

Associations Between Continuity of Care and Patient Outcomes in Mental Health Care: A Systematic Review

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Objective: Research investigating the association between continuity of care (CoC) and patient outcomes in mental health care is limited. A previous review (1970–2002) concluded that evidence for an association between CoC and outcomes was inconsistent and limited. This systematic review, conducted a decade later, provides an update.

Methods: Searches (1950–2014) were conducted on MEDLINE and PsycINFO. Included studies used a clearly identified measure of CoC and examined its relation to an outcome among adults (ages 18–65). Only English-language publications were included.

Results: A total of 984 studies were identified that measured CoC. Eighteen met inclusion criteria, and 13 found an association between CoC and an outcome. As found in the previous review, studies reported conflicting results for the most frequently examined outcomes (hospitalization, symptom severity,

social functioning, and service satisfaction). Little consistency was found between studies in choice of CoC measures and outcomes. Studies varied markedly in quality. Two of the three studies rated as good quality reported significant associations between CoC and social functioning. Compared with older studies, studies published since the previous systematic review (2002–2014) found a larger proportion of significant associations.

Conclusions: Little consistency was found in the way CoC was measured, which made it difficult to compare studies. Therefore, clear evidence about the association between CoC and outcomes remains limited. Results in regard to social functioning are encouraging. However, in order for conclusions to be made, researchers need to be more consistent with the measures they choose to allow comparison of studies.

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Continuity of care (CoC) is a multidimensional construct that can broadly be defined as the long-term delivery of care that is coordinated among services and is appropriate to a patient's current needs. The three-dimensional definition of relationship, informational, and management continuity developed by Haggerty and colleagues (1) is a common example of a multidimensional approach to CoC. CoC is considered a cornerstone of modern health care provision and is included as an indicator of quality of care in national health policy in the United Kingdom (2) and internationally (3). As health care becomes more specialized, patients are often seen by an increasing number of clinicians, teams, and organizations. Concern that this stratification of services leads to fragmentation of care has led to scoping exercises and service evaluations in order to improve CoC in the United Kingdom and Canada (3,4). Patients and professionals also endorse the importance of CoC, and discontinuity of care is cited as a major source of patient dissatisfaction and disengagement (5,6).

Studies designed to test factors that improve CoC have been conducted in a number of primary and secondary care settings, including general practice settings and emergency

departments, and with patients with a range of conditions, including cardiovascular disease, maternity care, pediatric care, diabetes, cancer, and mental health (1,4). In general medicine, there is evidence that CoC is associated with improved patient outcomes in pediatric care (7–9), diabetes care (10,11), prenatal care (12), general practice (13), and internal medicine (14).

However, few studies have investigated the association between CoC and patient outcomes in mental health care. A conceptual review of CoC by Johnson and colleagues (15) found three studies that reported on the association between CoC and patient outcomes. They concluded that these studies suffered from “substantial limitations,” most notably that they focused only on one or two dimensions of CoC when the conceptual literature emphasizes its multidimensional quality. Studies also suffered from low response rates and short follow-up durations.

Adair and colleagues (16) conducted a systematic review and found only five studies between 1970 and 2002 that examined the association between CoC and patient outcomes in mental health care. They reported that the studies identified

were inconsistent in both the way that they measured CoC and the patient outcomes that they investigated. They concluded that there is little evidence to suggest that patients have better outcomes with improved CoC but that this may be “primarily attributable to the underdevelopment of measures.”

Given the renewed focus on CoC in modern mental health care over the past decade, this systematic review aimed to update the evidence in regard to associations between CoC and outcomes.

METHODS

Search Strategy

This systematic review followed the guidelines of the Centre for Reviews and Dissemination guidance document (17). Relevant articles, published between 1950 and February 2014, were identified using MEDLINE and PsycINFO. We replicated the search strategy used by van Walraven and colleagues (18), including the search terms “continuity of care,” “continuity of patient care,” and related keyword phrases and keywords related to outcomes. We modified their search strategy by adding the Medical Subject Headings “mental disorders” and “mental health services” to restrict the search to articles in the field of mental health.

