is for providers to share a common management plan and adhere to it. Although coordination refers specifically to the interaction between providers — and thus is not strictly continuity — it should result in the patient sensing “management continuity,” which means the care received from different providers is connected in a coherent way.

This type of continuity is most prominent in disease-specific literature, where the emphasis is on the *content* of the plan, with relatively little attention paid to the mechanisms for communicating and implementing it. Defining an appropriate care pathway for a given condition is a prerequisite for management continuity, but it doesn’t become continuity unless that path is consistently followed.

Nursing and mental health literature put the emphasis on consistent implementation of plans. The most quoted definition of continuity in nursing literature exemplifies the emphasis on delivery:

“continuity is an even flow or progression of care from one nurse to another, from one shift to another, and from one discipline to another”.²⁹ An underlying care plan is implicit in “even flow” and information transfer is critical to maintaining the progression.

The transition from one setting to another is a common breaking point in management continuity, hence the prominence of discharge planning literature on continuity. More than any other health profession, nurses have assumed responsibility for transition of patient care between settings, typically from an acute-care hospital to a homecare nurse or to informal caregivers. Discharge planning is increasingly done by a hospital-based liaison nurse, who has more knowledge of non-hospital care than ward nurses and can bridge the gap between different settings.

Use of the term continuity in mental-health care emphasizes the need to connect treatment interventions, both short and long-term, into a coherent care strategy, sometimes referred to as continuity of treatment or service.^{13;30;31} For a successful transition from inpatient care to community mental-health services, Tessler suggests that patients need care plans with shared goals and approaches, which include follow-up by community providers shortly after discharge.

In mental health, the particular demands of coordinating services from various sources and tracking patients over time has led to the idea of case managers. They do a variety of things, from brokering medical and non-medical services to providing direct care. They are a point of stability in a complex of care. In mental health, the ideas of continuity and case management are closely entwined, leading

Bachrach to suggest “case management [is] the vehicle for putting the ideology of continuity of care into practice”.³² The idea of a case manager has many of the elements of relational continuity, but the role of the case manager is most often seen as related to management continuity. Their function differs from one setting to another ranging from brokering medical and non-medical services to providing direct care. In all models they are a point of stability in a complex of care.

Flexibility

Mental-health patients require particularly flexible care plans to allow for changes in patient needs and circumstances. Bass & Windle^{27;33} refer to continuity as “relatedness between past and present care in conformity with the client’s therapeutic needs” with an emphasis on *individualized* care plans. Outreach and on-going monitoring are important to adapt the care strategy to the changing needs of the patient. The emphasis on providers’ maintaining contact with patients has led to the inclusion in mental health literature of access as a feature of continuity; however these actions relate more to ensuring that management goals are adapted and met rather than facilitating entry to the health care system.

Although flexibility is not mentioned explicitly in other disciplines as a key feature of continuity, it is implicit in the emphasis that nurses place on frequent assessments of patient need and the development of individualized care plans. It is also implicit in primary care where an important part of provider autonomy is the adaptation of care protocols to the specific needs, context and values of individual patients. Flexibility should be intrinsic to any care strategy that extends over long period of time, whether it is adapting care to changes in the life cycle, such as the

transition from pediatric to adult care, or changes in the functional status of chronically ill patients, or changes in the management goal, such as moving from treatment to palliation.

Summary

There are two core elements and three types of continuity that are commonly understood as aspects of continuity of care. The core elements that form the base for understanding all types of continuity are care that is received and experienced by an individual and care that is provided over time. The three types of continuity are: informational continuity (the transfer and use of information concerning various elements of care as well as accumulated knowledge of contextual factors); relational continuity (the maintenance of patient-provider relationships over time and consistency of personnel); and management continuity, which is the provision of timely and complementary services that are responsive to changing needs. These features can be viewed as being person-focused or disease-focused, and the feature of continuity that is salient will depend on the situation. In primary care and mental-health care, the emphasis is on person-focused features of continuity such as ongoing provider-patient relationships, knowledge of the patient, and flexibility. In acute care and specialty ambulatory care, the salient features are information transfer and consistency of management plan over time.

MEASURES OF CONTINUITY

In addition to clarifying its definition, the objectives of this project were to catalogue tools and approaches available for measuring continuity, to recommend contexts where they may potentially be applied and to identify areas where further development or refinement of measures is

needed. The general consensus from the literature and the workshop was that continuity of care is a concept with many attributes. It follows that multiple measures are needed to fully capture the idea. Valid and reliable measurement is needed for two reasons — first, for research, such as studying the influence of continuity on specific outcomes and the trade-offs that improving continuity brings. Its second main use is for monitoring performance and quality assurance. Healthcare payers, providers and patients are seeking to monitor and improve this most salient feature of care.

Our review found literature replete with measures that have been proposed, applied, and modified for a variety of settings. For the most part, these measures were developed to examine a single aspect of continuity in a single context. There is a dearth of tools that examine continuity across care settings and across professional groups.

Many measures are indirect and are built on untested assumptions about associations with the underlying concepts of continuity discussed above. The most commonly used tools tend to focus on chronological aspects of care. These measures have been criticized because they appear far removed from the day-to-day impressions of continuity by patients and their caregivers.³⁴ Until recently, there has also been little attention to measuring patient perspectives of continuity. Relatively little is known about how patients perceive different aspects of the ‘smoothness’ of their care and the stability of those perceptions and preferences over time.

This section is divided into two parts: the first briefly summarizes the measures identified in the literature review

focusing on the types of continuity discussed above. Appendix B provides a detailed description of these measures and details their use in primary care, nursing, mental health care, and condition-specific care. The second section discusses the recommendations arising from the workshop and identifies key research needs.

Measurement Approaches and Available Tools

Chronological Measures

The vast majority of measures for continuity of care examine features of the chronology of a patient's contact with healthcare providers. Features looked at include the duration and frequency of the contact between patient and provider, the concentration of care among multiple providers, and the sequencing of care. In keeping with our contention that continuity refers to how an individual patient experiences care over time, these measures are usually applied at the level of the individual and may be aggregated to the provider or organizational level to give provider- and system-oriented perspectives.

While many have delineated chronology as a separate dimension of continuity, we believe that it is not a distinct concept, but rather a proxy for the underlying types of continuity discussed above. We believe the use of chronological measures as valid indicators of continuity is justified only if aspects of chronology of care are strongly related to one or more types of continuity.

Duration and Intensity of Patient/Provider Affiliation

The earliest chronological measures focused on the duration and/or frequency of the contact with a provider (or group of providers) identified as a patient's regular

provider. The appeal of this approach lies in its simplicity and the fact that the necessary data are readily available from administrative sources. These measures have been used in primary care, nursing, and mental health care.³⁵⁻³⁷ Their use is based on the assumption that enduring or repeated contact with a single provider is linked with stronger relationships, better information transfer and uptake, and more consistent management. However, there is remarkably little evidence for these assumptions. Freeman and Hjortdahl caution that seeing the same provider over time for most of their care does not necessarily produce a trusting and committed relationship.²³

Furthermore, the measures focus on a single provider (or provider group) and do not take into account the care provided by others. We regard these measures as insufficient and potentially misleading gauges of continuity when used alone.

Concentration of Care among Different Providers

In the last two decades, over a dozen indices have been developed to assess how care is concentrated among the different providers that a patient sees. The simplest approach is to count the number of different providers (usually of the same discipline) with whom a patient had contact during an episode of care or a specified time interval. This approach has found particular application in settings where many providers are involved in the care of patients such as in-hospital nursing. Counting the number of providers is considered a relatively crude approach to measuring the dispersion of care since it ignores the relative intensity of care provided by different practitioners.

Other measures have been developed to assess the concentration of care, including the commonly used Usual Provider of Care

(UPC) index³⁸ and the Continuity of Care (COC) index³⁹. The UPC measures the proportion of visits with a usual provider over a given period of time. This index is applied to a patient's self-identified regular or personal provider, or, if that's not known, to the one seen most often.⁴⁰ Although it is often assumed to measure the strength of the relationship dimension of continuity, there is only limited evidence to support this contention.^{41;42} The main advantages of the usual provider of care measure is its wide use, intuitive appeal, and ease of application; its chief downside is the fact that its values are affected by utilization levels, yielding spuriously high scores for low-users. It's been widely applied in primary care but variants have also been recently been applied in mental health care, primary care nursing, and cancer care.⁴³⁻⁴⁵

The continuity of care index performs well mathematically, accounts for the number of different providers seen, and can be adapted to capture aspects of the coordination of care by attributing referral visits back to the referring provider. However, unlike the UPC it is not simple to calculate, lacks easy interpretation, and may mask markedly different visit patterns. In most studies of general practice populations, researchers have found the UPC and COC indices to be highly correlated and thus the simpler UPC is often preferred. Other measures of concentration of care have also been proposed, including those that adjust for provider supply,⁴⁶ total number of encounters,⁴⁷ and the order that care is provided.⁴⁸ Several visit-based concentration measures also been developed⁴⁹ while others have been fashioned specifically for populations.⁵⁰ In general, these additional measures have theoretical advantages but they have not been thoroughly validated and/or widely applied.

Sequential Care

Numerous measures have been developed to assess patients' consecutive visits with the same provider or provider group. The best known measure is the Sequential Continuity Index (SECON)⁴⁶ which measures what proportion of consecutive visits are with the same provider. With its emphasis on the order of care, it is theoretically most useful for estimating the need for information transfer between professionals or provider organizations over time.¹⁸ Sequential continuity has been associated with some good outcomes⁴⁴ but there is little understanding of how it relates to informational continuity or the other underlying concepts.

Measures of the Informational Continuity

Measures of informational continuity can generally be divided into two types — measures relating to the transfer of information from one provider to another and measures relating to the uptake and use of that information by subsequent care providers. The conference attendees generally agreed that while information transfer and uptake is an essential feature of continuity across healthcare settings, measures in this type of continuity are among the least developed.

