

Care Management for Serious Mental Illness: A Systematic Review and Meta-Analysis

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Objective: Persons with serious mental illness face adverse psychiatric and medical outcomes, and their care is associated with a large burden of health care costs. Care management, in which assessment, care planning, and care coordination are provided, is a common model of support, yet the evidence supporting its use among psychiatric populations is mixed. A systematic review and a meta-analysis were undertaken to determine the impact of care management on clinical outcomes, acute care utilization, cost, and satisfaction among adults with serious mental illness.

Methods: A multidatabase literature search was performed. Articles were included if they compared standard outpatient care plus care management with standard outpatient care alone for adults with serious mental illness and reported on one or more predefined outcomes. Randomized controlled trials (RCTs) and other study designs were permitted for inclusion in the systematic review. The meta-analysis included only RCTs.

Results: For the systematic review, 34 articles representing 28 unique studies were included. Fifteen of these articles, representing 12 unique studies, were included in the meta-analysis, which indicated that care management was associated with small, statistically significant improvements in psychiatric symptoms, overall quality of life (QOL), and mental QOL (Hedges' g range 0.13–0.26). In addition, care management was associated with a small, statistically significant reduction in inpatient psychiatric hospital days (Hedges' $g=0.16$, $p=0.02$).

Conclusions: Care management is associated with fewer psychiatric symptoms and greater QOL for persons with serious mental illness. Further work is needed to determine which components of the intervention are associated with effectiveness.

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Serious mental illness, which encompasses schizophrenia spectrum disorders and bipolar disorder, is associated with adverse outcomes, such as increased risk for death (1, 2) and disability (3), and contributes a large burden of cost to the health care system (4, 5). The role of community-based support in the care of patients with serious mental illness came to prominence during the rise of deinstitutionalization in the 1960s and 1970s (6). This period saw the emergence of several models of community-based care, including assertive community treatment (ACT) (7–9), intensive case management (ICM) (10, 11), and other forms of care or case management and community-based support programs. Nonintensive care or case management differs from ACT and ICM in fundamental ways. Whereas ACT is always team based and ICM is often team based, nonintensive care management is not a team-based model, does not specify low staffing ratios, and does not require direct provision of care or services (10–12).

ACT and ICM have been the focus of several major reviews, including a Cochrane review (13) that found

significant reductions in hospitalizations and improvements in retention in care. However, the literature on nonintensive forms of care management is sparse, particularly in studies with experimental designs (10). The Cochrane review's authors (13) wrote that they “currently know of no review

HIGHLIGHTS

- Models of care management for individuals with serious mental illness are heterogeneous.
- In a meta-analysis, care management was associated with small improvements in psychiatric symptoms, overall quality of life, and mental quality of life among adults with serious mental illness.
- Further research is needed to identify which components of care management for serious mental illness are associated with favorable outcomes.

comparing non-ICM with standard care and reporting relevant outcomes.”

The past two decades have seen increased interest in care management interventions, as health systems have continued to prioritize cost containment in addition to effective clinical care. Care management has come to consist of several core activities (as defined by the National Academy of Certified Care Managers) (14): assessment, care planning, and coordination of care (including service referral). Nonintensive or nonteam-based care management—to which we refer in this article henceforth simply as “care management”—has had mixed results in the medical setting (15–18). One challenge in studying care management is that models of care management are highly heterogeneous and not well suited to replication or categorization (11). Nevertheless, given the complex and often fragmented system of community mental health care, this model has remained of interest in psychiatry (19–21).

This study is the first major systematic review of the literature on care management for individuals with serious mental illness in more than two decades (10, 11) and, to our knowledge, is the first-ever statistical synthesis of this literature. Specifically, we sought to study the impact of care management on health outcomes, acute care utilization, and patient satisfaction among adults with schizophrenia spectrum disorders and bipolar disorder.

METHODS

This study was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (22). A predetermined protocol was followed.

Search Strategy

A systematic literature search was conducted on October 22, 2018. Searches were conducted in Embase, MEDLINE, Web of Science, PsycINFO, CINAHL, and the Cochrane Database. Searches included variations of the following terms: care management, case management, case coordination, patient coordination, care facilitation, patient facilitation, care navigation, patient navigation, health coach, care partner, bipolar, schizophrenia, schizoaffective, and serious mental illness. The search was supplemented by review of the relevant articles’ bibliographies. A search example is provided in an online supplement to this article.

