

Clinical Reviews

EFFECTIVENESS OF CASE MANAGEMENT STRATEGIES IN REDUCING EMERGENCY DEPARTMENT VISITS IN FREQUENT USER PATIENT POPULATIONS: A SYSTEMATIC REVIEW

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Abstract—Background: Case management (CM) is a commonly cited intervention aimed at reducing Emergency Department (ED) utilization by “frequent users,” a group of patients that utilize the ED at disproportionately high rates. Studies have investigated the impact of CM on a variety of outcomes in this patient population. **Objectives:** We sought to examine the evidence of the effectiveness of the CM model in the frequent ED user patient population. We reviewed the available literature focusing on the impact of CM interventions on ED utilization, cost, disposition, and psychosocial variables in frequent ED users. **Discussion:** Although there was heterogeneity across the 12 studies investigating the impact of CM interventions on frequent users of the ED, the majority of available evidence shows a benefit to CM interventions. **Reductions in ED visitation and ED costs are supported with the strongest evidence. Conclusion: CM interventions can improve both clinical and social outcomes among frequent ED users.** © 2013 Elsevier Inc.

Keywords—case management; Emergency Department frequent utilizers; Emergency Department frequent users; frequent utilizers; frequent users; high attenders; high users; high utilizers

INTRODUCTION

As the United States continues to attempt to control the debt crisis, increasing attention has turned to health

care costs to achieve fiscal discipline. Drivers of health care costs in the United States are heterogeneous and include technological innovation, increased administrative expenditures, lack of strong cost-containment measures, increased provider market power, and increased use of health care services (1–5).

One area of health care expenditure that has been under the microscope has been Emergency Department (ED) utilization and cost. From 1997 to 2007, the annual number of visits to EDs increased by 23%, from 96 million to 117 million visits, respectively (6). Given this, there is mounting interest in the group of patients that utilize the ED at disproportionately high rates. These individuals, termed “frequent attenders” or “high utilizers” are frequent users of the ED, with ED visit rates that range anywhere from more than two to as many as 20 visits in any given year (7,8). Approximately 4.5–8% of patients visiting the ED are frequent users. Yet, this small group accounts for 21–28% of all ED visits (7). ED utilization by this group of patients is often viewed as non-emergent and inappropriate (8,9). This contributes to ED overcrowding, compromises quality of care for other patients, and reduces efficiency of health care systems (10,11).

Frequent ED users tend to be more ill, face greater social problems, are more frequently admitted to the hospital, have higher overall mortality rates, have greater psychiatric morbidity, and incur higher health care costs

(8,12–26). This subset of patients places a significant financial strain on health care resources. Frequent users represent about 50% of the Medicaid dollars spent on ED care (27). Compared with patients who are less frequent users, patients visiting the ED between three and 20 times a year incur higher overall costs as well as higher costs across all categories such as laboratory, pharmacy, radiology, catheterization, operating room, and other costs (8).

Interventions aimed at these patients have the potential to reduce ED utilization rates and reduce costs associated with these patients. Studies have employed different strategies to affect ED utilization by these patients, including individualized care plans and case management, patient education, primary care partnerships, and managed care level interventions. Case management is the most frequently cited approach and has been shown to reduce ED utilization and costs (28–42).

Case management (CM) is defined as a “collaborative process of assessment, planning, facilitation, and advocacy for options and services to meet an individual’s health needs through communication and available resources to promote quality cost-effective outcomes” (43). In this approach, case managers identify appropriate providers and services for individual patients while simultaneously ensuring that available resources are being used in a timely and cost-effective manner. This intervention can benefit patients as well as their support systems, the health care systems, and reimbursement sources. CM is based on a model of continuous, integrated medical and psychosocial care, which is markedly different from the episodic and often fragmented care that occurs in the ED setting.

Given the potential benefit of the CM model, studies have investigated the impact of CM on a variety of outcomes such as ED utilization rates and costs. We systematically reviewed the CM literature to determine the proven effectiveness of this model in the frequent ED user patient population. This review focuses on the evidence of impact of CM as an intervention in improving outcomes of frequent users of ED care. The primary outcome of interest was ED utilization, although some studies did report cost analyses and psychosocial outcomes as well.