Information Transfer

The most common method for measuring information transfer is to examine whether pertinent information is recorded (on paper-based or electronic records such as medical charts, referral forms and discharge plans) and then whether it is transmitted between providers or organizations.⁵¹⁻⁵⁴ This type of measure is most common when a patient is formally moved from one organization or level of care to another — for example from hospital

to homecare. Because information is often conveyed directly from one healthcare worker to another, rather than by use of charts and records alone, information transfer is sometimes inferred when discharge planners or case managers are involved in a patient's care.^{55;56} The assumption is that if they are present at a point of care, then information has been transferred and integrated. Again, this assumption has not been verified. Similarly, verbal communication between providers⁵⁷ and visit by a provider to patients in different care contexts⁵⁸ are also taken as evidence of information transfer.

Uptake and Use of Information

Since informational continuity is only achieved when information on past healthcare events is actually used in dealing with a current one, evidence that shows only that information has been transferred is insufficient to measure informational continuity. A more sophisticated approach examines whether providers are aware of what occurred previously and how this affects current care. In the past, researchers have examined medical records for evidence that prior problems, laboratory tests, and visits were acknowledged or followed-up.^{51;59} More recently, measures have included asking primary-care and mental-health patients directly whether their prior records were available when they met with their healthcare provider; whether the provider was aware of other visits, whether referral documents were completed and used and whether problems identified at previous visits were followed up.^{41;60-62}

Measures of Relational Continuity

Many researchers question whether prolonged or concentrated care with a single provider (or team of providers) actually indicates the strength of the therapeutic relationship between patient and provider.

Can chronological measures alone reflect good communication, a sense of ongoing responsibility and the accumulation of medical and contextual knowledge? As a result, there has been a growing impetus to measure these interpersonal attributes by *directly* asking patients and/or providers.

Affiliation

Affiliation is the most commonly used measure of relational continuity, particularly in primary care.⁶³⁻⁶⁵ In its most simplified and commonly applied form, patients are asked whether they have a "regular" or "personal" physician or other provider; if they do, they are presumed to have an ongoing relationship with a provider. A more refined approach, named affiliation, assumes that if patients are able to name their provider, they are more likely to have an established relationship. In health systems where patients voluntarily enroll with providers, registration records are often used as a proxy for affiliation.⁶⁶ Affiliation is also a common measure of continuity in maternity care. Patients are asked whether they know the provider who gave prenatal, intrapartum, and post-partum care and whether it was the same person throughout.⁶⁷ While simple affiliation is clearly a component of relational continuity, there was general consensus at the workshop that other measures are required to fully capture this type of continuity.

Strength of Patient-Provider Relationships

In addition to asking patients and providers if ongoing relationships exist, researchers inquire directly about the strength of interpersonal relationships including the levels of communication, trust, comfort, and overall knowledge about a patient's medical history, behaviour, attitudes, preferences, and social circumstances. The simplest of these measures is to globally rate how well

patients know their provider or vice versa. While simple, this measure has been linked to increased compliance with medication,⁶⁸ as well as improved ability on the part of patients to cope with illness⁶⁹ and facilitation of diagnosis and management.¹⁷ A variety of other, more sophisticated, tools are also available. The “Perception of Continuity” scale contains a subscale measuring aspects of knowledge, trust, comfort and other relational attributes.⁴² Three recently-developed tools measure this dimension as part of an overall assessment of the quality of primary care. The “Components of Primary Care” index measures the patient's preference for being seen by their personal physician, trust in the physician, and the extent to which the patient feels known.⁴¹ The “Primary Care Assessment Tool” measures the patient's perception of the listening and communication skills of the provider and the extent to which the patient is known as a person.⁷⁰ Similarly, the “Primary Care Assessment Survey” assesses the relationship through three subscales: interpersonal treatment (the provider's patience, friendliness, caring and respect), the trust in the provider and the extent to which the patient feels known.⁶² In mental-health care, the recently developed “Alberta Continuity of Services Scale for Mental Health” contains a similar subscale measuring aspects of the patients’ confidence in and communication with their mental health care providers.⁶⁰

Measures of Management-Plan Continuity

A final dimension of continuity is the consistency of approach to managing a patient's illness or condition. Continuity is measured by the extent to which care is given in the correct sequence, at the proper time and in the clinically appropriate manner. It is difficult to measure continuity across the entire clinical continuum, and

most measures focus on specific critical points.

Prescribed Follow-up

One of the more commonly used measures is whether follow-up visits occur as scheduled, or, alternatively, the time to follow-up. Most often this approach is used to examine care that crosses care boundaries. Follow-up visits are only one small aspect of continuity but they are critical measures in mental-health care, where adequate follow-up after discharge has been linked to improved outcomes.¹³

Consistency of Care across Providers

The most common way to measure consistency of care is to examine how closely management protocols for specific diseases are followed when a patient's treatment spans various settings and providers. The focus is almost always on a single aspect of the management plan, such as ensuring early rehabilitation for stroke patients. In these cases, the distinction between continuity and quality of medical care measures is often blurred.

General Conclusions on Measurement

At the conclusion of the workshop, we had reached a general consensus on key issues about the measurement of continuity of care. However, our original intention to recommend particular measures for application in various settings was clearly premature. There was strong agreement that new measures are needed and the role of existing measures must be clarified for the key components of continuity to be measured accurately. The following are the general recommendations generated from the workshop. More specific recommendations about measures used in

different types of care are provided in Appendix C.

1. Multiple measures are required to capture all the concepts of continuity. No single measure or measurement approach is able to reflect the whole concept.

Since there are many different aspects to continuity of care, multiple measures are required to capture the concept as a whole. The general consensus was that the three underlying aspects of continuity – interpersonal, informational, and management continuity – are germane to most, if not all, health care settings in varying degrees.

2. Some measures are more useful in some contexts than others.

Because some aspects of continuity are more relevant to some types of care than others, it follows that some measures will be more useful in some contexts. For instance, measures of relational continuity may not be as pertinent to hospital care as informational continuity. Conversely, management continuity is particularly relevant in mental health care and disease management. Since the types of continuity differ in important ways across care contexts (such as the types of information transferred and management plans generated), context-specific measures are likely needed to account for these nuances.

3. New measures are needed, especially for cross-boundary and informational continuity.

The conference attendees agreed that the available tools are insufficient to measure continuity. In particular, there are relatively few valid measures of information transfer and care consistency, especially across organizational and disciplinary boundaries.

Measures are needed that capture continuity in a patient's care trajectory across different disciplinary groups, organizational structures and sites. In particular, since hospital stays have become shorter with more care moved to ambulatory and home settings, better methods are needed to evaluate information transfer and consistency of care among hospitals, homecare agencies, and primary-care providers. In mental health, there is the added need to extend these measures to services provided by social agencies. Measures are needed that go beyond simply measuring availability and flow of information to measuring how it's taken up and used to improve health. Conference attendees agreed that both qualitative and quantitative methodologies are needed to develop meaningful measures.

4. More emphasis is needed on the development and application of direct measures from the patient's perspective.

Where possible, continuity should be measured from the patient's perspective. Not only will this permit greater understanding of the aspects of continuity critical for different patient groups and care settings, but by comparing them with existing chronological measures, researchers and decision-makers will gain more understanding of how and when the existing chronological measures should be used. Such comparisons will help clarify untested beliefs about the association between existing measures and the underlying constructs. In order to design and evaluate continuity interventions, there was clear consensus from the conference that more knowledge is needed about what the existing measures of continuity are actually measuring.

5. The role of chronological measures requires clarification.

The conference attendees were also in general agreement that it is important to retain, and if necessary adapt, selected chronological measures given their wide acceptance and administrative feasibility for large populations, particularly for region-wide reporting of continuity. However, caution should be used interpreting these measures until we have a clearer understanding how they work. We also need to know more about their value in measuring continuity in contexts other than those for which they were developed.

6. Measures are needed for continuity of care by teams.

Most available measures focus on the individual provider as the agent of continuity. Current trends in healthcare require broadening the focus of continuity measurement to the multi-disciplinary team level. This requires a deeper understanding of the interplay among patients and team members, how medical and contextual knowledge is transmitted among team members, and how teams collaborate to provide flexible and consistent care.

CONCLUSIONS

Continuity is the result, over time, of adequate access to care for patients, of good interpersonal skills by providers, of good information flow and uptake between providers and organizations, and of good care coordination between providers to maintain consistency. Continuity is the product of stable provider-patient relationships, the use of relevant information on previous care, and a application of consistent strategies to manage health problems. Continuity consists of bridging separate and discrete elements of care (e.g., care from different providers or different

episodes of illness) as well as maintaining and supporting elements that endure over time, such as disease management plans and stable provider-patient relationships. Doing so is increasingly challenging as the elements are provided by more people or organizations and as they relate to different health concerns.

Mechanisms to improve continuity — including co-ordination and collaboration between providers, discharge planning and patient rostering — do not in themselves equate to continuity. For continuity, these mechanisms must translate into care being experienced as connected and coherent over time for individual patients. The experience of continuity can be viewed from the patient or provider perspective. For patients and their families, the experience of continuity relates to their perception that providers know what happened before, that different providers agree on a management plan and that a provider who knows them will care for them in the future. For providers, the experience of continuity is their perception that they have sufficient information and knowledge about a patient to best apply their professional competence and that their care inputs are recognized and pursued by other providers.

To date, many of the measures of continuity have focused on mechanisms thought to foster continuity rather than measuring the experience of patients and providers directly. These measures may indeed be promising as indicators of continuity or discontinuity, but they need to be tested against direct experience before being used for monitoring the continuity of care by providers and systems. The pursuit of experienced continuity is not an end in itself; priority should go identifying and measuring those elements of continuity that

are associated with better health, greater satisfaction or better cost-effectiveness.

Our synthesis and consultation found three main deficits in current measures: first, measures have historically been discipline-specific and reflect providers' concepts of continuity. It is time for patient's perspective to become a priority for measurement. Several new instruments have recently been developed to do that and should be tested and applied in Canada. Second, existing measures concentrate on chronological aspects of care, while little is known about how they relate to information, relational and management continuity. These measures should be used cautiously until we have a clearer understanding of the effects of these relationships. Third, there are substantial gaps in the range of instruments available, especially for measuring transfer, uptake and use of information, whether medical or contextual. Similarly, there are few tools to measure consistency of care, especially across organizational boundaries. There was

general consensus at the workshop that more research is needed on developing new measures and validating and adapting old ones before a comprehensive set of performance indicators are recommended.

