

Interpersonal Continuity of Care and Care Outcomes: A Critical Review

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ABSTRACT

PURPOSE We wanted to undertake a critical review of the medical literature regarding the relationships between interpersonal continuity of care and the outcomes and cost of health care.

METHODS A search of the MEDLINE database from 1966 through April 2002 was conducted by the primary author to find original English language articles focusing on interpersonal continuity of patient care. The articles were then screened to select those articles focusing on the relationship between interpersonal continuity and the outcome or cost of care. These articles were systematically reviewed and analyzed by both authors for study method, measurement technique, and quality of evidence.

RESULTS Forty-one research articles reporting the results of 40 studies were identified that addressed the relationship between interpersonal continuity and care outcome. A total of 81 separate care outcomes were reported in these articles. Fifty-one outcomes were significantly improved and only 2 were significantly worse in association with interpersonal continuity. Twenty-two articles reported the results of 20 studies of the relationship between interpersonal continuity and cost. These studies reported significantly lower cost or utilization for 35 of 41 cost variables in association with interpersonal continuity.

CONCLUSIONS Although the available literature reflects persistent methodologic problems, it is likely that a significant association exists between interpersonal continuity and improved preventive care and reduced hospitalization. Future research in this area should address more specific and measurable outcomes and more direct costs and should seek to define and measure interpersonal continuity more explicitly.

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INTRODUCTION

Continuity of care traditionally is considered one of the core principles of family medicine,^{1,2} and it is a core element of the Institute of Medicine definition of primary care.³ Recently there has been a resurgence of interest in this subject, and the *Annals of Family Medicine* has devoted a theme issue to the topic.⁴ This resurgence has occurred in part because of the growing sophistication of research in family medicine and because of changes in American health care that many believe have undermined continuity in the relationship between physicians and their patients.⁵⁻¹¹ A central question facing the future of family medicine is the degree to which we will provide personal health care based on the individual doctor-patient relationship, or whether we will seek to provide a medical home for patients based on an interdisciplinary team with less emphasis on personal care.¹²

Continuity has proved to be a difficult variable to define and measure. Several previous reviews of this subject have noted major limitations to its research foundation because of inconsistent definitions and complex methodologic challenges.¹³⁻¹⁸ In early 2002, we undertook a comprehensive review of the medical literature to examine one aspect of continuity

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of care related to the ongoing relationship between an individual doctor and patient. We defined this aspect of continuity as *interpersonal continuity*. This review has resulted in 2 publications, the first examining how interpersonal continuity of care has been defined and measured,¹⁹ and the second evaluating the relationship between interpersonal continuity and patient satisfaction.²⁰ For many family physicians and health care policy researchers, however, the most important questions about interpersonal continuity relate to the degree to which it is associated with improved outcomes or lower cost of health care. This article describes our review of the studies published in the medical literature before April 30, 2002, for evidence about these associations.

METHODS

A search of the MEDLINE database from January 1, 1966, to April 30, 2002, was conducted by the primary author using the medical subject heading "continuity of patient care," including all possible subheadings. Titles and reference citations of each of the resulting 2,424 citations in the English language were reviewed, and references were eliminated if they were letters to the editor, if they addressed health professions other than medicine, or if they clearly addressed only aspects of continuity other than interpersonal continuity. Excluding these citations left 379 references that appeared to address interpersonal continuity as an attribute of the relationship between clinicians and patients in general medical care. Full-text copies of each of these articles were obtained and read in detail by the primary author. In addition, the bibliography of each article was scanned to identify potential references that were missed by the MEDLINE search. The process of article review and exclusion has been previously described.¹⁹

This process yielded 142 articles that directly related to the concept of interpersonal continuity. Forty-one were review articles or theory articles dealing with continuity of care in general. The remaining 101 were original research reports. All of the citations were entered into a bibliographic database. Each was then classified by study method and primary research question(s), and this information was recorded in the database for each article. Each article was also reviewed to determine how continuity was defined and measured, and that information was also included in each database entry. This classification process has been described previously.¹⁹