Inclusion and Exclusion Criteria

All studies had to meet the following four criteria. First, the study had to have used at least one quantitative measure of CoC. Examples of quantitative measures include time from inpatient discharge to first outpatient contact with mental health services, the number of outpatient service contacts over a specified period, and the number of changes in care coordinator. Studies were excluded if they used a service structure (for example, assertive outreach team) or specified model (for example, the “continuation of care” model) as a proxy for CoC rather than a distinct measure (for example, number of changes in care coordinator). Second, the study had to have investigated a CoC measure in regard to a specified outcome. Studies were excluded if they did not have a distinct measure of CoC and a separate measure of outcome. Outcomes were clinical (hospitalization and symptom reduction) or functional (quality of life, employment, and general community functioning) or were related to patient service satisfaction and treatment adherence. Third, only articles in English were included. Fourth, studies had to have investigated an adult sample (ages 18–65) with a primary diagnosis of mental illness. Studies that included participants with comorbid substance use disorders were included; however, they were excluded if participants’ primary diagnosis was substance misuse or a general medical condition, even if the patients had a comorbid mental disorder.

Study Screening and Selection

After identifying the screening criteria, the two reviewers (SP and AF) practiced applying them to a subset of the articles and determining their level of agreement, before

they independently inspected titles and abstracts against the inclusion criteria. Any disagreement was resolved through discussion. Subsequently, a single reviewer (SP) inspected the full text of the remaining articles to assess eligibility. References and citations of the included articles were searched by hand for further relevant articles. Here only associations that were significant at the final stage of analysis (for example, after Bonferroni corrections or multivariate analysis) are reported.

Quality Assessment

There is no recommended instrument for quality assessment of nonrandomized studies (19). In their systematic review of CoC in health care, van Walraven and colleagues (18) used the Newcastle-Ottawa Scale (NOS), which has not been subject to psychometric evaluation or peer review.

To select a quality assessment instrument for this systematic review, the NOS was compared against selected checklists described in Sanderson and colleagues’ (19) review of quality assessment instruments. Sanderson and colleagues identified three types of instrument: simple checklists, checklists with additional summary judgments, and weighted scales. Only checklists were included in our review because Sanderson and colleagues’ advise against using weighted quality scales. Weighting component items and domains implies different levels of importance, and Sanderson and colleagues found these weightings variable and inconsistent. Our final list was based on four criteria: the instrument was developed for future use, the development was described in the article, the instrument was developed for use in systematic reviews, and the instrument was developed to assess cohort studies. Five quality assessment instruments fulfilled these criteria (20–24). Two of the five were excluded for not specifying scoring criteria (20,21). The QUADAS instrument was excluded because it measures diagnostic test accuracy, not study quality (23). Zaza and colleagues’ (22) instrument was excluded after a pilot trial. Even though the authors included instructions for completion, both reviewers found several of the items difficult to interpret and too generic to answer confidently. For example, one item covered three separate questions of randomization, matching, and participant allocation. Therefore, only Steinberg and colleagues’ (24) assessment instrument was compared with the NOS.

The NOS is a nine-item checklist divided into three subscales: selection of participants (four items), comparability of study groups (two items), and ascertainment of exposure and outcome (three items). For the purpose of this review, articles were ranked on their total score (possible score of 9). Steinberg and colleagues’ (24) checklist contains 24 items, scored as 0, .5, or 1 depending on the extent to which they fulfill the required criteria. Not all items are relevant to all studies and thus are not rated. A total score between 0 and 1 is created by dividing the summed score of responses by the total number of rated questions. Papers with a score over .5 are considered good.