When providers or researchers from different disciplines discuss continuity, misunderstanding and confusion will persist until there is additional clarification of the types of continuity. For instance, in expressing concerns about continuity of discharged patients, a nurse may be referring to inadequate transfer of information about the in-hospital care to the new caregiver. A family physician may be thinking about disruption of the established therapeutic relationship with the patient, and a specialist may be worrying about compliance with the management protocol by other providers. Both disease- and person-focused features of continuity are important to the patient's experience of being appropriately cared for over time. The achievement of continuity is an active process; both patients and providers have roles to play.

Reference List

1. World Health Organization. The Ljubljana Charter on Reforming Health Care. <http://www.who.dk/cpa/charter.htm> . 6-19-1996. 2-4-2001.
2. Institute of Medicine. Primary Care: America's Health in a New Era. Washington,DC: National Academy Press, 1996.
3. NHS Service Delivery and Organization National R&D Programme. National Listening Exercise: Report of the Findings. 1-2-2000. London, UK, NHS Service Delivery and Roganization National R&D Programme.
4. Rubenstein LV, Fink A, Yano EM, Simon B, Chernof B, Robbins AS. Increasing the impact of quality improvement on health: an expert panel method for setting institutional priorities. *Joint Commission Journal on Quality Improvement* 1995;**21**:420-32.
5. Canadian Health Services Research Foundation. 2001 Open grants competition: call for letters of intent. http://www.chsrf.ca/english/programs/OGC2001loi_e.html#3 . 2000. 2-4-2001.
6. Canadian Health Services Research Foundation. Listening for direction: a national consultation on health services and policy issues. Joint Report of the Advisory Committee on Health Services of the Conference of Federal/Provincial/Territorial Deputy Ministers of Health, the Canadian Coordinating Office for Health Technology Assessment, the Canadian Health Services Research Foundation, the Canadian Institute for Health Information, and the Institute for Health Services and Policy Research, Canadian Institutes for Health Research. 2001.
7. Johnson S, Prosser D, Bindman J, Szmukler G. Continuity of care for the severely mentally ill: concepts and measures. *Soc Psychiatry Psychiatr Epidemiol* 1997;**32**:137-42.
8. Dietrich AJ, Marton KI. Does continuous care from a physician make a difference? *J Fam Pract* 1982;**15**:929-37.
9. Wall EM. Continuity of care and family medicine: definition, determinants, and relationship to outcome. *J Fam Pract* 1981;**13**:655-64.
10. Starfield B. Continuous confusion. *Am J Public Health* 1980;**70**:117-9.
11. Hennen BK. Continuity of care in family practice. Part 1: dimensions of continuity. *J Fam Pract* 1975;**2**:371-2.
12. Baker F, Vischi T. Continuity of care and the control of costs: can case management assure both? *J Public Health Policy* 1989;**10**:204-13.

13. Sytema S, Burgess P. Continuity of care and readmission in two service systems: a comparative Victorian and Groningen case-register study. *Acta Psychiatr Scand* 1999;**100**:212-9.
14. Starfield B, Simborg D, Johns C, Horn S. Coordination of care and its relationship to continuity and medical records. *Med Care* 1977;**15**:929-388.
15. Test M. Continuity of care in community treatment. *Ment Health Serv* 1979;**2**:15-22.
16. Anderson MA, Helms LB. Talking about patients: communication and continuity of care. *J Cardiovasc Nurs* 2000;**14**:15-28.
17. Hjortdahl P. The influence of general practitioners' knowledge about their patients on the clinical decision-making process. *Scand J Prim Health Care* 1992;**10**:290-4.
18. Starfield BH. Primary Care: Balancing Health Needs, Services and Technology. New York, NY: Oxford University Press, 1998.
19. Freeman G. Priority given by doctors to continuity of care. *J R Coll Gen Pract* 1985;**35**:423-6.
20. Rogers J, Curtis P. The concept and measurement of continuity in primary care. *Am J Public Health* 1980;**70**:122-7.
21. Hjortdahl P, Borchgrevink CF. Continuity of care: influence of general practitioners' knowledge about their patients on use of resources in consultations. *BMJ* 1991;**303**:1181-4.
22. Banahan BFJ, Banahan BF. Continuity as an attitudinal contract. *J Fam Pract* 1981;**12**:767-8.
23. Freeman G, Hjortdahl P. What future for continuity of care in general practice? *BMJ* 1997;**314**:1870-3.
24. Torrey EF. Continuous treatment teams in the care of the chronic mentally ill. *Hosp Community Psychiatry* 1986;**37**:1243-7.
25. Quartier F. ["Continuity". Progress of a team in today's psychiatry]. [French]. *Ann Med Psychol (Paris)***144**:931-40.
26. Lamb HR. Therapist-case managers: more than just brokering services. *Hosp Community Psychiatry* 1980; **31**:762-3.
27. Bachrach LL. Continuity of care for chronic mental patients: a conceptual analysis. *Am J Psychiatry* 1981;**138**:1449-56.
28. Piette JD, Weinberger M, and McPhee SJ. The effect of automated calls with telephone nurse follow-up on patient-centered outcomes of diabetes care: a randomized, controlled trial. *Med Care* 38, 218-230. 2000.

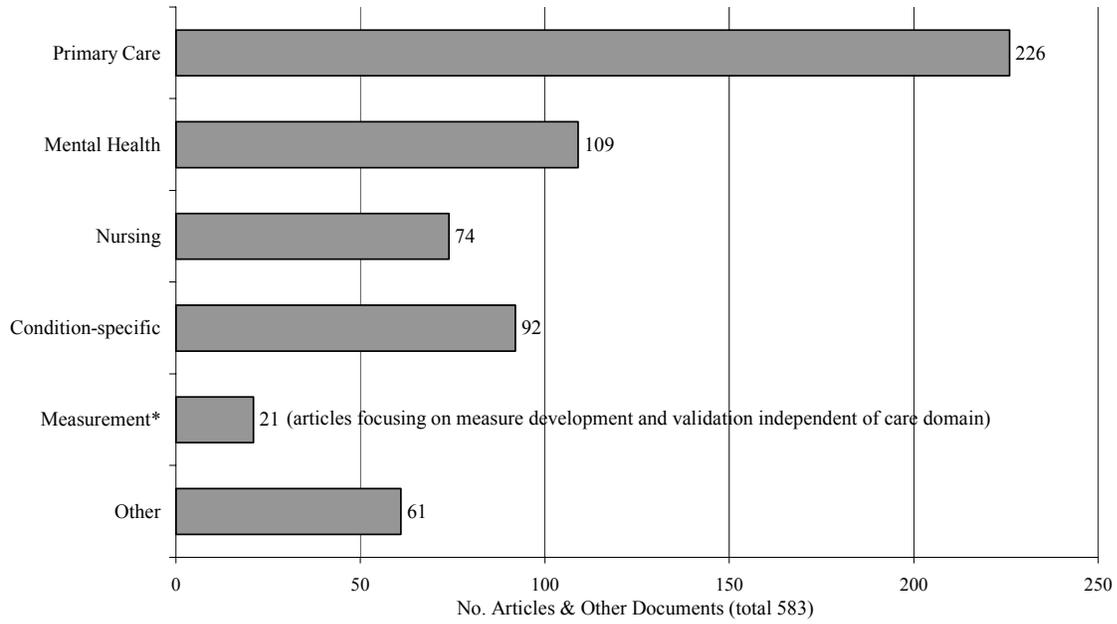
29. Bower FB. *The Process of Planning Nursing Care*. St. Louis, MO: Mosby, 1972.
30. Tessler R, Mason JH. Continuity of care in the delivery of mental health services. *Am J Psychiatry* 1979;**136**:1297-301.
31. Barbato A, Terzian E, Saraceno B, Montero Barquero F, Tognoni G. Patterns of aftercare for psychiatric patients discharged after short inpatient treatment. An Italian collaborative study. *Soc Psychiatry Psychiatr Epidemiol* 1992;**27**:46-52.
32. Bachrach LL. Spotlight on Canada. *Hospital and Community Psychiatry* 1993;**44**:931-3.
33. Bass RD, Windle C. Continuity of care: an approach to measurement. *Am J Psychiatry* 1972;**129**:110-5.
34. Ware NC, Tugenberg T, Dickey B, McHorney CA. An ethnographic study of the meaning of continuity of care in mental health services. *Psychiatr Serv* 1999;**50**:395-400.
35. Kao AC, et al. Effects of choice, continuity and payment method. *J Gen Intern Med* 1998;**13** :681-6.
36. Bostrom J, Tisnado J, Zimmerman J, Lazar N. The impact of continuity of nursing care personnel on patient satisfaction. *J Nurs Adm* 1994;**24**:64-8.
37. Casadebaig F, Quemada N. Mode et durée des prises en charge d'une clientèle de secteurs psychiatriques publics. / Method and duration of treatment of clients in public mental health facilities. *Evolution Psychiatrique* 1992;**57**:213-23.
38. Breslau N, Reeb KG. Continuity of care in a university-based practice. *J Med Educ* 1975;**50** :965-9.
39. Bice TW, Boxerman SB. A quantitative measure of continuity of care. *Med Care* 1977;**15**:347-9.
40. Ejlertsson G, Berg S. Continuity-of-care measures. An analytic and empirical comparison. *Med Care* 1984;**22**:231-9.
41. Flocke SA. Measuring attributes of primary care: development of a new instrument. *J Fam Pract* 1997;**45**:64-74.
42. Chao J. Continuity of care: incorporating patient perceptions. *Fam Med* 1988;**20**:333-7.
43. Gray R, Smedley N. Assessing primary nursing in mental health. *Nursing Standard* 1998;**12**:35-8.
44. Chien CF, Steinwachs DM, Lehman AF, Fahey M, Skinner EA. Provider continuity and outcomes of care for persons with schizophrenia. *Ment Health Serv* 2000;**2**:201-11.
45. Mor V, Rice C. Physician use among patients receiving cancer chemotherapy. *Cancer* 1993;**71** :219-25.