The 142 articles addressed 13 different research themes related to interpersonal continuity of care.¹⁹ Two themes were the relationship of interpersonal continuity to care outcome and cost. Forty-one of the 101 original research reports addressed the relationship between interpersonal continuity of care and care

outcome. These 41 articles described the results of 40 separate studies on this topic. We defined an improved care outcome conceptually as a measurable result of care that would generally be considered a desirable outcome or indicator of quality from a patient's point of view and that, ideally, would relate directly to reduced patient mortality or morbidity. Many of the improved care outcomes reported in these articles, however, are actually intermediate variables, such as improved diabetes control or improved delivery of preventive services. Twenty-two articles describing 20 original research projects were found that examined the association between interpersonal continuity and the cost of care. We defined a reduced cost of care as a measurably lower cost of either providing or receiving health care and might include direct costs to the patient or third party payer, such as emergency department visits or laboratory test utilization. We also included studies examining the costs of providing care, such as missed office appointments, because such missed appointments would reduce office efficiency and increase the cost of delivering care to the community.

Both authors systematically analyzed these 2 groups of articles to assess the significance and strength of these relationships. The goals of our analyses were to determine the quality of this evidence and to assess the methods used by previous authors to examine the associations. We originally considered a meta-analysis of these data, but we found it to be impossible because of the substantial differences in study methods and the manner in which care outcomes and costs were examined. Thus, our analyses consisted of a systematic review of each group of articles to assess the study method, the results of each study, and quality of evidence reported in each article.

Quality of evidence was evaluated by determining the degree to which each article addressed 5 quality characteristics (Table 1 displays outcome studies and Table 2 displays cost studies). We chose these 5 quality characteristics for each analysis after reading the chosen articles and discussing the project with colleagues. Each study was reviewed independently by the 2 authors and assigned a score of 2, 1, or 0 for each quality characteristic according to whether the characteristic was met, partially met, or not met, respectively. This subjective assessment was based on the independent judgment of each author. The scores listed in Table 1 are the average of these 2 scores except in those cases where the scores differed by more than 1 point. Whenever any of the scores differed by more than 1 point (one score was 2 and the other 0), the article in question was reread by both authors and discussed to reach consensus.

In some cases, we found it challenging to assign a

Table 1. Quality Analysis of Studies Examining Interpersonal Continuity and Care Outcome