The two reviewers rated all articles included in the systematic review with both the NOS and Steinberg and colleagues’

TABLE 1. Summary of 18 studies measuring the association between continuity of care (CoC) and outcomes

Study and country	Design	Follow-up	N	Type of CoC measure	Outcomes measured	Results
Adair et al. (35), Canada ^a	Prospective cohort	17 months	411	Observer-rated scale, patient-rated scale	Symptom severity, functioning, service satisfaction, other (quality of life)	No association between CoC and symptom severity; CoC associated with better functioning, service satisfaction, and quality of life
Bindman et al. (31), UK	Prospective cohort	20 months	100	Patient-rated scale, breaks in care, change in keyworker	Hospitalization, symptom severity, functioning	No associations between CoC and hospitalization, symptom severity, or functioning
Brekke et al. (30), US	Prospective cohort	12 months	41	Contact intensity, breaks in care	Hospitalization, symptom severity, functioning	No association between CoC and hospitalization; CoC associated with reduced symptom severity and improved functioning
Catty et al. (37), UK	Prospective Cohort	24 months	180	Continuity measures created from factorial analysis	Hospitalization, symptom severity, functioning, other (quality of life, therapeutic relationship, care needs met)	Consolidation and care coordination factors associated with reduced odds of hospitalization; regularity associated with a higher risk of being hospitalized; meeting needs associated with an increase in symptoms the previous year but a decrease the following year
Chien et al. (25), US	Retrospective cohort	12 months	351	Continuity indices	Other (Medicaid cost, life satisfaction, satisfaction with health)	Better CoC associated with reduced Medicaid costs; CoC not associated with life satisfaction or satisfaction with health
Greenberg et al. (26), US	Retrospective cohort	8 months	131	Continuity indices, contact intensity, contact regularity	Symptom severity, functioning, other (therapeutic alliance, life satisfaction, commitment to treatment, substance abuse, violence, employment)	No associations between CoC and outcomes
Greenberg & Rosenheck (32), US	Retrospective cohort	3–6 months	181,651	Contact intensity, contact regularity, time to contact after discharge	Functioning	CoC associated with better functioning; for continuing outpatient group, intensity of contact associated with poorer functioning
Greenberg et al. (27), US	Prospective cohort	4 months	2,357	Continuity indices, contact regularity, time to contact after discharge	Symptom severity, other (substance abuse, violent behavior)	No significant associations between CoC and symptom severity or substance abuse; better CoC associated with reduced violent behavior
Grinshpoon et al. (33), Israel	Retrospective Cohort	6 months	908	Time to contact after discharge	Hospitalization	Better CoC associated with lower risk of rehospitalization
Heffernan & Husni (39), UK	Retrospective cohort	24 months	26	Changes in keyworker.	Hospitalization	No association between CoC and number of days in a hospital
Hoertel et al. (28), France	Retrospective cohort	36 months	14,515	Continuity of Care Index	Other (mortality rate)	Likelihood of death significantly lower among patients with better CoC
Huff (34), US	Retrospective cohort	1 month	3,755	Time to contact after discharge, total number of services used	Hospitalization	Contact within 5 days of discharge related to a reduced risk of rehospitalization; however, greater service utilization associated with increased risk of hospitalization

continued

TABLE 1, continued

Study and country	Design	Follow-up	N	Type of CoC measure	Outcomes measured	Results
Lehman et al. (41), US	Quasi-experimental	12 months	661	Patient-rated scale, changes in keyworker	Hospitalization, symptom severity, functioning, other (life satisfaction)	CoC associated with reduced symptom severity; no significant differences found in hospitalization, functioning, or life satisfaction
Mitton et al. (36), Canada ^a	Prospective cohort	17 months	437	Observer-rated scale	Other (health care costs)	No association between CoC and total cost (a trend, $p=.054$); better CoC associated with lower hospital costs and higher community costs
Olsson et al. (42), US	Prospective cohort	3 months	208	Consultation with outpatient consultant before discharge	Hospitalization, symptom severity, functioning, other (employment, medication adherence)	CoC associated with reduced symptom severity; no associations between CoC and hospitalization, functioning, employment, or medication adherence
Sweeney et al. (38), UK	Cross sectional	None	167	Patient-rated scale	Other (therapeutic relationship, health needs, social needs)	CoC associated with better therapeutic relationships and more health and social needs met
Sytema & Burgess (29), Australia and The Netherlands	Retrospective cohort	48 months	2,257	Breaks in care, time-to-contact after inpatient discharge	Hospitalization	No association between CoC and hospitalization
Vita et al. (44), Italy	Retrospective cohort	18 months	99	Contact regularity	Other (medication adherence)	Regular CoC (1 visit a month) associated with better medication adherence; greater intensity of contact (more than 1 visit a month) related to poorer medication adherence