Inclusion Criteria

Because findings of previous reviews suggested that only few studies of care management for individuals with serious mental illness are available, we took an inclusive approach to study design by permitting randomized controlled trials (RCTs), quasi- and non-RCTs, prospective cohort studies, retrospective cohort studies, and time-series analyses in our systematic review (23).

Studies were included only if at least half of their participants met our criteria for being persons with serious mental illness, namely having schizophrenia spectrum disorders or

bipolar disorder. Studies varied in their approaches to reporting the diagnoses of their participants. For the purpose of screening and data extraction, we assumed that participants categorized by authors as having “psychotic disorders,” without any further specification in the text, had schizophrenia spectrum disorders. If the classification “affective disorders” was used without further specifying diagnostic categories, we counted all participants with this classification as having nonserious mental illness, because we could not disaggregate the disorders of these patients.

The interventions of the included studies had to meet our definition of care management: an individual performing assessment, care planning, and coordination of care (including service referral) at least partly in the outpatient setting and a nonteam-based model of service. We required that the primary activities of the care manager not include psychopharmacology, psychotherapy, or medication administration (i.e., components of standard outpatient psychiatric care); however, we recognized that care managers may not only plan and coordinate care (as is typical of a brokerage model of care management) but may also engage in direct provision of services (10, 11), often involving coaching or providing education about mental or general medical health topics. Studies of peer interventions were excluded. Regarding the comparator, we required that the only difference between the control group and the intervention group be the care management intervention and that both groups otherwise receive standard outpatient care. In other words, included studies had an intervention cohort that received standard outpatient care plus the care management intervention and a control cohort that received standard outpatient care alone, without the care management intervention. Accordingly, for time-series analyses, we required the participants to have received ongoing outpatient care at preintervention time points.

We also required the studies to have reported on one or more of the following outcome domains: psychiatric symptoms, general medical health symptoms, mental quality of life (QOL), physical QOL, global QOL, patient satisfaction, total health care costs, number of inpatient psychiatric hospitalizations, number of inpatient psychiatric hospital days, and number of emergency department visits.

Screening and Data Extraction

Two of three reviewers (C.T.L., M.P.C., and C.H.K.) independently examined each title and abstract in the systematic review program Covidence, a Web application that allows reviewers to screen citations and articles, extract data, and reconcile disagreements. For this study, Covidence was used only for screening and reconciliation. Relevant articles were obtained as full texts and assessed for inclusion independently by two reviewers each. Disagreements between reviewers were resolved via consensus; the senior author (M.C.T.) was consulted if consensus was not reached by the two initial reviewers. The senior author reviewed all definitions of care management to ensure consistency with the inclusion criterion as defined above.

Two of the three reviewers independently extracted the data from each study by using a predetermined data tool in Microsoft's Excel for Office 365. Foreign-language articles were translated into English for extraction. Extracted data included information on the study authors, design, population, intervention, comparator, outcomes, and quality. Because of the anticipated heterogeneity of care management interventions across studies, we prospectively identified several intervention characteristics to extract for each study: whether an intervention explicitly included the coordination of social services, such as housing or employment services (as opposed to the coordination of clinical care, which the interventions in all of the included studies entailed); whether an intervention explicitly entailed the direct provision of services (such as coaching about mental or general medical health); whether an intervention was embedded in the outpatient psychiatric team; care manager caseload; and intervention duration. Several of these intervention characteristics have been previously associated with care management effectiveness (10, 11, 24). Study authors were contacted if this information was missing from the journal articles. Disagreement between reviewers was resolved via consensus; the senior author was consulted if consensus was not reached by the two initial extractors.

For studies comparing more than two cohorts, the cohort that received the most intensive intervention that met our definition of care management was compared with the control cohort. If multiple measures for an outcome domain were reported, one measure was extracted per domain, and the broadest outcome definition was selected (e.g., general psychiatric symptoms was chosen over psychosis-specific symptoms). If outcomes for multiple time points were reported, the data were extracted either from the longest time point during active care management or from the 12-month follow-up point, whichever was longer. If the 12-month time point was not available, the shortest time point longer than 12 months was extracted; if a 12-month or longer time point was not available, the longest time point was extracted.

Meta-Analysis and Quality Assessment

We used Biostat Comprehensive Meta-Analysis software, version 2.2, to perform a random-effects meta-analysis of each outcome domain for which at least two studies contributed data. To be included in the meta-analysis, an individual analysis in a study had to report an unadjusted mean of a continuous variable, a measure of dispersion (such as standard deviation, standard error, or confidence interval), and the sample size for both the intervention and the control cohorts. A Hedges' g , the standardized mean difference measure recommended by the Cochrane Handbook for Systematic Reviews of Interventions (23), was calculated for each meta-analyzed outcome domain. Our meta-analysis included only RCTs. For each analysis, a confidence interval and a p value were calculated, as well as I^2 and Q values as measures of effect size heterogeneity (23).