MATERIALS AND METHODS

We performed a systematic review of the literature designed to capture relevant primary studies for inclusion in our review (44). Figure 1 details the search strategy employed to obtain our results and is based on the PRISMA guidelines (45).

We conducted a comprehensive search of MEDLINE and EMBASE databases. The search was performed in

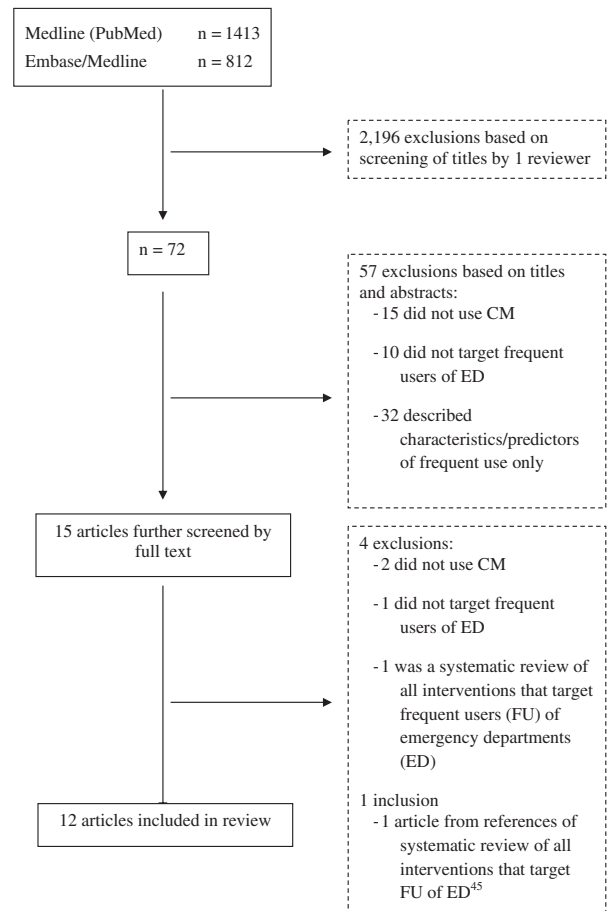


Figure 1. Search strategy of systematic review. CM = case management; ED = Emergency Department.

May 2010 and included studies dating from 1990 to April 2010. A verification search was performed in July 2010.

We combined three main search themes—frequent use, emergency department, and case management—as Medical Subject Headings (MeSH). Frequent use was captured using the terms “frequent use,” “repeat use,” “frequent users,” “frequent attenders,” “repeat users,” and “high utilizers.” Emergency Department location was captured using the broad terms “emergency” and “emergency department.” CM interventions were targeted using the terms “case management” and “intervention.” The Boolean operator “and” was used to combine MeSH terms. Asterisks were used in searches to capture multiple forms of a word (e.g., searching for “use*” captures use, uses, user, users, using). Limits used for each search phrase include publications dating from 1990 to April 2011, human subjects, age >18 years, and English language. In addition, we performed a manual search of the references of captured articles and mined additional relevant articles for inclusion in the literature review.

Given the large number of captured articles, we devised a three-tiered review process. After initial capture, article titles were screened by reviewers for inclusion in the study. After this step, both title and abstract were reviewed to identify articles for an in-depth review by two independent reviewers. Selected articles were retrieved and full text was reviewed independently by two reviewers for inclusion.

We included studies that described a CM intervention in adult patients that were deemed frequent users of hospital ED services. The targeted study population was patients >18 years of age that were designated as frequent users of the ED without specific limitations on medical condition, reason for ED utilization, or complaint.

The studied intervention must have been identified as a CM intervention and the study reported at least one outcome with this intervention. The primary outcomes of interest were ED utilization and cost, although inpatient hospitalization rates and psychosocial variables were included as well. We included studies that describe some form of comparison between patients who receive CM to those who do not receive CM. This included both prospective and retrospective studies, randomized and non-randomized controlled trials, case control studies, and pre- and post-intervention analysis using historical controls.