^a Two studies with same sample

instrument. The instrument to be used in the review was chosen on the basis of the level of concordance in ranking and scores between the two raters. Both reviewers also rated each article using an overall judgment of quality as good, moderate, or poor. The judgment was based on five criteria: an adequate sample size, study design, whether the study controlled for extraneous variables either in the design or statistically, the proportion of participant data collected (adequate participant follow-up was considered to be 70%), and the absence of any obvious risks of bias. Studies were considered good quality if they were rated as good by both reviewers or good by one reviewer and fair by the other.

RESULTS

The search strategy generated 984 studies. After duplicates were removed, abstracts of 687 studies were screened for relevance. Of these, 73 were identified as being related to CoC, and after a full-text review, 59 were excluded. Reasons for exclusion were: 47 (80%) did not measure CoC, seven (12%) used CoC as an outcome measure, four (7%) were conceptual reviews of CoC, and one (1%) was not in English. A further four studies were included after a hand searching of references listed in the selected articles, resulting in 18 studies for inclusion in the analysis. These studies are summarized in Table 1. All five studies from the review by Adair and colleagues (16) were included. Two studies that were published before, but not reported in, their review were also included in this review. Eleven included studies were published after Adair and colleagues' review.

Study Designs

No randomized controlled trials were identified. Half of the studies ($N=9$) used a retrospective cohort design or a prospective cohort design ($N=7$). One study had a cross-sectional design, and one had a quasi-experimental design. Of the 18 studies, 17 were longitudinal. The length of follow-up ranged from 30 days to four years (median=12 months).

Measurement of CoC

The 18 studies showed little consistency in the measurement of CoC. Four studies used the Continuity of Care Index (COC Index) (25–28); two of these were from the same group of authors. Three studies used “breaks in care” as a measure, although all three defined a break differently (29–31). Five studies used the time from hospital discharge to first outpatient contact, again measured in a variety of ways (27,29,32–34). Table 2 summarizes information about the CoC measures used in the studies. This inconsistency of measurement made meta-analysis impossible.

Thirteen studies investigated CoC from the service provider's perspective. Most of these studies used contact frequency and regularity or changes in care provider as a measure of continuity, with two exceptions. Adair and colleagues (35) created an observer-rated continuity instrument that measured various aspects of CoC and was used in two

studies (35,36). Catty and colleagues (37) combined multiple single-item measures into continuity factors through factorial analysis and measured those factors against outcomes.

Three studies measured continuity from a patient's perspective by using specifically developed instruments (35,37,38).

Association Between CoC and Outcomes

Table 3 summarizes the direction of the association between CoC and outcomes in the 18 studies. There was little consistency in outcome measures across studies, and some studies that used the same outcome often measured it differently. For example, the six studies that used "duration of hospitalization" as an outcome used three different measures of duration: total number of days in the hospital (31,37,39,40), average number of nights in the hospital per month (41), and hospitalization measured with the Strauss Carpenter Outcome Scale (30). The relationships between CoC and specific outcomes are reported below.

Hospitalization Outcomes

Duration of hospitalization. Six studies examined duration of hospitalization (29–31,37,39,41). Only Sytema and Burgess (29) found an association between CoC and duration of hospitalization. They compared CoC in Groningen, Netherlands, to CoC in Victoria, Australia, and found that duration of hospitalization was longer in the cohort with poor continuity of care (Groningen) but there was no increase in the relative risk of readmission between the cohorts.

Relative risk of rehospitalization. Four studies tested for associations between CoC and the relative risk of rehospitalization (31,33,34,42). Using "time to first contact after discharge" as their measure of CoC, Grinshpoon and colleagues (33) and Huff (34) found that CoC was associated with a reduced risk of hospitalization. Grinshpoon and colleagues reported reduced rates of rehospitalization after 180 days for patients who had visited an outpatient clinic within 180 days of their discharge, and Huff found a reduced risk of readmission after 30 days for patients who had an outpatient contact within five days of discharge from their index admission. However, the Huff study also found that increased service utilization (more services contacted and a larger number of service contacts) was associated with an increased risk of readmission.