46. Steinwachs DM. Measuring provider continuity in ambulatory care: an assessment of alternative approaches. *Med Care* 1979;**17**:551-65.
47. Magill MK, Senf J. A new method for measuring continuity of care in family practice residencies. *J Fam Pract* 1987;**24**:165-8.
48. Lou WYW. A new measure for continuity of care: the Alpha index. *Health Services and Outcomes Research Methodology* 2001;**1**:277-89.
49. Eriksson EA, Mattsson LG. Quantitative measurement of continuity of care. Measures in use and an alternative approach. *Med Care* 1983;**21**:858-75.
50. Shortell SM. Continuity of medical care: conceptualization and measurement. *Med Care* 1976;**14**:377-91.
51. Johns CJ, Simborg DW, Blum BI, Starfield BH. A minirecord: an aid to continuity of care. *Johns Hopkins Med J* 1977;**140**:277-84.
52. Rosenthal JM, Miller DB. Providers have failed to work for continuity. *Hospitals* 1979;**53**:79-83.
53. Anderson MA, Helms L. Home health care referrals following hospital discharge: communication in health services delivery. *Hosp Health Serv Adm* 1993;**38**:537-55.
54. Rea CM, Thompson GE. Multidisciplinary patient management by means of a high social risk screening tool. *Clin Perform Qual Health Care* 1996;**4**:159-63.
55. Boyd C, Henderson WE. Improving continuity of care through a state hospital-CMHC liaison program. *Hosp Community Psychiatry* 1978;**29**:384-6.
56. Hazell PL. Clinical continuity. *J Am Acad Child Adolesc Psychiatry* 1992;**31**:172-3.
57. Semke, JI. Continuity of care for chronically mentally ill individuals with substance abuse problems. 1991.
58. Susman J, Zervanos NJ, Byerly B. Continuity of care and outcome in nursing home patients transferred to a community hospital. *Fam Med* 1989;**21**:118-21.
59. Starfield BH, Simborg DW, Horn SD, Yourtee SA. Continuity and coordination in primary care: their achievement and utility. *Med Care* 1976;**14**:625-36.
60. Adair CE, Wild TC, Joyce AS, McDougall GM, Gordon MD, Costigan N *et al*. Development of a measure of perceived continuity of care for persons with severe mental illness. *Am J Epidemiology* 2001;**153**:S101.
61. Shi LY. Type of health insurance and the quality of primary care experience. *Am J Public Health* 2000;**90**:1848-55.

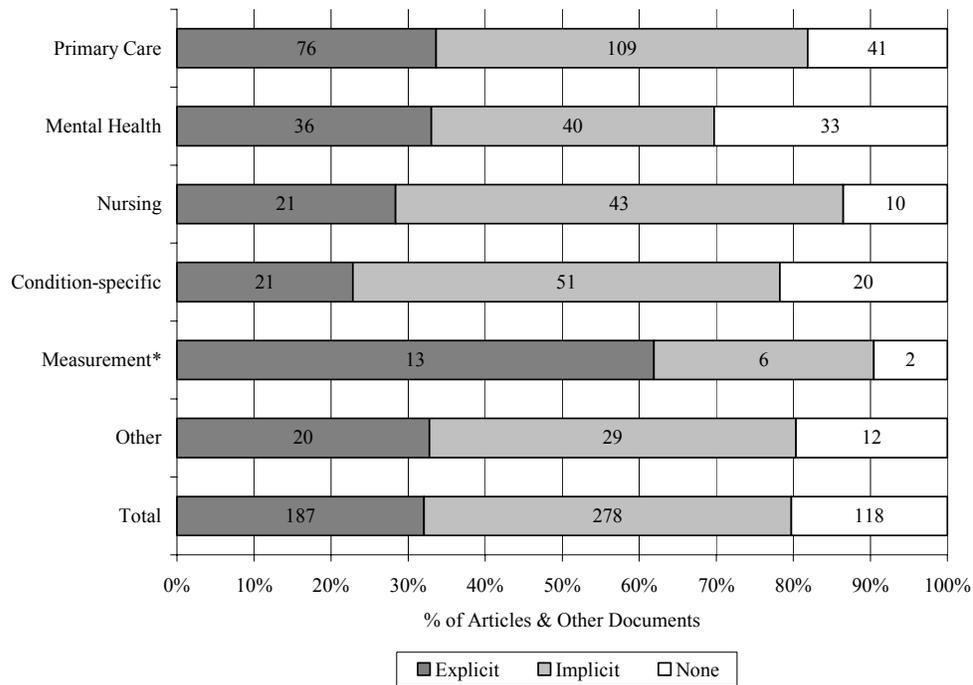
62. Safran DG, Kosinski M, Tarlov AR, Rogers WH, Taira DH, Lieberman N *et al.* The Primary Care Assessment Survey: tests of data quality and measurement performance. *Med Care* 1998;**36**:728-39.
63. Baker D, Stevens C, Brook R. Regular source of ambulatory care and medical care utilization by patients presenting to a public health emergency department. *JAMA* 1994;**271**:1909.
64. Kogan MD, Alexander GR, Teitelbaum MA, Jack BW, Kotelchuck M, Pappas G. The effect of gaps in health insurance on continuity of a regular source of care among preschool-aged children in the United States. *JAMA* 1995;**274**:1429-35.
65. Weiss GL, Ramsey CA. Regular source of primary medical care and patient satisfaction. *Qual Rev Bull* 1989;**15**:180-4.
66. Freeman GK, Richards SC. How much personal care in four group practices? *BMJ* 1990;**301**:1028-30.
67. Hemingway H, Saunders D, Parsons L. Social class, spoken language and pattern of care as determinants of continuity of carer in maternity services in east London. *J Public Health Med* 1997;**19**:156-61.
68. Ettlinger PRA, Freeman GK. General practice compliance study. *BMJ* 1981;**4**:1192-4.
69. Howie JGR, Heaney DJ, Maxwell M, Walker JJ, Freeman GK, Rai H. Quality of general practice consultations: cross sectional survey. *BMJ* 1999;**319**:738-43.
70. Shi L, Starfield B, Xu J. Validating the Adult Primary Care Assessment Tool. *J Fam Pract* 2001;**50**:n161w-n171w.

APPENDIX A – SUMMARY OF ABSTRACTION RESULTS

1. Domain of Care

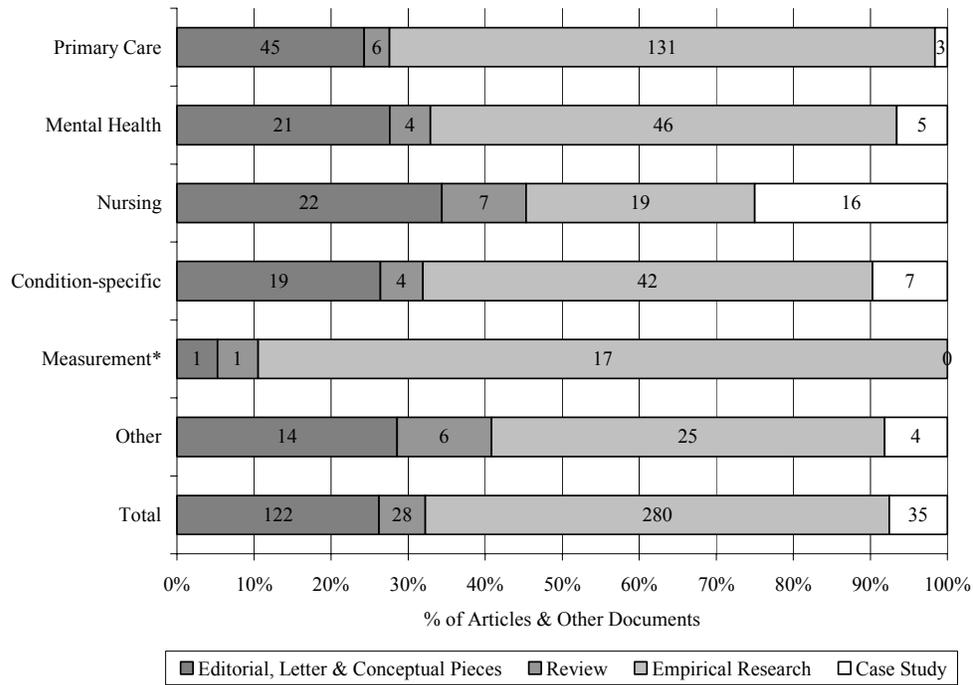


2. Type of Definition

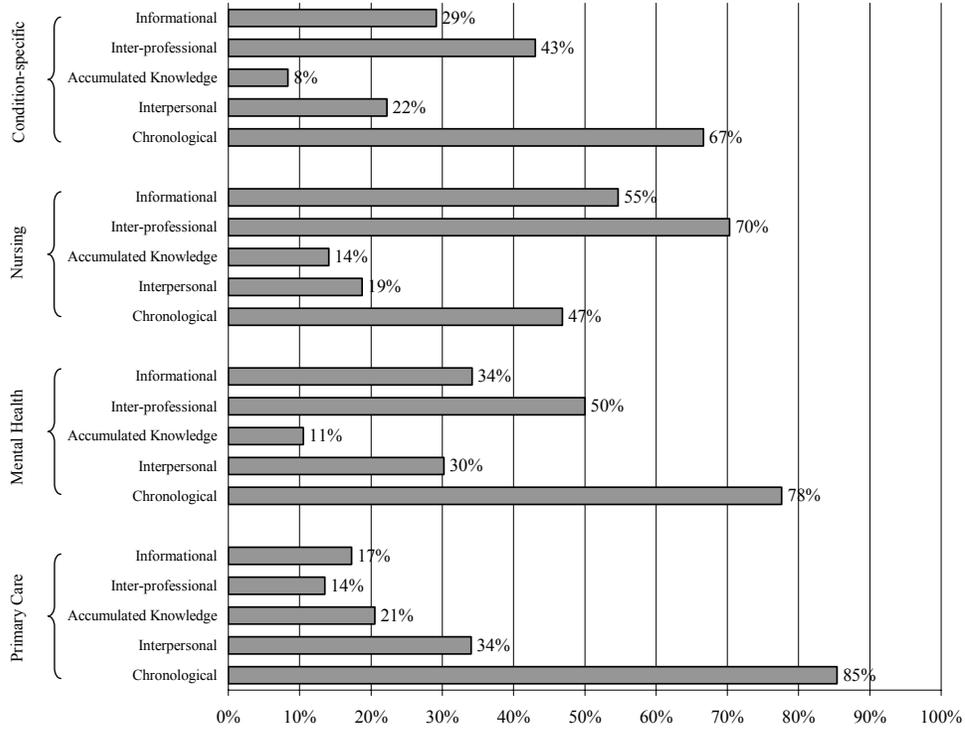


3. Type of Article

(Note: Articles without implicit or explicit definition omitted)