Study	Interpersonal Continuity Defined and Measured in Credible Way	Study Design Appropriate to Study Question	Outcome Studied Applicable to FP Practices	Outcome Measured in Credible Way	Findings Generalizable to Other Settings	Overall Quality of Evidence
Charney et al, 1967 ²¹	2	1.5	2	1.5	2	9
Alpert et al, 1968 ²²	0	2	2	2	1.5	7.5
Alpert et al, 1970 ²³	0	2	1.5	0.5	1	5
Gordis & Markowitz, 1971 ²⁴	0.5	2	2	1.5	1	7
Gordis, 1973 ²⁵	0	1.5	1	1	1	4.5
Becker et al, 1974 ^{26,27}	0.5	2	1	1*	1.5	6
Starfield et al, 1976 ²⁸	1	0.5	1	0	0.5	3
Alpert et al, 1976 ²⁹	0	2	2	1	1.5	6.5
Roos et al, 1980 ³⁰	2	0.5	1	0.5	0	4
Ettlinger & Freeman, 1981 ³¹	1.5	1.5	2	1.5	2	8.5
Shear et al, 1983 ³²	1.5	0*	2	1*	0.5	5
Wasson et al, 1984 ³³	2	2	2	2	1	9
Phillips & Shear, 1984 ³⁴	1*	1	2	1.5	1	6.5
Flynn, 1985 ³⁵	2	1	2	1	0.5	6.5
Susman et al, 1989 ³⁶	1	1.5	2	1.5	1*	7
Hjortdahl, 1992 ³⁷	2	1	1.5	1*	1	6.5
Freeman & Richards, 1994 ³⁸	2	0.5	1	0	1	4.5
Petersen et al, 1994 ³⁹	1*	1	1	1	0.5	4.5
Rowley et al, 1995 ⁴⁰	0	1*	1.5	1.5	0	4
Smith, 1995 ⁴¹	0	1	1	1	0	3
Sweeney & Gray, 1995 ⁴²	1.5	0.5	2	0.5	2*	6.5
Ettner, 1996 ⁴³	0.5	1.5	2	2	1	7
Lambrew et al, 1996 ⁴⁴	1.5	1.5	2	1.5	2	8.5
Weiss & Bluestein, 1996 ⁴⁵	2	2	2	1.5	2	9.5
Flocke et al, 1997 ⁶	1.5	1	2	1.5	2	8
O'Malley et al, 1997 ⁴⁶	1	1.5	2	2	1.5	8
Gill & Mainous, 1998 ⁴⁷	1.5	2	2	2	1	8.5
Mainous & Gill, 1998 ⁴⁸	2	2	2	2	1	9
O'Connor et al, 1998 ⁴⁹	1	2	2	2	1.5	8.5
Ettner, 1999 ⁵⁰	1	1.5	2	1.5	1	7
Howie et al, 1999 ⁵¹	1	1	1	0.5	1	4.5
Christakis et al, 2000 ⁵²	2	2	2	1.5	1.5	9
Christakis et al, 2001 ⁵³	2	2	2	2	1	9
Boss & Timbrook, 2001 ⁵⁴	2	2*	2	2	1*	9
Gallagher et al, 2001 ⁵⁵	0.5	1	1.5	1.5	1	5.5
Hanninen et al, 2001 ⁵⁶	1	2	2	2	1.5	8.5
Mainous et al, 2001 ⁵⁷	2	1	1.5	1.5	1.5	7.5
Overland et al, 2001 ⁵⁸	2	1.5	2	2	1	8.5
Sturmberg & Schattner, 2001 ⁵⁹	2	2	1.5	1.5	1.5	8.5
Gill et al, 2002 ⁶⁰	1	2	2	2	1.5	8.5

Note: Scores are the average of independent reviews by 2 authors.

FP = family physician; 2 = yes; 1 = somewhat; 0 = no.

* Cells where authors scores differed by more than 1 point requiring a repeat evaluation and discussion.

particular outcome as either quality or cost (ie, either Table 1 or 2). For example, hospitalization rate can be considered to both an important driver of cost and an indirect indicator of care quality. We therefore decided

to include studies examining hospitalization rate in both analyses. In contrast, we considered appointment no-show rates, emergency department visits, and office visit frequency to be costs, but not quality outcomes.

Table 2. Quality Analysis of Studies Examining Interpersonal Continuity and Care Costs

Study	Interpersonal Continuity Defined and Measured in Credible Way	Study Design Appropriate to Study Question	Cost Outcome Measured Applicable to FP Practice	Cost Measured in Appropriate Manner	Outcome Studied Applicable to FP Practices	Overall Quality of Evidence
Alpert, 1964 ⁶¹	0.5	1	2	1.5	1.5	6.5
Alpert et al, 1968 ²² & 1976 ²⁹	0	1.5	2	2	1.5	7
Heagarty et al, 1970 ⁶²	0	1.5	2	2	1.5	7
Becker et al, 1974 ^{26,27}	0.5	2	1.5	0.5	1	5.5
Hennelly & Boxerman, 1979 ⁶³	1*	0.5	1.5	1.5	1*	5.5
Phillips & Shear, 1984 ³⁴	1*	1	1	0.5	0.5	4
Wasson et al, 1984 ³³	2	2	2	2	1	9
Hjortdahl & Borchgrevink, 1991 ⁶⁴	0.5	1	1.5	1	1	5
Smith, 1995 ⁴¹	0.5	0	1.5	0.5	0	2.5
Sweeney & Gray, 1995 ⁴²	1.5	0.5	2	1	2	7
Rowley et al, 1995 ⁴⁰	0	1*	1	1	0.5	3.5
Weiss & Bluestein, 1996 ⁴⁵	2	2	1.5	2	2	9.5
Cornelius, 1997 ⁶⁵	1.5	2	2	2	1.5	9
Gill & Mainous, 1998 ⁴⁷	1.5	1.5	2	1.5	1	7.5
Mainous & Gill, 1998 ⁴⁸	2	1.5	2	1.5	1	8
Raddish et al, 1999 ⁶⁶	1	1	2	1.5	1.5	7
Christakis et al, 1999 ⁶⁷	2	2	2	1.5	1.5	9
Gill et al, 2000 ⁶⁸	2	1.5	2	2	1	8.5
Meredith et al, 2001 ⁶⁹	1.5	1.5	1	0.5	0.5	5
Christakis et al, 2001 ⁵³	2	2	2	2	1.5	9.5