Number of days to readmission. Sytema and Burgess (29) examined the association between CoC and the number of days to readmission and found no association.

Symptom Severity

Eight studies investigated the association between CoC and symptom severity. Five used the Brief Psychiatric Rating Scale (BPRS) (30,31,35,37,42) to measure symptoms, two used specific rating scales for posttraumatic stress disorder (PTSD) (26,27), and one used the Symptom Checklist–90 (41). Four of the eight studies found an association between CoC and symptom severity (30,37,41,42). Brekke and colleagues (30)

found that greater intensity of contact and fewer gaps in care were associated with reduced BPRS scores 12 months after discharge from a hospital. Olfson and colleagues (42) found that patients who had a predischARGE contact with their outpatient clinician were significantly more likely than those with no contact to have lower BPRS scores after three months. Conversely, Lehman and colleagues (41) found that after a year, symptom severity scores were worse in their intervention group compared with a control group. Catty and colleagues (37) found that two of their factors were associated with increased symptom severity, whereas one factor was associated with decreased symptom severity.

Neither study investigating the association between CoC and PTSD symptoms found any difference in symptom severity (26,27). None of the studies published since the review by Adair and colleagues (16) found an association between CoC and symptom severity.

Social Functioning

Eight of the 18 studies investigated an association between CoC and social functioning (26,30–32,35,37,41,42). Three found an association between good CoC and improved functioning in the community. Greenberg and Rosenheck (32) examined the charts of a sample of 181,651 veterans enrolled in Medicaid. They found that Global Assessment of Functioning (GAF) scores increased over six months with improved regularity of care (number of months with at least one visit) and provider consistency (COC Index). Adair and colleagues (35) found that an increase in functioning, measured by the Multnomah Community Ability Scale (43), was associated over 17 months with better CoC among 411 outpatients. Brekke and colleagues (30) also found an association between increased regularity and intensity of contact and higher GAF scores.

Service Satisfaction

Three studies investigated the association between CoC and service satisfaction. Two of these found no association (41,42). Adair and colleagues (35) found an association between Service Satisfaction Scale scores at 17 months and better reported and observed CoC.

Other Outcomes

A number of other outcomes were measured. Ten of the 18 studies investigated 26 other outcomes, finding eight associations in eight different studies. Three studies investigated quality of life (26,35,37). Adair and colleagues (16) reported a significant association between improved CoC and better quality of life, and the other two found no difference (26,37). All three studies used different measures for quality of life, had different follow-up durations, and targeted different patient populations (general mental health and PTSD-specific samples). Chien and colleagues (25) found no association between CoC and satisfaction with mental and general medical health. Contradictory results were found for medication adherence (42,44) and substance abuse reduction (26,27); both significant associations and no associations were found. Three studies examined

life satisfaction (25,26,41), and none found any association. No study found an association between CoC and employment (26,27,42), violent behavior (26,27), or levels of homelessness (42).

Three studies investigated the therapeutic relationship (26,37,38). Two found no associations (26,37). Sweeney and colleagues (38) found that better self-reported CoC was related to a better patient-provider relationship. They also reported a significant association between self-reported CoC and a greater proportion of patient needs met as measured by the Camberwell Assessment of Needs (CAN). However, Catty and colleagues (37) found no association between CoC and CAN scores. Two studies investigated the association between CoC and health care costs. Chien and colleagues (25) found an association between usual-provider continuity and decreased Medicaid costs, which they attributed to less hospital usage. Mitton and colleagues (36) found a nonsignificant trend toward reduced total costs with better CoC. Finally, a large-scale risk study by Hoertel and colleagues (28) found an association between better CoC, as measured by the COC Index, and a lower mortality rate.