Because the systematic review included studies with heterogeneous study designs, we developed a custom quality

assessment tool adapted from the Newcastle-Ottawa Quality Assessment Scale (25) and with input from other studies (26, 27) that have assessed the quality of heterogeneous study designs. Our quality assessment tool rated studies in a binary fashion on seven dimensions: representativeness, response bias, appropriate control, ascertainment of exposure and non-contamination, planned follow-up duration, follow-up rate, and outcome assessment. A total quality score was then calculated (range 0–7, with 0 indicating lowest quality and 7 indicating highest quality). Detailed quality assessment methods are described in the online supplement.

A sensitivity analysis was conducted to assess for publication bias. Funnel plotting and a two-tailed Egger test were performed on all outcome domains with at least three contributing studies. We had planned to perform moderator analyses with study- and intervention-level characteristics as moderator variables; however, because of the limited number of RCTs that met inclusion criteria, we ultimately deferred these analyses.

RESULTS

A PRISMA diagram (see the online supplement) summarizes the process used to search and screen the literature.

Study and Participant Characteristics

Overall, 34 articles (20, 21, 28–59) representing 28 unique studies and 12,783 study participants were included in the qualitative synthesis of the literature. Of these 28 studies, 14 were RCTs, two were non-RCTs, four were prospective cohort studies, three were retrospective cohort studies, and five were time-series analyses. For the meta-analysis, 15 articles (20, 21, 28–40) representing 12 unique studies (RCTs with adequate intervention and control cohort outcome data) and 3,960 study participants were included.

The included studies represented a broad period, as shown by the publication dates of the articles; 15 were reported in articles published in 2010 or later, six in articles published between 2000 and 2009, and seven in articles published before 2000. Of the 12 studies in the meta-analysis, eight were reported in articles published in 2010 or later, three in articles published between 2000 and 2009, and one in articles published prior to 2000.

The studies represented a wide range of locations, including 10 studies performed in the United States, 12 performed in Europe, and six performed elsewhere, including Israel (two studies), India, Iran, South Africa, and Canada (one study each). Twenty studies had multicenter designs. Most studies enrolled patients from standard outpatient mental health or community health services in the study location. Exceptions included two studies that enrolled individuals during or shortly after inpatient psychiatric hospitalization (48, 59), two that enrolled individuals who were homeless and residing in a shelter or other temporary accommodation (33, 34, 47), one that enrolled homeless individuals who had recently been psychiatrically hospitalized and were living in a

transitional residence (57–59), and one conducted in two U.S. Veterans Affairs clinics (30).

Patient characteristics were summarized across all studies included in the qualitative synthesis. Of note, reporting of patient characteristics varied across studies, because of issues such as missing data and alternative methods of reporting demographic information (e.g., age histogram vs. mean age). Thus, total sample sizes for patient characteristics did not precisely match the total number of patients noted above ($N=12,783$). Mean patient age was 40.0 years ($N=3,798$), and 44.3% (2,922 of 6,597) were women. Diagnostically, of 12,809 patients, 86.4% ($N=11,062$) met our definition of having serious mental illness; 75.1% ($N=9,624$) had schizophrenia spectrum disorders, 6.0% ($N=768$) had bipolar disorder, and 5.2% ($N=670$) had an unspecified serious mental illness. Of the 28 studies, seven enrolled only patients with schizophrenia or other psychotic illness, three only patients with bipolar disorder, and two only patients with either schizophrenia spectrum disorders or bipolar disorder. The 16 other studies included both patients with and patients without serious mental illness.

Several studies had other notable participant characteristics. As mentioned above, three studies specifically enrolled individuals who were homeless, and one study enrolled U.S. veterans. One of the studies (47) of homeless individuals enrolled participants who were homeless and had comorbid serious mental illness and substance use disorder. Finally, a U.S. study (45) based in New York City specifically enrolled Hispanic individuals and delivered a bilingual care management intervention.