Note: Scores are the average of independent reviews by 2 authors.
 FP = family physician; 2 = yes; 1 = somewhat; 0 = no.
 * Cells where authors scores differed by more than 1 point requiring a repeat evaluation and discussion.

RESULTS

Table 1 displays the 40 studies (41 articles) addressing the association between interpersonal continuity and care outcome, as well as our assessment of the quality of evidence in each study. Because each outcome was evaluated by the 5 criteria listed as column headings in Table 1, a total of 200 quality scores were assigned for the 40 studies. Independent review by the 2 authors resulted in scores that were similar. In 11 of the 200 cells, our quality score differed by more than 1 point. For each study, the sum of the scores for each criterion is listed in the last column of this table as a measure of overall study quality.

Table 2 displays the results of a similar analysis of the 20 studies (22 articles) addressing the association

between interpersonal continuity and the cost of care. A total of 100 quality scores were assigned for these 20 studies. Our scores differed by more than 1 point in only 4 of the 100. The scores listed in Table 2 are derived by using the same process described above. Table 2 also lists a total score ranking the quality of each of article in the last column.

In Supplemental Table 1 (<http://www.annfam.org/cgi/content/full/3/2/159/DC1>) we summarize each study by examining improved outcome and indicating whether a significant association existed between interpersonal continuity and each outcome being studied.

Many of the articles reported multiple outcomes. Supplemental Table 1 displays each reported outcome

separately in the fourth column. The fifth column lists whether a significant association was found between interpersonal continuity and each outcome. Further details about the findings for each study are listed in the sixth column, and the quality score for each study (from Table 1) is listed in the last column. The studies in Supplemental Table 1 are displayed in order of decreasing total quality score.

In 5 of the 40 studies, the researchers failed to find a significant association between an improved outcome and interpersonal continuity.^{30,35,36,55,58} In 2 studies at least 1 care outcome was found that was significantly worse with interpersonal continuity.^{55,56} Twelve studies had a positive association for at least 1 outcome, but there was no significant association for other outcomes.* The remaining 23 articles reported a positive association for all outcomes addressed in the study.

The most common outcomes examined in these studies were the delivery of preventive care (12 studies examined 22 separate outcome variables),[†] hospitalization rate (9 studies, 11 outcome variables),[‡] quality of doctor-patient relationship (5 studies, 5 outcome variables),^{26,38,42,51,57} chronic illness management indicators (4 studies, 8 outcome variables),^{34,49,56,58} and maternity care outcomes (4 studies, 16 outcome variables).^{32,35,40,54} Supplemental Table 2 (<http://www.annfammed.org/cgi/content/full/3/2/159/DC1>) displays the most commonly studied care outcomes and is sorted by outcome category to allow comparison of results across multiple studies.