Quality Assessment

The results of the quality assessments are reported in Table 4. The intraclass correlation coefficient measuring reliability between the two raters was .51 (95% confidence interval [CI]=.07–.78) for the NOS and .58 (CI=.17–.82) for Steinberg and colleagues' instrument. These are both considered at the lower bounds of moderate agreement according to Fleiss (45). Given the poor level of agreement and wide CIs for both scales, neither quality instrument was used in evaluating study quality in this review. There was a good level of agreement for both researchers' 3-point rating scale (.67, CI=.30–.86) (Table 4). Six studies were rated good (either both raters rated the study as good, or one rater rated the study as good and the other as moderate), six were rated moderate, and six were rated as poor-quality studies.

All six studies rated as good reported significant associations between CoC and an outcome, with nine of the 15 outcomes tested found to be significantly associated with CoC. Of the six studies, only Lehman and colleagues (41) did not find that good CoC was associated with at least one improved outcome.

Lehman and colleagues' (41) study was the only one that investigated hospital readmission and found no association. Two studies measured symptom severity; Adair and

colleagues (35) reported no association, whereas Lehman and colleagues (41) found an association between fewer changes in case manager and an increase in symptoms. Three investigated the association between CoC and social functioning (32,35,41), with two finding an association between good CoC and an improvement in social functioning (32,35). Adair and colleagues (35) found an association between CoC and service satisfaction, whereas Lehman and colleagues (41) found no association. Other outcomes that were associated with CoC included mortality rate (28), therapeutic relationship (38), quality of life (35), number of needs met (38), and lower health care costs (25). There were no associations between CoC and life satisfaction (25,41) and satisfaction with general medical health (25).

TABLE 2. Continuity of care (CoC) measures used in 18 studies and association with outcomes, by type of measure

Type of measure and study	N items in instrument	N studies using measure
Multicomponent CoC measure		
Indices		
Continuity of Care Index (25–28)	—	4
Usual-provider continuity (25)	—	1
Sequential continuity (25)	—	1
Modified Continuity Index (26,27)	—	2
ECHO factors (37) ^a	7	1
Observer-rated scales: ACSS-MH observer (35,36) ^b	17	2
Patient-rated scales		
ACSS-MH patient (35)	37	1
CONTINU-UM (38) ^c	51	1
Perceived accessibility score (31)	10	1
Met needs score (41)	2	1
Single-component CoC measure		
Contact intensity		
Summed minutes of contact (30)	—	1
N days with at least 1 contact (26)	—	1
Total N of contacts (32)	—	1
Contact regularity		
N months with at least 1 contact (26,27,32)	—	3
N of 2-month periods with at least 2 contacts (27)	—	1
Breaks in care		
N days from missed contact to next contact (31)	—	1
N of 30-day gaps without contact (30)	—	1
N of 90-day gaps without contact (29)	—	1
Summed N of days of 90-day gaps (29)	—	1
Time to contact after inpatient discharge		
Visit within 30 days (27,32)	—	2
Visit within 5 days (34)	—	1
N days between discharge and first visit (29,33)	—	2
Changes in keyworker.		
Total N of keyworkers (31)	—	1
Change in keyworker (39,41)	—	2
Keyworker allocated (41)	—	1
Total N of services used (34)	—	1
Consultation with outpatient consultant before discharge (42)	—	1

^a ECHO, Experiences of Continuity and Health and Social Outcomes in Mental Health

^b ACSS-MH, Alberta Continuity of Services Scale for Mental Health

^c CONTINU-UM, CONTINUity of care–User Measure

TABLE 3. Direction of outcomes in 18 studies measuring the association between continuity of care and outcomes^a

Study	Hospital readmission	Symptoms	Social functioning	Service satisfaction	Other
Lehman et al. (41) ^b	=	–	=	=	
Olfson et al. (42)	=	+	=	=	=
Brekke et al. (30)	=	+	+		
Sytema & Burgess (29)	=				
Bindman et al. (31)	=	=	=		
Chien et al. (25) ^b					= +
Huff (34)	+				
Greenberg et al. (27)		=			+
Greenberg et al. (26)		=	=		=
Adair et al. (35) ^b		=	+	+	+
Mittton et al. (36)					+ – =
Greenberg & Rosenheck (32) ^b			+		
Vita et al. (44)					+ –
Heffernan & Husni (39)	=				
Grinshpoon et al. (33)	+				
Sweeney et al. (38) ^b					+
Catty et al. (37)	+ –	+ –	=		+ – =
Hoertel et al. (28) ^b					+
Outcome score ^c	2	1	3	1	