Data were extracted from full-text articles and compiled by two authors independently. Patient characteristics included age, sex, chief complaint, and medical history. Psychosocial variables included insurance status, homelessness, history of substance abuse or psychiatric disorders, and primary care physician relationship. CM interventions were examined, specifically the use of a CM team or manager, the disciplines involved, and interventions utilized. Outcomes included ED utilization, inpatient admission rates, cost, and psychosocial outcomes.

We assessed risk of bias and limitations of the studies. These included the use of randomization in study design, sample size, identification and selection of control groups, retrospective data collection, selection bias, and follow-up. Discord was settled by discussion and third party review.

RESULTS

The structured search strategy yielded 12 unique studies meeting criteria as described above (28–39). Figure 1 reveals the flow chart of the search strategy used to obtain the relevant results. Table 1 displays details extracted from the studies (28–39).

Of the 12 studies included, two were randomized control trials, eight were pre- and post-intervention studies

using historical controls, and two employed age-matched controls. Taken together, these studies included a total of 960 participants in CM interventions. The average age was 43.7 years, with 56% being male among the nine studies reporting genders. All the studies addressed all adult frequent utilizers of the ED, yet the studied populations were diverse and included insured and uninsured patients, homeless patients, employed and unemployed patients, patients with and without primary care physicians, and patients with psychiatric disorders and substance abuse disorders.

The definition of “frequent users” ranged from more than three visits a year to more than five visits a month. Two studies did not report a specific metric for frequency of use (34,38). There was marked heterogeneity in the types of complaints reported by frequent ED users across all studies, but mental health and substance abuse issues were most frequently cited. Five studies reported mental health and drug/alcohol abuse disorders as the primary clinical presentation, and two studies reported pain as the chief complaint (28,29,31,32,34–36).

There was also significant heterogeneity among the CM interventions used across the 12 studies. The specific CM interventions are further described in Table 2. Six studies described a multidisciplinary CM team, five of which incorporated physicians as part of the CM team (28–30,34–36). Two studies used a single case manager (33,38). Nine studies reported using substance abuse counseling or referral services as part of their intervention, seven studies reported assistance with financial entitlements, seven studies reported using individualized care plans, and three studies reported using assertive and persistent outreach to assist patients in going to their appointments (28–30,32–36,38,39).

All studies investigated a CM intervention with varying outcomes and degrees of effectiveness. Of the 12 studies, 11 studies reported ED use as the primary outcome (28–37,39). Four studies also reported a cost analysis associated with ED use (29,30,33,39). Four studies investigated the effect of CM on disposition such as medical inpatient admissions (29,31,33,39). Four studies investigated the impact of CM interventions on various psychosocial variables such as homelessness, financial needs, and substance abuse (29,31,33,35). Length of follow-up ranged from 5 months to 2 years, with six studies having 12-month follow-up time period.

Emergency Department Use

Among the 11 studies reporting ED use outcomes, eight reported reduction in ED use, two studies reported no significant reduction, and one study reported an increase in ED use (28–37,39).

Table 1. Characteristics of Case Management Intervention Studies Targeting Frequent Utilizers of Emergency Department Care

Study (First Author, Year)	Study Type	Patient Population	Chief Complaint	CM Intervention	Follow-up (Mon)	Outcomes	Limitations
Spillane, 1996 (28)	Randomized controlled trial	>10 ED visits a year (n = 70). Mean age 38 years, 48% male (M)	Substance abuse (20 patients), psychiatric patients (27 patients).	Team: ED physician and ED nurse practitioners Interventions: Individualized care plans, referrals to social work, psychiatric services, and primary care physician, care coordination. multi-disciplinary case conferences	12	No significant difference in number of ED visits between groups (574 ED visits in treatment group vs. 426 visits in the control group).	
Shumway, 2008 (29)	Randomized control trial	≥5 ED visits a year (n = 252). Mean age 43.3 years, 75% male, 54% African American, 57% alcohol problems, 81% homeless, 67% lack insurance.	Mental disorder (22%), injury (16%), skin disorders (8%).	Team: Psychiatric social workers, nurse practitioner, primary care physician, psychiatrist. Interventions: Crisis intervention, individual and group supportive therapy, arrangement of stable housing and financial entitlements, referral to PCPs, substance abuse referral, and ongoing and extensive outreach.	24	Fewer ED visits and reduction in ED costs with CM as compared to controls. Reduction in inpatient medical admissions with CM but no difference in length of inpatient stay, psychiatric ED visits, psychiatric inpatient admissions, medical outpatient visits, inpatient cost, outpatient cost, or all hospital cost. Reduction in homelessness, alcohol use, lack of health insurance, lack of social security income, and unmet financial needs observed among CM patients	No societal costs included.