A total of 81 separate care outcomes were reported in these 41 articles. **Of these outcomes, 51 were significantly improved in association with interpersonal continuity of care.** In 2 cases, interpersonal continuity was found to be associated with a significantly worse outcome. Roos et al³⁰ found that appropriate referral criteria for tonsillectomy were less likely to be documented when interpersonal continuity was present, and Gallagher et al⁵⁵ found that women were more likely to receive counseling about hormone replacement therapy when they received care from both a family physician or internist and an obstetrician. No significant association or a mixed association was found in the remaining 28 outcomes.

There were 7 clinical trials, 14 cohort studies, 17 correlational studies, and 2 case control studies included in this analysis. Interpersonal continuity of care was measured in 10 different ways by these articles. These measurement methods have been previously reviewed.¹⁹ The most common methods used were patient survey (10 studies),[§] usual provider continuity index (UPC, 6 studies),^{6,38,41,48,54,57} index provider identification (5 studies),^{21,28,36,39,42} continuity of care index

(COC, 5 studies),^{30,33,35,52,53} and duration of relationship with the primary physician (5 studies).^{21,37,45,57,58} In 7 of the studies, including 6 of the 7 clinical trials, patients were assigned either to a clinic designed to deliver clinician continuity or to a clinic with no physician continuity.^{22-26,29,40,70} Unfortunately, the quality of evidence in these studies is compromised, because in only 1 study was continuity actually measured in either study group.³³

Supplemental Table 3 (<http://www.annfammed.org/cgi/content/full/3/2/159/DC1>) summarizes the 20 studies examining the association between interpersonal continuity and the cost of health care.

Only 1 of these studies directly examined the total cost of health care,⁶⁵ and 1 study measured total Medicare part A and B costs.⁴⁵ The most commonly examined cost variables were hospitalization rate (10 studies),^{||} frequency of office visits (4 studies),^{29,34,63,66} emergency department visits (4 studies),^{42,53,67,68} office appointment no-show rate (4 studies),^{26,29,42,61} and utilization of diagnostic tests (4 studies).^{29,33,62,64}

Our review identified 5 clinical trials, 3 correlation studies, 2 case control studies, and 10 cohort studies (Supplemental Table 2). Eight different methods of measuring continuity of care were used in these 20 studies, and no method was used by more than 3 studies. In 3 of the 4 clinical trials, patients were assigned to clinics with or without continuity, but continuity was not measured in either study group.^{24,26,29,40,70} Only 1 study found no significant association between interpersonal continuity and any of the cost outcomes being studied.³⁴ One study identified 2 cost outcomes that were significantly higher when interpersonal continuity was present. Hjortdahl and Borchgrevink⁶⁴ found that increased interpersonal continuity was associated with increased prescription drug use and specialty referral. Nineteen of the 20 studies identified a significant association between interpersonal continuity and at least 1 reduced cost variable.

These studies examined a total of 41 cost variables. **A significant positive association was found between reduced cost and interpersonal continuity for 35 of these variables.** Two cost outcomes were higher, and no significant association was found for the remaining 4. One of the cohort studies examined interpersonal continuity as the dependent variable in a managed care environment and found a significant association between more restrictive utilization and increased continuity of care.⁶⁹

* References 21, 22, 24, 26, 32, 38, 40, 43, 45, 49, 50, 56.

† References 22, 24, 26, 29, 43-46, 50, 52, 55, 60.

‡ References 22, 29, 32, 33, 41, 45, 47, 48, 53.

§ References 31, 43, 44, 46, 49-51, 55, 56, 60.

|| References 29, 33, 34, 39-41, 45, 47, 48, 53, 66.

DISCUSSION

Our literature search identified 9 review articles published before April 30, 2002, that examined the evidence of an association between interpersonal continuity and improved outcomes or lowered cost.^{13-15,71-76} Most previous reviews of interpersonal continuity have reported an association between such continuity and patient satisfaction,²⁰ but evidence of improved outcome or reduced cost has been deemed less conclusive. All these reviews cite persistent methodologic challenges regarding the definition and measurement of continuity of care, and most concluded that there was insufficient evidence that such continuity uniformly improves care.^{14,15,71-75} One author raised the possibility that transient discontinuity might actually improve care by allowing new insights into the process of diagnosis and management.⁷⁵ Since we began our review, several additional studies that examined the association of continuity of care and improved outcomes have been published in the primary care literature.^{70,77-83} We chose not to include these articles in our review, because we have not systematically searched the literature for all studies published after April 2002.