Intervention and Control Characteristics

Care management across the 28 studies represented a range of interventions, despite sharing the common characteristics of assessment, care planning, and coordination of care. Care management in 17 of the 28 studies explicitly involved social service coordination. In another 17 studies, the intervention explicitly involved the direct provision of services, beyond care planning and coordination. Examples of direct service activities included psychoeducation (21, 36, 49, 50), counseling on treatment adherence (21, 31, 48, 50, 55), counseling on medications (32, 36, 48), counseling on general medical health (38, 41, 45), crisis intervention (31, 46, 49), and other clinical skills and self-management training (30, 36, 56). In 19 studies, care management was performed exclusively by a clinically trained individual, such as a nurse or social worker. All 28 studies included some in-person intervention; none entailed an entirely virtual or telephonic intervention. The care manager was integrated into the outpatient mental health team in six studies; in none of the studies was the care manager integrated into the outpatient medical team. Care manager caseload was reported only in 16 of the 28 studies; among these studies, mean \pm SD caseload per care manager was 24.0 ± 21.1 . The mean \pm SD intervention duration across all 28 studies was 16.3 ± 14.6 months.

Only four studies focused on general medical health, wherein there was both a general medical component to the

intervention and at least one general medical outcome measured; all four of these studies had a focus on cardiovascular or metabolic health. Two of these studies (20, 30) were of an intervention for individuals with bipolar disorder (i.e., Life Goals Collaborative Care) that included individual care management, group education, and self-management sessions. Hence, of the three studies that exclusively enrolled individuals with bipolar disorder, two had a general medical health-oriented intervention. Of note, the third study of only individuals with bipolar disorder (36, 37) also had a group education component in addition to care management. None of the other 25 studies had a group component of the intervention.

Several of the study interventions were described as being consistent with a traditional model of care or case management (10, 11). These included three studies using the strengths model (28, 29, 54), three using the clinical model (31, 32, 49), one using a hybrid between the strengths and clinical models (43, 44), two using the rehabilitation model (51, 53), and two using the social services model (33, 34, 56). In most cases, the study authors did not claim to maintain strict fidelity to these models but named these models as paradigms to which the interventions were most closely related. Other studies either did not specify alignment to a specific model or created a novel name for the intervention.

The stated aims of the interventions were manifold, even within individual studies, and included improvements in the outcome domains selected for this review: reduction of psychiatric symptoms, improvement in QOL, reduction of acute care utilization, and reduction of health care costs. Other, more broadly stated goals included rehabilitation (51), social well-being (28), and psychosocial functioning (31, 40, 46). One consistent exception was that the four studies with a general medical health focus all included a general medical health outcome as the primary objective.

As noted above, control cohorts in all studies received standard outpatient care alone; thus, there were no instances in which control cohorts received an alternative to care management that the intervention cohort did not receive. Control cohorts did have access to other outpatient clinical and social services that were also available to intervention cohorts. Of all 28 studies, only the Life Goals Collaborative Care study for bipolar disorder (30) explicitly stated that patients in the control cohort (as well as the intervention cohort) had access to case management through their preexisting outpatient primary and mental health care. Because the study intervention included additional care management beyond this (only available to the intervention cohort), we felt that this study met our inclusion criteria. In all the other studies, there was no indication that control cohorts received any care management services. Additional details of study, participant, intervention, and control characteristics for each study are included in the online supplement.

Outcomes

Qualitative review. A summary of symptom, QOL, patient satisfaction, health care cost, and acute care utilization outcomes

extracted from each study is shown in the online supplement. Data were extracted from at least one study for all prespecified outcome domains, with the exception of general medical health symptoms. For each outcome domain reported by a study, the summary indicates whether the outcomes had a statistically significant difference indicating a positive outcome in the intervention cohort ($p < 0.05$), a statistically significant difference indicating a positive outcome in the control cohort ($p < 0.05$), or no significant difference ($p \geq 0.05$).

Within each outcome domain, most studies reported no significant difference between the intervention and control cohorts. Two exceptions were patient satisfaction (where the intervention cohorts had higher patient satisfaction) and health care costs (where the control cohorts had lower total health care costs). For other outcome domains, when studies detected a statistically significant difference between cohorts, the intervention cohort generally had a positive outcome, with only a handful of exceptions where the control cohort had a positive outcome.

Meta-analysis. We extracted 31 unique analyses and included them in the meta-analysis. Two or more analyses were extracted for all outcome domains, so the meta-analysis could be performed for all outcome domains, except for general medical health symptoms and emergency department visits. An assortment of scales was used across studies to measure psychiatric symptoms, mental QOL, physical QOL, global QOL, and patient satisfaction. Details about these scales are shown in the online supplement.