Wassmer, 2008 (30)	Pre-/post-intervention analysis	≥4 ED visits in a year (n = 157) Mean age 45 years, 68% male, 39% Caucasian, 28% African-American	NR	Team: Project coordinator, two patient navigators, two peer counselors, ED discharge planners Interventions: Education about medical and social services available in community, assistance with housing, individualized care plans, PCP referrals, referrals to mental health services and chemical dependency programs, assistance with transportation and financial entitlements	2 years	Significant reduction ED visits, ED overnight stays, and ED costs	Retrospective design.
Phillips, 2006 (31)	Pre-/post-intervention analysis	≥6 ED visits a year (n = 60). Mean age 48 years, 68% male, 58% single, 33% without PCP.	Drug and alcohol (43%), general medical (27%), psychosocial (30%) problems.	Intervention: Hospital-based care, community and primary health care.	12	Increase in number of ED visits (610 ED visits compared to 777 ED visits) after CM intervention. No change in ED length of stay but increase in numbers of admission for observation. Improvement in housing stability score, linkage to primary care, and engagement with community services.	Retrospective design. No randomization.
Lee, 2006 (32)	Pre-/post-intervention analysis	>3 ED visits in a month (n = 50). Mean age 37.8 years, 44% male, 80% with PCP, 70% Medicaid.	Pain (62%), seizures, respiratory complaints.	Interventions: Limiting narcotics, referral, and coordination with PCPs, referral to community services, social worker, and substance abuse counseling.	5	No difference in number of ED visits with CM intervention.	Short follow-up period.
Okin, 2000 (33)	Pre-/post-intervention analysis	≥5 ED visits a year (n = 53). Mean age 45 years, 87% male, 49% African American, 67% homeless, 100% unemployed, 45% without insurance.	Cardiovascular Alcohol and substance abuse diagnoses Chronic pulmonary disorders Neurologic	Team: Social worker Interventions: Extensive and persistent outreach, crisis intervention, individual and group supportive therapy, arrangement of stable housing and financial entitlements, referral to PCP, substance abuse referral, and community services.	12	40% reduction in ED visits (Median 15 ED visits per year reduced to 9 ED visits per year). 45% reduction in ED cost and 67% reduction in medical inpatient costs with CM intervention. 57% reduction in homelessness, 22% reduction in drug use, and 26% reduction in alcohol use. Increase in patients linked to PCP and obtaining Medicaid.	No randomization. No societal costs included.

(Continued)