4. Aspects of Continuity



APPENDIX B – CATALOGUE OF CONTINUITY MEASURES & MEASUREMENT APPROACHES

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
1. Measures of the Chronology of Care					
Duration of Patient/Provider Affiliation	<ul style="list-style-type: none"> Length of time from initial to final encounter between patient and provider. Data may be obtained from registration files, utilization records or patient/provider surveys. Range 0 to ∞ 	<ul style="list-style-type: none"> May be adapted to examine attrition rates of patients (or providers) in an organization over a defined interval (e.g., Harrington et al 1993; McWhinney et al 1988). May be adapted to examine duration of long-term follow-up for chronic problems (e.g., Dorwart et al 1994). 	n/a	<ul style="list-style-type: none"> Simple to measure from available registration and encounter data. In primary care, duration of affiliation associated with accumulated knowledge by providers (Hjortdahl 1992), a sense of responsibility to patient, and with patient satisfaction. (Hjortdahl et al 1992) 	<ul style="list-style-type: none"> Does not directly measure strength of relationship or information transfer. Ignores intensity and pattern of services delivered. For instance, services may be scattered and discontinuous but of long duration. Does not account for relationships with other providers or care sites. Validity has not been extensively studied.
Intensity of Patient/Provider Affiliation	<ul style="list-style-type: none"> Examines the number and/or total duration of visits with provider over a defined interval. Range 0 to ∞ 	<ul style="list-style-type: none"> May apply threshold intensity levels implying a minimum no. of encounters to maintain continuity (e.g., Smith et al 1998). May be adapted to examine 'discontinuity' by measuring intervals with no contact (e.g., Ansel 1997; Shaw et al 1990; Tessler 1987) or intensity of contact with other providers such as emergency departments (e.g., Horan et al 1980; O'Shea et al 1982). In mental health care, may examine whether the patient is an 'active case' (e.g., Semke 1991). 	n/a	<ul style="list-style-type: none"> Simple to measure using encounter and/or registration data. Particularly useful for identifying individuals with poor continuity due to barriers in access (e.g., gaps in care). 	<ul style="list-style-type: none"> Does not directly measure strength of relationship, information flow, or consistency of management plan. Ignores differences in pattern of delivery (e.g., sequencing of care between different providers).

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
<p>Concentration of Care Number of Providers</p>	<ul style="list-style-type: none"> Number of providers with whom the patient had contact during an episode of care (e.g., hospitalization) or in a defined time interval (e.g., one year). Measure based on the assumption that a greater concentration of care with one provider (or care site) signifies stronger relationships, more consistent care plans, and/or smoother transfers of information. Range 0 to ∞ 	<ul style="list-style-type: none"> May count only those providers in same discipline (e.g., primary care physicians, nurses) or may count providers across disciplines. Can be summarized as a dichotomous variable (those patients who visited only one provider during an interval vs. those who saw more than one) (e.g., Hall et al 1994; Veale et al 1995). May be adapted to count number of different sites who had contact with patient rather than number of individual providers (e.g., Brown et al 1994; Meyer et al 1996; Sahlberg-Blom et al 1998). May be adapted to count number of referred and not referred sources. (Mor et al 1993) In mental health and nursing, may be adapted to count case managers (e.g., Lehman et al 1994) or community agencies (e.g., Brown et al 1994). 	n/a	<ul style="list-style-type: none"> Simple to measure from medical records or computerized encounter data. Intuitively interpretable as the needs for information exchange between providers (in the same or different discipline) increases as the number of providers increases. 	<ul style="list-style-type: none"> Ignores intensity of care by different providers and sequencing of care. Does not directly measure strength of patient/provider relationships. Does not account for degree of communication or coordination of care between providers. Validity of assumptions not extensively studied.

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
<p>Usual Provider of Continuity (UPC) (Breslau et al 1975)</p>	<ul style="list-style-type: none"> The number of visits to a 'usual' provider in a given period over the total number of visits to similar providers. 'usual' provider can be specified in multiple ways including (a) the patient's preferred provider, (b) the provider identified on patient enrollment files (in health systems where patients enroll with particular providers), or, most commonly, (c) as the provider seen most frequently usually determined with medical records or billing data. Range from 0 to 1 	<ul style="list-style-type: none"> Can be modified to measure continuity of providers practicing as a group ('site' continuity). Can be summarized as dichotomous variable. Patients are commonly divided into those who obtained all their care from one source vs. all others. (e.g., Mindlin et al 1969; Phillips et al 1980; Rogers et al 1980) UPC can be aggregated to the population-level (e.g., Menec et al 2000) May be statistically normalized (Ejlertsson et al 1985). May be modified as a visit based measure (e.g., Eriksson et al 1983; Starfield et al 1976). For primary care, often based on initial (not repeat) visits. The Fundamental Continuity of Care (FCCI) index is a modification of the UPC which additionally takes into account the cumulative duration of contact with the usual provider. (Citro et al 1998) 	<p>$UPC = n_i / N$</p> <p>where n_i is no. visits to usual provider in a defined time period & N is total no. visits.</p> <p>With utilization data, can be specified :</p> $UPC = \frac{\max(x_1, \dots, x_k) - 1}{N - 1}$	<ul style="list-style-type: none"> Widely used measure facilitating comparisons between studies. Relatively simple to apply with administrative data (such as physician billing data). Because it specifies a 'usual' provider, potentially useful in examining the role of a primary clinician or case manager in the care of a patient. Values are meaningful and intuitively appealing to clinicians. 	<ul style="list-style-type: none"> Indirect measure of relationship strength, information transfer and/or consistency of care. Not sensitive to the distribution of visits to providers other than the usual one. Does not account for number of providers seen. Not independent of utilization levels. Measure decreases as number of visits increases. Ignores sequencing of visits and extent of communication and coordination between providers. Requires complete information on provider of care for each patient visit.

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
Continuity of Care (COC) Index (Bice et al 1977)	<ul style="list-style-type: none"> Measures both the dispersion and concentration of care among all providers seen. Range from 0 to 1 	<ul style="list-style-type: none"> May be adapted to measure concentration of care at a care site or with a group of providers. Similar concentration indices have been developed including the FRAC (Roos et al 1980) and the CON indices. (Shortell 1976) 	$COC = \frac{\sum_{i=1}^k n_i^2 - N}{N(N-1)}$ <p>where n_i is no. visits to provider i and N is total no. visits in a defined period</p>	<ul style="list-style-type: none"> Widely used measure, permitting comparison between studies. Accounts for number of different providers seen (i.e., falls with increasing number of providers). Sensitive to shifts in the distribution of visits among providers. Good mathematical performance. Tends to have a mean of 0.5 and a large coefficient of variation. 	<ul style="list-style-type: none"> Lacks an intuitive interpretation. No inherent meaning except at the extremes. May mask important differences in sequencing of care. Requires detailed utilization information. Sensitive to utilization. Spuriously high for low users and again rises in high users. (Smedby et al 1986; Steinwachs 1979) Measure falls rapidly with increasing number of providers seen. (Magill et al 1987)
'Known' provider continuity (K index) (Ejlertsson et al 1985)	<ul style="list-style-type: none"> Measure of concentration of care with different providers. Modifies a simple count of the number of providers with the number of visits made. Range from 0 to 1 	<ul style="list-style-type: none"> Can be adapted as a visit based measure (k index) where k is 1 where known provider and 0 otherwise (Eriksson et al 1983). 	$K = (N - k) / (N - 1)$ <p>where N is total no. visits & k is no. providers seen in a defined interval</p>	<ul style="list-style-type: none"> Simple to calculate Commonly used permitting comparisons across sites and studies. Requires summary utilization data only (no. visits and providers). Accounts for total number of visits. Intuitively interpretable as the needs for information exchange between providers (in the same or different discipline) increases as the number of providers increases. 	<ul style="list-style-type: none"> May be sensitive to differences in utilization levels (i.e., measure increases as no. visits increases). (Eriksson 1990) Does not account for visit sequencing.