^a Outcomes, compared with baseline or treatment as usual, were rated as positive (+), no difference (=), or negative (–). A positive outcome indicates a good clinical outcome. For example, for hospital admissions, it could mean fewer days hospitalized or reduced relative risk of re-admission. For functioning, a good outcome reflects higher scores (for example, better functioning) on the Global Assessment of Functioning. More than one symbol indicates findings in different directions of association. Studies are ordered by year published, from earliest to latest.

^b Quality assessed as good

^c Represents the relative strength of agreement (possible range of –18 to 18); created by summing results of each outcome category (+, 1; =, 0; –, –1). The “other” category was not scored because “other” outcomes were too heterogeneous to compare.

Studies Since Previous Systematic Review

Of the five studies described in the review by Adair and colleagues (16), only two found significant associations for CoC, one with symptom control (42) and one with reduced costs (25). Both studies published within the period reviewed by Adair and colleagues but not included in their review found significant associations (30,34). The 11 studies published after the review by Adair and colleagues reported additional significant associations; nine found an association between CoC and a variety of outcomes (hospitalization, functioning, medication adherence, service satisfaction, quality of life, life satisfaction, violence reduction, health care costs, risk of mortality, and the therapeutic relationship).

DISCUSSION

The aim of this study was to systematically review the association between CoC and outcomes in mental health care. It updates and expands on the review by Adair and colleagues (16) of a decade ago.

There has been a notable increase of interest in studying the association between CoC and outcomes. Seven studies identified in this review were conducted in the 32 years between 1970 and the Adair review in 2002, and 11 studies were conducted since 2002. Development is also evident in measuring patients' perception of CoC and its associations

with outcomes; since the last review, two made-for-purpose patient-rated scales were used in three outcome studies (35,37,38). All three of these studies of patient-rated CoC showed significant associations between CoC and an outcome. This move toward patient-rating follows the theoretical literature's shift toward a patient-focused understanding of CoC (15,46).

The increase in quantity of publications has not brought increased consistency of measurement, and there remains considerable variation in both measurement of CoC and the choice of outcomes. CoC is a multidimensional construct (15), and one would expect measures to address different components of CoC. However, most studies examined only the regularity of, or gaps in, provider contact, and the heterogeneity of measures is within this narrow conception of CoC. Although measuring CoC in a variety of different ways creates a comprehensive and rich understanding, progress in the field may have been slowed by this lack of consistency. To determine whether service-focused measures, such as regularity of contact and changes in care coordinator, are a meaningful construct when measuring CoC, replication of existing measures and of prior research may currently be more useful.

This review found no clear association between CoC and outcomes. Although more than half of the 18 studies reviewed reported associations between CoC and an outcome, results were conflicting for all the main outcomes investigated. A number of studies had methodological limitations, including small samples (30,39), short follow-up duration (27,34,42), and poorly controlled cohorts (29), which likely influenced the results of many of the studies.

The overreliance on cohort designs makes it difficult to infer causality. For instance, Greenberg and Rosenheck (32) found that for their continuing outpatient group (those who were already outpatients in regular care), intensity of contact was associated with worse functioning. This finding may reflect an appropriate response to poorer functioning rather than a causal link between greater contact intensity and poorer functioning. Similarly, in Sweeney and colleagues' (38) cross-sectional study, CoC was associated with the therapeutic relationship and the number of patient needs met. In theory, the therapeutic relationship is a process that leads to better CoC rather than an outcome of CoC.