The results of the meta-analysis indicated positive outcomes associated with care management, with small effect sizes, for psychiatric symptoms (Hedges' $g = 0.15$, $p = 0.03$, 11 studies), mental QOL (Hedges' $g = 0.26$, $p = 0.04$, three studies), and global QOL (Hedges' $g = 0.13$, $p = 0.002$, five studies) (see online supplement). A small, statistically significant reduction in inpatient psychiatric hospital days was found for the care management group (Hedges' $g = 0.16$, $p = 0.02$, four studies), and no significant effect was detected on total number of inpatient psychiatric hospitalizations. In addition, a large effect size indicating a positive outcome for care management was observed for patient satisfaction (Hedges' $g = 0.92$, $p < 0.001$, two studies) and a large effect size indicating a positive outcome for the control group was seen for total health care costs (i.e., lower total cost) (Hedges' $g = -1.07$, $p = 0.02$, two studies). Statistically significant heterogeneity among studies was found in the domains of psychiatric symptoms ($I^2 = 63.4\%$, $Q = 27.3$, $p = 0.002$) and health care costs ($I^2 = 87.1\%$, $Q = 7.7$, $p = 0.005$).

Quality Assessment

A detailed quality assessment for each study is shown in the online supplement. The median quality score across all studies was 3 (of a possible 7). Among the 12 studies included in the meta-analysis, the median score was 4.5. Of note, quality scores were low overall for response bias (three of 28 studies rated as high quality) and for exposure and noncontamination

(two of 28 studies rated as high quality). Most studies (25 of 28) had adequate planned follow-up, and, among studies included in the meta-analysis, most had adequate outcome assessment (21 of 22 outcomes). Funnel plot and Egger test results (see the online supplement) indicated no significant asymmetry in any outcome domains, suggesting no evidence of publication bias.

DISCUSSION

Key Findings

In this systematic review, we identified 28 studies of care management for patients with serious mental illness that have assessed at least one predefined clinical, patient satisfaction, or utilization outcome. These studies were heterogeneous in regard to geography, time when the study was conducted, and study population. Both in the systematic review and in the meta-analysis, more than half of the studies included were reported in articles published in 2010 or later, suggesting that this review synthesized recent, contemporary data.

Diagnostically, the studies had substantial heterogeneity. More than half (16 of 28 studies) included some individuals who did not meet our definition of serious mental illness (i.e., having schizophrenia spectrum disorder or bipolar disorder). A stricter approach to the study population for this review (e.g., requiring all participants to have serious mental illness or limiting the participants to those with schizophrenia spectrum disorder only) would have led to substantially fewer included studies. Aside from differences in diagnoses, however, most studies did appear to enroll general outpatient populations in their respective cohorts. Only a small minority of the studies had other restrictions on enrollment, such as homelessness or comorbid conditions.

Similarly, study interventions were heterogeneous, but some trends were observed. All interventions involved some in-person component, and most involved delivery by a clinician care manager (e.g., a nurse or social worker). Most studies described the interventions as involving social service coordination (17 of 28) and some direct service provision (17 of 28), such as psychoeducation, counseling, and skill training. Other studies' interventions may have included these activities but were not described as such. Indeed, we presume that, in practice, a greater number of study interventions likely included social service coordination and direct service provision. The one distinct category of interventions appeared to be those aimed at improving general medical health (four of 28 studies).

The results of the qualitative review of outcomes across studies indicated that, aside from patient satisfaction and health care costs, most studies showed no significant difference in outcomes between intervention and control cohorts. The meta-analysis revealed a small, positive effect of care management on psychiatric symptoms (Hedges' $g = 0.15$), although we found evidence of statistically significant heterogeneity among studies. The meta-analysis also found a small, positive effect of care management on QOL, both for overall

QOL (Hedges' $g=0.13$) and mental QOL (Hedges' $g=0.26$). Although the overall QOL result was largely attributable to a single study with a large sample size (29), statistically significant heterogeneity was not observed for this domain, and the study was not an outlier in the funnel plot. We found that care management was associated with a small reduction in the number of inpatient psychiatric hospital days (Hedges' $g=0.16$) but not with a reduced number of inpatient psychiatric hospitalizations. This discrepancy may be explained by a difference in statistical power; four studies were included in the analysis of hospital length of stay, whereas only two (a subset of the four) were included in the analysis of the number of hospitalizations. Finally, on the basis of a limited number of studies, care management had a large, positive effect on patient satisfaction (two studies in the meta-analysis) and a large, negative effect on total health care cost (two studies in the meta-analysis).