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
Likelihood of Continuity (LICON) (Steinwachs 1979)	<ul style="list-style-type: none"> Measures the probability that the number of providers seen is fewer than that that would have occurred under random conditions, given the patient's utilization levels and the number of available providers. Range from 0 to 1 	<ul style="list-style-type: none"> For patients in 'open access' systems, the number of available providers is assumed to be the maximum number of providers seen by any one patient. 	$LICON = 1 - \sum_{i=1}^k P_n i + \frac{i}{M} P_{n-1}(i)$ <p>where $P_n i = \frac{M - [i-1]}{M} P_{n-1}(i-1) + (i/M) P_{n-1} i$</p> <p>$N$ is total no. visits, n_i is no. visits to ith provider and $P_n(k)$ is prob. of seeing k different providers in n visits assuming random assignment. M is the total no. of available providers.</p>	<ul style="list-style-type: none"> Most applicable in settings where there are significant differences provider supply. Does not require detailed visit data (only number of visits and different providers seen). Helps differentiate between 'forced' provider continuity (because of limited supply) and 'chosen' continuity. 	<ul style="list-style-type: none"> Complex to calculate. Does not reflect specific patterns of care and lacks intuitive interpretation. Requires data on number of available providers. Very sensitive to how the number of available providers is measured. Does not account for number of visits or distribution of visits across providers. Does not account for sequencing of care across providers. Uncommonly used.
Modified Continuity Index (MCI) (Godkin et al 1984)	<ul style="list-style-type: none"> Measure of concentration of care in a population of patients. Calculated by dividing the average nr. visits by a group by the average number of providers in a population. Developed to account for problems of COC index. Range from 0 to 1 		$MCI = \frac{\sum_{i=1}^k n_i / k}{\sum_{i=1}^k p_i / k}$ <p>where n_i is no. visits and p_i is no. providers seen by patient i in population k during a defined time interval</p>	<ul style="list-style-type: none"> Simple calculation. Accounts for total number of visits made by patients. Accounts for number of providers seen. Requires summary utilization measures only (i.e., no. visits and providers seen by each patient). 	<ul style="list-style-type: none"> Difficult to interpret. Extremes of continuity not reflected in measure (i.e., two visits to same provider yields an intermediate result rather than 'perfect' continuity). Does not account for sequencing of care. Uncommonly used and little validation to date.
Modified Modified Continuity Index (MMCI) (Magill et al 1987)	<ul style="list-style-type: none"> Measure of concentration of care with providers and at the individual patient level. Developed to account for problems of COC and MCI indices. Range from 0 to 1 	<ul style="list-style-type: none"> Can be aggregated to the group level. 	$MMCI = \frac{1 - (K_i / [N_i + 0.1])}{1 - (1 / [N_i + 0.1])}$ <p>where N_i is no. visits and K_i is total no. of providers seen by patient i during a defined time interval</p>	<ul style="list-style-type: none"> Simple calculation. Requires summary utilization measures only. Accounts for total number of visits and providers. Not overly sensitive to large number of providers. 	<ul style="list-style-type: none"> Does not account for sequencing of care. Uncommonly used and little validation to date.

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
Sequencing of Care Sequential Continuity (SECON) (Steinwachs 1979)	<ul style="list-style-type: none"> The proportion of sequential visits over a discrete time interval that were with the same provider. Based on encounter records. Range from 0 to 1 	<ul style="list-style-type: none"> Can be adapted as a visit based measure (s index) (i.e., whether the provider seen at this visit was seen previously) (e.g., Becker et al 1972; Pilotto et al 1996). Can be adapted to account for differences in the number of available providers (Likelihood of Sequential Continuity or LISECON). (Steinwachs 1979) Can be dichotomized (e.g., whether or not a patient received a threshold number of consecutive visits from same provider) (e.g., Sweeney et al 1995). 	$SECON = \frac{\phi_1 + \dots + \phi_{n-1}}{N - 1}$ where ϕ is 1 if visits i & $i + 1$ are to same provider and 0 if otherwise during a defined time interval	<ul style="list-style-type: none"> Intuitive interpretation. Sensitive to the shifts in sequence of visits . Potentially useful as measure of amount of inter-provider communication necessary because of transfers in care. 	<ul style="list-style-type: none"> Does not measure continuity in long-term sense (only visit to visit). Does not account for the total of providers seen. Detailed visit data required (number of visits to each provider and order that each was seen). Insensitive to the distribution of visits among providers if sequencing remains constant. Does not account for the total number of visits.
Alpha Index (CI_α) (Lou 2001)	<ul style="list-style-type: none"> Represents a weighted average between sequential continuity and the concentration of providers seen over a series of patient visits. 		$CI_\alpha = \alpha KL + 1 - \alpha SECON$, where KL is the KL info. index of concentration, SECON is sequential continuity, and α is a pre - determined weighting between 0 and 1 .	<ul style="list-style-type: none"> Combines a measure of visit sequencing (SECON) with a measure of concentration. 	<ul style="list-style-type: none"> Users much choose how to weight the index. No empirical applications to date.
Survey based- Sequential Continuity	<ul style="list-style-type: none"> Ask respondents whether provider seen at this visit was same as at the prior visit or whether provider seen was patient's 'usual' provider. 		n/a	<ul style="list-style-type: none"> Simple to calculate. Intuitive interpretation. 	<ul style="list-style-type: none"> Requires survey data. Does not reflect long-term continuity over multiple visits.

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
2. Measures of Relational Continuity					
Affiliation between Patient & Provider(s)	<ul style="list-style-type: none"> • Most common approach is to ask whether or not patient has a 'regular' provider. • May also ask patients to name their regular provider ('named affiliation'). 	<ul style="list-style-type: none"> • In system where patients enroll with particular provider(s), patient lists may be used to infer the presence of a 'regular' provider (e.g., Becker et al 1974). • In maternity care, patients may be asked whether they 'knew' the provider who gave prenatal, intra-partum, and post-partum care, and whether it was the same provider. • In primary care, researchers have also examined the extent to which 'regular' patients see their provider for newly presenting health problems (e.g., Forrest et al 2000). 	n/a	<ul style="list-style-type: none"> • Commonly used in primary care, permitting comparisons with other settings and studies. • Has been associated with many health outcomes and better processes of care (e.g., receipt of clinical preventive surveys). (Number of references too numerous to cite) 	<ul style="list-style-type: none"> • Crude measure: in primary care, substantial majority of populations report having a regular source of care. • Does not measure extent of affiliation (i.e., the strength of the patient-provider relationship).
Strength of Relationship Survey Questions on Extent of Patient - Provider Affiliation	<ul style="list-style-type: none"> • Most common approach is to ask patients whether they know their providers 'well'. • May ask questions about adequacy of 'communication' and 'trust' (e.g., Freeman et al 1994). 	<ul style="list-style-type: none"> • Extent of knowledge base may also be obtained from asking providers. (e.g., Hjortdahl et al 1991) • May also ask about provider's sense of ongoing responsibility to patient (e.g., Hjortdahl 1992). 	n/a	<ul style="list-style-type: none"> • Capture patient's viewpoint of the relationships. • Relatively simple to apply in practice settings. • Knowing a provider 'well' has been associated with length of patient/provider relationship. (Hjortdahl 1992) • Also associated with some health outcomes, patient satisfaction, and more appropriate resource utilization. 	<ul style="list-style-type: none"> • Requires surveying patients but little respondent burden. • Knowledge of patients is subjectively measured. • Providers known to overestimate their extent of knowledge about patients. (Hjortdahl 1992)

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
Perception of Continuity Scale (Chao 1988)	<ul style="list-style-type: none"> • Self-administered questionnaire describes the ongoing physician patient relationship. • 23 items divided into two subscales “structural elements” and “interpersonal elements”. • Interpersonal subscale includes items on comfort level, knowledge, trust, communication, and comprehensive care. 		n/a	<ul style="list-style-type: none"> • Good internal consistency reliability. • Highly related to patient satisfaction. • Interpersonal scale has significant face validity. 	<ul style="list-style-type: none"> • Modest association with UPC and COC indices. • Questionable generalizability in non-middle class populations. • Limited use.
Multi-dimensional Primary Care Surveys	<p>The following three instruments measure multiple aspects of primary care, one of which is the strength of patient-provider relations:</p> <ul style="list-style-type: none"> • Primary Care Assessment Survey (PCAT). (Safran et al 1998) Subscales measure multiple aspects of the relationship including knowledge of patient; communication; interpersonal treatment and trust. • Primary Care Assessment Tool (PCAT). One subscale measures extent of longitudinal affiliation. (Shi et al 2001; Cassady et al 2000) Questions relate to extent of knowledge by provider, adequacy of communication, and level of comfort. • Components of Primary Care (CPC). (Flocke 1997) Three subscales related to strength of relationship: preference for regular provider; accumulated knowledge; and interpersonal communication. 		n/a	<ul style="list-style-type: none"> • Surveys capture patient perspectives on relationship strength. • PCAS has good psychometric performance. Interpersonal treatment and trust highly correlated with each other. • PCAT also has good psychometric performance, has child and adult versions, and captures both patient and provider perspectives. • CPC shows good psychometric performance. Preference for regular provider associated with immunization compliance, communication & screening practices. 	<ul style="list-style-type: none"> • Survey of patients is required. • Significant respondent burden. • May be resource intensive. • May exclude persons with access difficulties or those who do not have a regular provider. • Validity not extensively studied outside the US. • PCAS, PCAT, and CPC surveys only useful in measuring strength of relationship in primary care.

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
Alberta Continuity of Services Scale for Mental Health (ACSS-MH) (Adair et al 2001)	<ul style="list-style-type: none"> Multidimensional survey completed by mental health care patients. Four subscales; one of which is 'relationship base'. Asks patients about communication and trust in provider. 		n/a	<ul style="list-style-type: none"> Items had good internal consistency reliability. Relationship subscale has high test-retest reliability. Evidence for content validity. Expressly developed for mental health care. 	<ul style="list-style-type: none"> Developed on small sample of mental health clients. Has not yet seen wide application. No concurrent or predictive validity studies as of yet.
3. Measures of Informational Continuity					
Information Transfer	<ul style="list-style-type: none"> Evidence a mechanism for information transfer exists or evidence that information has successfully transferred, often against a normative standard. Objective of the mechanism may be to transfer information from one visit to the next or between facilities or agencies. Some studies examine extent of communication between providers (e.g., Boyd et al 1978; Semke 1991). 	<ul style="list-style-type: none"> The presence of a case-manager (or other person responsible for coordinating care) may also be used to reflect a mechanism for information transfer. (e.g., Semke 1991) Examples include assessing the completion of referral documents (e.g., Rosenthal et al 1979) and use of a pharmacy information system (Foisly et al 1996). Another variation is the extent to which the same provider visits a patient in different care settings (e.g., a primary care physician visiting a patient in hospital). (e.g., Olfson et al 1998). 	n/a	<ul style="list-style-type: none"> Simple to assess availability of mechanism, but more complex to assess transfer of information. Information transfer and uptake critical when multiple providers assume care over time. Often integrated into quality improvement programs (e.g., in hospitals). 	<ul style="list-style-type: none"> Measures a structural feature of care only. Measure fails to examine whether information is taken up providers and used to inform current care. Absence of standardized methods, making comparability between studies difficult. Measurement may be site or context specific, limiting comparability.
Referral Data Inventory (RDI) (Anderson & Helms 1995)	<ul style="list-style-type: none"> Instrument measures the amount and type of information contained in referrals to home health agencies. Scale contains 40 items grouped in 4 categories: background, psychosocial, medical & nursing care. 		n/a	<ul style="list-style-type: none"> Instrument can be generally applied to a variety of discharge settings. Can be used o compare completeness of info transfer in different contexts. Can be used as a tool to improve and focus communication among institutions & agencies. 	<ul style="list-style-type: none"> Focuses only on transfer documents. May underestimate completeness of information transfer.