Of the studies rated as good, social functioning was the only outcome for which results suggested an association between good CoC and an improvement (32,35). For health care costs (25), risk of mortality (28), therapeutic relationship (38), and number of needs met as measured by the CAN (38), significant associations were found between good CoC and better outcomes. However, these are all single findings

TABLE 4. Rater scores and rankings for quality assessment tools to assess the quality of 18 studies measuring the association between continuity of care and outcomes

Study	Newcastle-Ottawa Scale ^a				Steinberg et al. instrument ^b				Rater's evaluation ^c	
	Rater 1		Rater 2		Rater 1		Rater 2		Rater 1	Rater 2
	Rating	Rank ^d	Rating	Rank ^d	Rating	Rank ^d	Rating	Rank ^d		
Adair et al. (35)	7	2	9	1	.92	4	.85	3	Good	Good
Bindman et al. (31)	7	2	8	2	.89	6	.73	6	Moderate	Moderate
Brekke et al. (30)	5	4	5	5	.77	11	.67	8	Moderate	Moderate
Catty et al. (37)	7	2	6	4	.85	8	.77	5	Moderate	Moderate
Chien et al. (25)	5	4	6	4	.92	4	.83	4	Good	Good
Greenberg et al. (26)	6	3	3	7	.92	4	.57	11	Poor	Poor
Greenberg & Rosenheck (32)	5	4	4	6	.89	6	.62	10	Poor	Moderate
Greenberg et al. (27)	6	3	6	4	.96	3	.86	2	Moderate	Good
Grinshpoon et al. (33)	6	3	6	4	.79	10	.83	4	Moderate	Moderate
Heffernan & Husni (39)	6	3	6	4	.86	7	.86	2	Poor	Poor
Hoertel et al. (28)	8	1	8	2	1.00	1	.92	1	Good	Good
Huff (34)	7	2	7	3	.65	13	.69	7	Moderate	Moderate
Lehman et al. (41)	6	3	9	1	.90	5	.63	9	Good	Moderate
Mitton et al. (36)	8	1	7	3	.81	9	.69	7	Moderate	Moderate
Olfson et al. (42)	7	2	8	2	.97	2	.73	6	Moderate	Poor
Sweeney et al. (38)	5	4	5	5	.69	12	.67	8	Moderate	Good
Sytama & Burgess (29)	7	2	6	4	.53	15	.57	11	Poor	Poor
Vita et al. (44)	6	3	7	3	.58	14	.54	12	Moderate	Poor

^a Possible scores range from 0 to 9, with 9 indicating that most criteria are met.

^b Possible scores range from 0 to 1, with higher scores indicating better quality.

^c Possible ratings were good, moderate, or poor.

^d Studies are ranked from highest score to lowest score for each of the two measures. Studies with the same score are ranked in the same position. A higher ranking indicates a higher study quality.

without corroboration. Good CoC was found to be significantly associated with worse symptom severity by Lehman and colleagues (41).

Our review identified an emerging consensus in terms of the outcomes that are important for measuring the effects of CoC. Hospital readmission, symptom severity, and social functioning were the most studied outcomes by far.

This review had a number of limitations. First, CoC is a broad concept, and authors use various terms, such as coordination of care and care integration, interchangeably to describe it (47). The search strategy used in this review was intentionally broad to find studies with different naming conventions, but it is still possible that relevant articles were missed. Second, lack of conformity across studies in designs, measures, and outcomes meant that a meta-analysis was not possible. Third, this review excluded studies with samples that were drawn from patients with a primary diagnosis of substance abuse with a comorbid mental disorder, children and adolescents, and older adults, and generalizability to other patient groups is limited. Fourth, only one reviewer (SP) inspected the full-text articles for eligibility, and thus no interrater checks for this stage of the screening process were conducted. Finally, the quality assessment ratings should be interpreted with caution.

CONCLUSIONS

Research into the relationship between CoC and outcomes has accelerated, but there is still no clear evidence that CoC

improves patient outcomes in mental health care. These findings echo Adair and colleagues' (16) review of a decade ago. The 18 identified studies found conflicting results for all main outcomes measured. Furthermore, persisting variation in measuring both CoC and outcomes makes meaningful comparisons difficult. Studies that are poorly designed, use small samples, and measure only a single element of CoC are unlikely to add to our understanding of continuity. Future studies should incorporate experimental designs and focus on multidimensional measures of CoC. More recent studies have found modestly encouraging results, especially in relation to social functioning, but replications that use better methodologies and measures are needed before evidence-based conclusions can be drawn.

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