Our results suggest that interpersonal continuity is associated with improvement in some outcomes of care. In particular, interpersonal continuity seems to be associated with improved delivery of preventive services and with lower rates of hospitalization. An association between interpersonal continuity and improved measures of chronic illness care is less clear from our review. It is also important to remember that association does not imply causation. Most of the studies included in this review are retrospective cohort studies or cross-sectional patient surveys, which do not allow us to evaluate a cause-effect relationship. Seven studies included in our analysis were clinical trials, a method that would allow us to evaluate causation, but 6 of them did not report a measurement of interpersonal continuity in either study group. So although patient assignment may have been randomized, the degree to which continuity was superior in the intervention groups is unclear. Other differences between the control and intervention groups in these trials also confounded the results. In the only clinical trial that did show better continuity in the intervention group, Wasson et al³³ found significantly fewer hospitalizations, fewer intensive care unit days, and shorter hospital lengths of stay in elderly male veterans.

Even though a cause-effect relationship between interpersonal continuity and reduced hospitalization and improved preventive health measures is possible, it is important to entertain other possibilities as well. It could be that increased interpersonal continuity is the

effect of patients experiencing desired health outcomes rather than the cause of these outcomes (ie, patients with good outcomes are happier with their care and choose to maintain longer term relationships with their clinicians than are patients with poorer health outcomes). Perhaps the long-term doctor-patient relationship is representative of some other characteristic of the patient that is, in fact, more directly related to improved outcomes, or perhaps it is representative of a well-coordinated system of care, which as a whole contributes to improved patient health outcomes.

Similar to previous reviews, we found considerable diversity in how interpersonal continuity was measured and widely different techniques of measuring care outcomes. Two studies suggested that outcomes might be improved when a larger number of physicians were involved in the care (reduced interpersonal continuity).^{30,55} In only 1 study was interpersonal continuity associated with increased cost.⁶⁴ None of the other studies included in this review associated interpersonal continuity with worse outcome or higher cost. In fact, 35 of 40 studies found a positive association with at least 1 improved outcome of care, and 51 of the 81 outcomes examined in these studies were significantly improved.

Nineteen of 20 studies associated interpersonal continuity with lower cost and 35 of 41 cost variables were significantly lower. Unfortunately, all but 1 of the cost studies examined only an indirect aspect of cost, and only 1 actually correlated total health care cost with continuity of care.⁶⁵ The highest quality studies uniformly found an association between interpersonal continuity and lower cost variables, but again no inference can be made about cause-effect relationships because of the limitations of study methods.

In conclusion, the available medical literature suggests that interpersonal continuity of care is associated with significant improvement in at least some care outcomes. The strongest evidence of such an association is for those outcomes that have been most frequently studied: preventive services and hospitalization. There are fewer studies addressing the association between continuity and cost, and most have looked at only 1 or 2 indirect aspects of cost. Continuity research continues to be limited by inconsistencies in how continuity is defined and measured, but recent work seems to be creating more consensus on these issues. Christakis⁸⁴ has suggested that, "it is time to declare continuity of care an outcome and to spur subsequent research in how to better achieve it." If we consider continuity of care an outcome, however, are we really sure that it is a desirable outcome? Those of us in primary care would likely answer yes, but the behavior of health plans and health system planners suggests that others might not be convinced. The discipline of family medi-

cine has always been predicated on a core assumption that interpersonal continuity of care is as important to patients as it is to family physicians. Now that our research expertise is maturing, it is time to prove that this assumption is valid.

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Key words: Continuity of patient care; primary health care; physician-patient relations; quality of health care; health care costs

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