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
Evidence of Information Transfer, Completeness of Information and /or Uptake	<ul style="list-style-type: none"> Evidence that information generated out of prior visits has been acknowledged and/or used to inform current decisions. Two approaches for measuring: examining medical records for evidence of acknowledgement of prior information (e.g., Starfield et al 1976; Johns et al 1977); or patient surveys about the use of prior information by their providers. (e.g., CPC Flocke 1997; PCAS Safran et al 1998; PCAT Shi et al 2001; Adair et al 2000) 	<p>Examples of measures</p> <ul style="list-style-type: none"> Examples of the information obtained from chart review include evidence that prior problems, laboratory results, or visits with other providers are acknowledged and/or followed up. Examples of patient survey questions include their provider's knowledge that other visits were made, the availability and use of referral documents; and whether previously identified problems were inquired about. Some researchers ask about patient's knowledge of discharge instructions (e.g., Sparbel et al 2000). 	n/a	<ul style="list-style-type: none"> Recognizes that information transfer is meaningless unless it is accessible and used by providers. Good performance of survey-based methods (e.g., PCAS, PCAT). 	<ul style="list-style-type: none"> Survey based methods may be resource intensive. Measuring uptake of and use of information by providers is complex.
4. Measures of Management Continuity					
Evidence of Longitudinal follow-up	<ul style="list-style-type: none"> Evidence of indicated follow-up of care for particular problems. Often used when there is a transition of care from one organization or provider group to another (e.g., transfer from inpatient to outpatient psychiatric care). 	<ul style="list-style-type: none"> May also examine prescribed time to follow-up. Some researchers examine appointment 'no shows' as an indicator of lack of follow-up May also examine service 'gaps' (e.g., 30 days) for problems where ongoing treatment is indicated Other researchers have looked at treatment completion rates (e.g., Harlow 1999). The Temporal Continuity Index (TCI) summarizes the intervals between index and follow-up visit in relation to what would be expected. (Spooner 1994) 	n/a	<ul style="list-style-type: none"> Particularly applicable to the management of ongoing and complex problems (e.g., chronic mental health problems). Useful to examine success of key transitions from care provided by one site or organization to another. (e.g., inpatient to ambulatory care). Well validated measures in mental health care. TCI not extensively developed or validated. 	<ul style="list-style-type: none"> Confounded by access issues. Does not examine the consistency in care management across providers.

Measure	Description	Adaptations & Modifications	Formula (if applicable)	Advantages	Disadvantages and Words of Caution
Adherence to Disease-specific Protocols and Consistency of Care over Time	<ul style="list-style-type: none"> • Assesses whether there is ‘agreement’ on parameters of care across providers and over time. • May be applied to assess the receipt of key services (e.g., Downing et al 1999). • May be subjective assessment that care is similar across providers (e.g., Bell 1996). 	<ul style="list-style-type: none"> • Some researchers have subjectively asked providers whether care was similar and consistent across providers (e.g., Bell 1996). 	n/a	<ul style="list-style-type: none"> • Widely used for illnesses such as diabetes and tuberculosis. • Associated with key health outcomes. 	<ul style="list-style-type: none"> • Confounded by issues of access. • Difficult to distinguish from quality of care process measures.

Note: References for the above measurement tools are available in Appendix D at www.chsrf.ca

APPENDIX C – RECOMMENDATIONS FOR MEASURING CONTINUITY WITHIN AND ACROSS HEALTH CARE SECTORS

The following table summarizes our recommendations for measuring continuity in primary care, acute care and specialty care settings, mental health (We originally intended to include the continuing and long-term care setting but an insufficient literature was identified with our search strategy.) These recommendations were based on the systematic review of the literature and our consultation with researchers and decision makers.

Approaches to Measurement	Primary Care	Specialty & Condition-specific Care	Acute Care	Mental Health Care	Cross-Boundary Care
A. Informational Continuity					
Is type of continuity relevant? If so, what aspects?	Very relevant, particularly accumulated knowledge about patient (both contextual and medical across conditions)	Very relevant, particularly transfer of information regarding diagnosis and treatment and of problem. For some conditions (e.g. maternity) knowledge accumulation also considered important.	Very relevant, particularly transfer of information between hospital providers. Accumulation of knowledge not identified as central issue.	Very relevant, particularly ongoing knowledge of patient and transfer of information from other non-medical agencies	Very relevant, especially transfer of information between settings.
Are tools currently available to measure this type of continuity?	<i>Information transfer:</i> Tools available using either survey and admin data. Primary care assessment questionnaires (PCAT, PCAS and CPC*) ask patients about components of information transfer. SECON [†] measures degree of information transfer required between providers. Few validated measures were identified that use admin data and medical records to look at completeness, uptake and use of transferred information.	<i>Information transfer:</i> SECON [†] may be used to measure need for information transfer among providers regarding a single problem. No other measures identified.	<i>Information transfer:</i> Referral data inventory (RDI) [‡] measures types of information contained in referrals from hospitals to home agencies. Few other measures are available. Medical record review used to acknowledge prior information. Few available to assess adequacy of information transfer within hospitals.	<i>Information transfer:</i> Poorly developed. Most rely on presence of case-manager to infer information transfer. None identified to examine the timeliness, applicability, or completeness of information transfer. ACSS-MH [§] asks patients about elements of information transfer	<i>Information transfer:</i> Between institutions, most common method is to look for discharge plans, and transfer of discharge information. Referral data inventory (RDI) ^{**} measures may be useful. Between primary & specialty care, the presence of referral documents may be measured and ‘quality’ of information.

Approaches to Measurement	Primary Care	Specialty & Condition-specific Care	Acute Care	Mental Health Care	Cross-Boundary Care
<i>A. Informational Continuity (continued)</i>					
Are tools currently available to measure this type of continuity (continued)?	<i>Accumulated knowledge</i> Most common method is to ask patients how well they are known (or providers how well they know their patient). This dimension also captured in general primary care assessment surveys.	<i>Accumulated knowledge</i> In maternity care, patients are asked if they know their providers of antenatal, intrapartum, and postpartum care.	<i>Accumulated knowledge</i> None identified	<i>Accumulated knowledge</i> None identified	<i>Accumulated knowledge</i> None identified
Have tools been validated in this context?	General primary care surveys show good psychometric performance. There is recent experience with these surveys in Canada. Questions about knowing provider well associated with satisfaction, and resource use. SECON [†] is associated with other chronological measures but little understanding of construct validity.	SECON [†] is associated with other chronological measures but little understanding of construct validity. May be adapted to be problems specific. Knowing providers in maternity care is weakly associated with satisfaction.	Generally site-specific with little external relevance.	ACSS-MH [§] shows good psychometric properties for this aspect of continuity. Developed for Canadian mental health populations but not extensively tested.	Considerable face validity for using discharge planning and referral letters to measure cross-boundary information transfer.
What orientation and unit of analysis is most relevant?	Person-based (across conditions), usually for extended intervals. Discrete episodes-of-care may also relevant.	Problem-specific, usually for episodes-of-care. For chronic conditions, extended intervals (e.g., 1 year) also relevant.	Problem-specific, usually oriented around single hospitalization. May extend to ambulatory/home care before and after discharge.	Problem-specific, usually for extended intervals. For time limited conditions, episode-of-care also relevant.	Usually problem-specific relating to specific care episodes. Linking with primary and long-term care is person-focused.

Approaches to Measurement	Primary Care	Specialty & Condition-specific Care	Acute Care	Mental Health Care	Cross-Boundary Care
A. Informational Continuity (continued)					
Are required data available?	Encounter (i.e., billing data) generally available at low costs. May be incomplete in some areas (e.g., where physicians are paid by salary or sessional arrangements). Survey data not currently available and potentially costly to obtain.	Encounter (i.e., billing data) generally available at low costs. May be incomplete in some areas (e.g., where physicians are paid by salary or sessional arrangements).	Medical records contain some details on information transfer but often collection is not systematized. May be costly to extract data from medical records.	Administrative data not generally available. Many privacy concerns. Survey data not commonly available and may be costly.	Discharge and referral records generally available in medical record. However, data often not systematic and may be costly to obtain.
What are issues & research needs?	Development of medical-record based measures of info transfer and uptake are needed. (e.g., electronic record transfer) Construct validation of SECON [†] (and variants) needed. More validation of available survey tools in Canada needed.	Development of medical-record based measures of info transfer and uptake are needed. Construct validation of SECON [†] needed.	Development of methods to examine information flow within hospital setting are required. May require survey-based methods.	Development of methods to examine timeliness, availability and completeness of information transfer among providers and agencies. Need for measures of within team information exchange.	