A comparison between our results and the results obtained with ACT and ICM is of interest. Whereas ACT and ICM have been found to reduce hospitalization rates, increase time in the community, and improve employment outcomes (7, 13), their impact on psychiatric symptoms has been less clear. In contrast, our results indicate that care management has a clear impact on psychiatric symptoms and QOL. It may be that the different underlying objectives of the programs explain this difference. That is, whereas ACT was designed with the goal of supporting deinstitutionalization, reducing psychiatric hospitalization (with studies of ACT often requiring enrolled participants to have had a high level of hospital use), and maintaining function in the community, the studies of care management in this review represented a range of objectives, including symptom improvement as well as reduction of acute care utilization. However, most care management interventions in this review were performed by clinically trained individuals and entailed providing some degree of direct services, such as psychoeducation and skills training. This finding suggests that, overall, contemporary care management for individuals with serious mental illness has support and coordination functions in the service of clinical goals.

Care management interventions were associated with higher total health care costs, but this result should be interpreted with caution. Cost in our meta-analysis was based on aggregating data from only two relatively small studies, between which there was statistically significant heterogeneity. Additionally, one of the studies (55), included only in the qualitative synthesis (because of the lack of reporting on measures of dispersion), indicated a positive effect of the care management intervention from a cost perspective. Another consideration is that our definition of cost in the present analysis was limited only to health care costs. In contrast, the original ACT studies considered cost from a broader, societal perspective (8, 60) by incorporating other costs, such as those incurred by the criminal justice system, which were beyond the scope of our study. Indeed, the complexity of measuring the costs of mental health programs cannot be understated, and there may be inter- and even intrastudy

heterogeneity in how costs are calculated (61, 62). Finally, cost findings are difficult to interpret in the absence of other outcome data; a costlier intervention that also achieves favorable clinical outcomes may be cost-effective.

Limitations and Next Steps

This review had several limiting factors. First, the studies included were heterogeneous, representing a range of interventions, populations, and settings. Whereas all the studies featured interventions that met our definition of care management, some heterogeneity of any effects on the measured outcomes may be attributable to differences among the interventions and intervention aims. Furthermore, as noted above, studies included varying levels of detail about the care management interventions, making it difficult to know with certainty exactly what the intervention components were. Ultimately, we posit that intervention heterogeneity is unavoidable in any review of care management or other community-based psychosocial support. As Rapp notes in a 1998 review of case management (11), "Replication of models is virtually impossible and 'truth' probably lies in components of the models rather than the entire models." Indeed, only a minority of the studies included in this review identified a preexisting model of care management that their intervention embodied; furthermore, when such a model was identified, several studies noted that the model was a paradigm rather than a basis for intervention fidelity.

Additionally, our analyses had limited power to draw subgroup-level conclusions about the effectiveness of care management across the various outcomes in the moderator analyses. For instance, only three of the 12 studies included in the meta-analysis were conducted in the United States. The role of geography, among other variables, is important for future research on care management.

Finally, most of the included studies were limited by low rates of response, ascertainment, and exposure. However, because adherence to care is often a goal rather than an assumption in psychosocial interventions for individuals with serious mental illness (13), it may be inappropriate to expect studies to achieve high exposure; indeed, any studies that do may have features that limit external generalizability.

Future directions for this work include additional research to determine which patient-, intervention-, and context-level factors are associated with the effectiveness of care management for individuals with serious mental illness. To do so, more quality research is needed. In particular, given the heterogeneity of care management interventions, investigators need to understand and enumerate the components of each care management intervention. Although previous studies have attempted to address the issue of heterogeneity by comparing categories of care management (10, 11) or through qualitative analysis of care manager report (63, 64), a fresh approach to this question is needed. Given our findings, we believe it is important for studies to specify whether care managers are performing social service coordination or direct service provision and what those activities entail. Finally,

future studies are needed to couple costs with other outcomes such that interventions can be compared in terms of relative cost, health care utilization, and clinical impact. Indeed, cost-effectiveness analyses, which this study was not designed to perform, are likely to be critical in influencing policies and funding for care management programs.

CONCLUSIONS

Overall, the results of this study have revealed a small positive impact of care management on the psychiatric symptoms and QOL of individuals living with serious mental illness. Further investigation is needed to better understand in which contexts, for which populations, and in which forms care management is likely to be most effective. Further investigation is also needed to confirm the impact on acute care utilization and to assess the cost-effectiveness of care management. Given the severe and multidimensional burden of serious mental illness, these goals remain an urgent imperative for contemporary mental health systems.

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