Approaches to Measurement	Primary Care	Specialty & Condition-specific Care	Acute Care	Mental Health Care	Cross-Boundary Care
A. Informational Continuity (continued)					
Summary & Recommendations for Measurement	<ul style="list-style-type: none"> • More development and/or testing of methods required before wide-scale application • More emphasis on patient-based perspectives of continuity • SECON[†] should be interpreted with caution because its link with information transfer unknown. 	<ul style="list-style-type: none"> • More development and/or testing of methods required before wide-scale application • SECON[†] should be interpreted with caution because its link with information transfer unknown. 	<ul style="list-style-type: none"> • This dimension is likely very important and may be captured by instruments such as the RDI[‡] • Methods to measure information transfer, and uptake urgently needed for hospital care 	<ul style="list-style-type: none"> • Available measures are relatively crude indicators of this dimension. • Better methods and validation are required before wide scale application. • Further testing and application of ACSS-MH[§] or similar measures recommended. 	<ul style="list-style-type: none"> • Measurement of information transfer via discharge plans and referral records good but not perfect • More emphasis on whether relevant information is transmitted and uptake of that information
B. Relational Continuity					
Is type of continuity relevant? If so, what aspects?	Very relevant, person-centered relationship essential attribute of primary care	Relationship only extends for duration of problem. Little relevance for short-term problems.	Not emphasized historically in literature, but therapeutic benefits of nurse-patient relationship now recognized	Very relevant, but relationships form with multiple members of team. Relationship with mental health team stressed.	Little relevance except in circumstances where same provider delivers care in multiple settings or where other personnel bridge care (e.g., case-managers)

Approaches to Measurement	Primary Care	Specialty & Condition-specific Care	Acute Care	Mental Health Care	Cross-Boundary Care
B. Relational Continuity (continued)					
Are tools currently available to measure this type of continuity?	<p><i>Survey-based:</i> Multiple tools available to assess strength of ongoing relationship. Asking about whether patient has regular provider considered an incomplete measure of this domain.</p> <p><i>Administrative databases:</i> UPC & COC^{††} often used as proxies for relational continuity. These measures are often modified to include visits for new health problems only.</p>	In maternity care, patients asked whether their prenatal, intrapartum, and post-natal providers are the same.	<p><i>Survey-based:</i> None identified in literature review.</p> <p><i>Administrative databases:</i> commonly count number of providers (e.g., nurses) with whom patients has had contact.</p>	<p><i>Survey-based:</i> ACSS-MH[§] has a ‘relationship-based’ subscale that ask about communication and trust.</p> <p><i>Administrative databases:</i> COC and UPC^{**} have been applied but construct validity unknown.</p>	Crudely measured. Current measures examine for 1) the presence of a case manager; and 2) the extent to which the same provider sees the patient in different settings.
Have the tools been validated in this context?	Surveys have good psychometric performance but usefulness in Canada unknown. Mathematical performance of COC & UPC ^{**} well described but construct validity not well established	Women place a higher value on care by known providers more before than after childbirth.	Methods not extensively validated.	ACSS-MH [§] only recently developed without extensive evaluation in other contexts. COC and UPC ^{**} considered crude measures with little evidence of construct validity in mental health	Generally poorly validated.

Approaches to Measurement	Primary Care	Specialty & Condition-specific Care	Acute Care	Mental Health Care	Cross-Boundary Care
B. Relational Continuity (continued)					
What orientation and unit of analysis is most relevant?	Person-based (across conditions), usually for extended intervals. Discrete episodes-of-care may also be relevant.	Problem-specific, usually for episodes-of-care. For chronic conditions, extended intervals also relevant.	Problem-specific, usually for single hospitalization. May extend to care before and after discharge.	Problem-specific, usually for extended intervals. For time limited conditions, episode-of-care also relevant.	Usually problem-specific relating to specific care episodes. Linking with primary and long-term care is person-focused.
Are required data available?	Admin data is generally available for total populations (with some data gaps). Questions on regular source of care available on national surveys (e.g., National Population Health Survey). More complex surveys generally unavailable.	Admin data generally available, but proxies of relational continuity may not be relevant to this context.	Number of providers may be obtained from retrospective review of hospital charts.	Administrative data may not be available for all pertinent contacts; even data on medical contacts is incomplete. Survey data currently unavailable except in a small sample.	Presence of case manager and cross-boundary care by same provider can generally be obtained from administrative sources
What are issues & research needs?	New measures are required that measure relationship strength with teams of providers rather than individual providers.	More understanding on the importance of ongoing patient-provider relationships and outcomes. Will likely require disease-specific patient registries.	Better measures of relationship strength in acute care settings are required. Survey-based data likely required.	Measures to examine relationships with teams of providers also needed.	More understanding of importance of maintaining personal relationships across care sites is needed.

Approaches to Measurement	Primary Care	Specialty & Condition-specific Care	Acute Care	Mental Health Care	Cross-Boundary Care
B. Relational Continuity (continued)					
Summary & Recommendations for Measurement	<ul style="list-style-type: none"> • Available measures are good but not perfect, including the UPC&COC** • Current measures should provide the basis for future development • Survey-based methods most useful for in-depth analysis while admin measures useful for population based reporting • UPC & COC** should be used with caution until links with relational continuity more fully understood • More emphasis on development of team-based methods needed 	<ul style="list-style-type: none"> • Meaningfulness of this type of continuity for various conditions and problems unknown. • More research needed on conceptualizing and measuring this domain are needed. 	<ul style="list-style-type: none"> • Likely an important type of continuity but not as important as information or management continuity. • Better measures are needed for persons where hospital care forms a large part of their ongoing care (e.g., burn patients, palliative care) 	<ul style="list-style-type: none"> • Considered a critical type of continuity to measure. • Survey methods most useful; admin. methods may be useful but validation is needed. • Measures to examine ongoing relationships with ‘mental health care teams’ are needed. 	<ul style="list-style-type: none"> • This type of continuity is of uncertain relevance and feasibility for cross-boundary issues. • Relevance should be established.

Approaches to Measurement	Primary Care	Specialty & Condition-specific Care	Acute Care	Mental Health Care	Cross-Boundary Care
C. Management Continuity					
<i>Is type of continuity relevant? If so, what aspects?</i>	Relevant, but often hard to operationalize because management continuity is problem specific and primary care is patient-specific.	Very relevant since management continuity is usually oriented around single problem.	Very relevant	Very relevant	Very relevant, especially as care for a particular problem is transferred from providers in one setting to another (e.g., hospital to community nursing)
Are tools currently available to measure this type of continuity?	<i>Longitudinal follow-up:</i> Uncommon approach in primary care. Temporal Continuity index (TCI) has been proposed for preventive services but has been incompletely developed (Spooner 1994). Another approach is to look for treatment ‘no-shows’ for scheduled appointments <i>Consistency in care:</i> Measures of compliance with preventive care pathways in practice populations have been proposed, but none were identified in examining consistency across conditions.	<i>Longitudinal follow-up:</i> May look at completion rates of recommended treatment for specified diseases or for ‘gaps’ in care for chronic disease. <i>Consistency in care:</i> Disease-specific measures are available that measure adherence to care protocols over time.	<i>Longitudinal follow-up:</i> Not relevant for within hospital care. Important in transition to community (see cross-boundary care) <i>Consistency in care:</i> Generally poorly developed. Retrospective analysis of preventable incidents to identify source of error (discontinuity). Some of the disease-specific measures may be relevant.	<i>Longitudinal follow-up:</i> Most commonly used measure. Typically used to look at documented ambulatory follow-up following discharge from mental health care facility. May also examine time to follow-up in comparison to normative standards. <i>Consistency in care:</i> Generally poorly developed & used in continuity of care literature. Indicators of concept may exist in other literatures.	<i>Longitudinal follow-up:</i> Common approach especially in transition from hospital to community / home care. Also commonly used in discharge planning. <i>Consistency in care:</i> Measures poorly developed.
Have the tools been validated in this context?	Adherence to disease protocols based on medical record audits used as a reflection of quality of medical care rather than continuity.	Adherence to disease protocols based on medical record audits used as a reflection of quality of medical care rather than continuity.	Cross-disciplinary analysis of consistency of care more likely to occur in disciplinary audits.	Yes – particularly measures for post-discharge follow-up	Yes – particularly measures for post-discharge follow-up

Approaches to Measurement	Primary Care	Specialty & Condition-specific Care	Acute Care	Mental Health Care	Cross-Boundary Care
C. Management Continuity (continued)					
What orientation and unit of analysis is most relevant?	Person-based (across conditions), usually for extended intervals. Discrete episodes-of-care may also be relevant.	Problem-specific, usually for episodes-of-care. For chronic conditions, extended intervals also relevant.	Problem-specific, usually for single hospitalization. May extend to care before and after discharge.	Problem-specific, usually for extended intervals. For time limited conditions, episode-of-care also relevant.	Usually problem-specific relating to specific care episodes. Linking with primary and long-term care is person-focused.
Are required data available?	Medical records are available to show internal consistency of care; data is resource intensive.	Variable; the more multi-disciplinary and cross-organizational the care pathway, the less available the data.	In hospital records tend to be available, and complete for multiple providers; resource intensive.	Data on community follow-up may be available in some but not all settings.	Community follow-up may be available with administrative data systems linked at individual level.
What are issues & research needs?	Better methods to assess patient- vs. problem-based consistency in care.	Adherence to protocols over time		Adherence to individualized plans; accounting for plan flexibility.	
Summary & Recommendations for Measurement	<ul style="list-style-type: none"> • More consideration should be given to measuring 'gaps' in care. • Measures of care consistency should be developed and tested for validity. 	<ul style="list-style-type: none"> • Adherence to key parts of disease-specific protocols appears to be an appropriate way to measure this type of continuity. • Need to develop measures of consistency for an entire care pathway. • More consideration should be given to measuring 'gaps' in care for chronic conditions. 	<ul style="list-style-type: none"> • Adherence to in-hospital care protocols appears to be most appropriate way to measure this type of continuity. • Evidence of follow-up community care also important. • Further development of measures to examine consistency of care across providers is needed. 	<ul style="list-style-type: none"> • Evidence of follow-up post-discharge (or time to follow up) is well validated measure of this type of continuity. • Development of methods to measure care consistency is required for common mental health conditions. 	<ul style="list-style-type: none"> • Evidence of transition of care from one locale to another is appropriate way to measure longitudinal care. Most relevant between primary and specialty care, hospital and community care. • Adherence to disease-specific protocols that extend across care sites also relevant to measure this aspect.

* Primary Care Assessment Tool (PCAT) (Shi et al 2001); Primary Care Assessment Survey (PCAS) (Safran et al 1998); Components of Primary Care (CPC) (Flocke et al 1997)

† Sequential Continuity Index (SECON) (Steinwachs 1979)

‡ Referral Data Inventory (RDI) (Anderson & Helms 1995)

§ Alberta Continuity of Services Scale for Mental Health (ACSS-MH) (Adair et al 2001)

** Referral Data Inventory (RDI) (Anderson & Helms 1995)

†† Usual Provider of Care index (UPC) (Breslau et al 1975); Continuity of Care index (COC) (Bice & Boxerman 1977)