Table 1. Continued

Study (First Author, Year)	Study Type	Patient Population	Chief Complaint	CM Intervention	Follow-up (Mon)	Outcomes	Limitations
Pope, 2000 (34)	Pre-/post-intervention analysis	Frequent ED users referred by ED (n = 24). Mean age 46 years, 58% male.	Alcohol use, drug use, & chronic pain (33%), depression & history of violence (25%), drug-seeking (21%)	Team: Social worker, ED medical director, director of quality improvement, care manager, psychiatric nurse, clinical nurse specialist, family physicians, community care providers. Intervention: Individualized treatment plans updated monthly, limiting narcotics and benzodiazepines, referral to PCP, pain program, community resources, and mental health, addiction counseling, communicating care plans with other EDs, supportive therapy, and provision of food services.	12	72% reduction in ED visits (Median 26.5 ED visits per year reduced to 6.5 ED visits per year with CM intervention).	No randomization. Small sample size.
Grover, 2010 (35)	Pre-/post-intervention analysis	≥5 ED visits a month (n = 96) Mean age 42.4 years, 33% male, 67% white, 88% had PCP, 1.2% homeless.	Headache (28%), Back pain (22%), Abdominal pain (16%)	Team: ED nurse & physicians, chemical dependency physicians, hospitalists, pain management physicians, behavioral health physicians, nurses, social workers Interventions: ED treatment plan, referral to PCP, assistance with financial entitlements, chemical dependency treatment program, pain management, psychiatric services, and social services.	6	83% reduction in ED visits (2.3 visits per patient per month reduced to 0.6 visits) 32% referral attendance rate Increase in patients obtaining Medicare or Medicaid. 67% reduction in CT imaging (25.6 CT studies per patients per month reduced to 10.2 CT studies)	Retrospective design. No randomization. Short follow-up period.
Skinner, 2008 (36)	Pre-/post-intervention analysis	≥10 ED visits within 6 months (n = 57). Mean age 43.6 years, 12% homeless, 98% with PCP.	Alcohol related complaints (46%), mental health (37%), abdominal or chest pain (40%).	Team: ED physicians, psychiatric nurse specialist. Interventions: Individualized care plan & key contacts included in medical record, referrals to other services, close observation.	6	31% reduction in ED visits (median 12 ED visits in 6 months compared to 6 ED visits) after CM intervention. 64% of CM patients and 85% of control patients reduced their ED visit rates during the study period.	Regression to the mean. No randomization. Short follow-up period.

Sciorra, 2009 (37)	Pre-/post-intervention analysis	≥5 ED visits in a year (n = 33)	NR	NR	2 to 8	42.4% patients in CM group had a subsequent ED visit compared to 60.6% control patients. History of substance abuse associated with 60% increased risk of return ED visit (1.6 HR). 69% reduction in ED visits after adjustment for substance abuse.	Retrospective design. Small sample size. No randomization. Short follow-up period. Limited data reported.
Witbeck, 2000 (38)	Age-matched controls	Frequent ED users referred by 5 local EDs (n = 10). Mean age 46.5 years, 90% white, 90% homeless, alcohol abuse (100%), cocaine abuse (50%).	NA	Team: Single case manager Interventions: Regular and persistent outreach, assistance with securing housing and accessing resources (financial, food, clothing, legal resources), referral to substance abuse services, social services, and mental health facilities, transport assistance, positive support for functional sobriety, and individualized care plans.	12	58% reduction in ambulance use (0.67 monthly ambulance use rate in CM group compared to 1.2 in control group).	Small sample size. No randomization.
Shah, 2011 (39)	Age-matched controls	≥4 visits a year (n = 98) Mean age 46 years, 52% male, 49% Caucasian, 38% Hispanic, 100% uninsured	Diseases of the pancreas 16% Asthma 7% Diabetes 4%	Interventions: Assistance with access to social and medical resources, scheduling appointments, following-up on referrals, application for benefits, receiving stable housing, care navigation, arranging for support services, care transitions while in hospital, communicating with providers, and linking with other community resources.	24	32% reduction in ED visits for CM patients (median 6 ED visits in 1 year compared to 1.7 ED visits) 26% reduction in ED costs 65% reduction in inpatient admissions costs.	Retrospective design. Control group is different than intervention group at baseline.

CM = case management; ED = Emergency Department; PCP = primary care physician; mon = month; NR = not reported; CT = computed tomography.

Table 2. Specific Case Management Strategies Used in CM Interventions Targeting Frequent Utilizers of Emergency Department Care

Intervention	Spillane, 1996 (28)	Shumway, 2008 (29)	Wassmer, 2008 (30)	Phillips, 2006 (31)	Lee, 2006 (32)	Okin, 2000 (33)	Pope, 2000 (34)	Grover, 2010 (35)	Skinner, 2008 (36)	Sciorra, 2009 (37)	Witbeck, 2000 (38)	Shah, 2011 (39)
Crisis intervention	NR	+	NR	NR	+	+	NR	NR	NR	NR	NR	NR
Assistance in housing	NR	+	+	+	+	+	NR	NR	NR	NR	+	+
Assistance with financial entitlements	NR	+	+	NR	+	+	NR	+	NR	NR	+	+
PCP referral	+	+	+	+	+	+	+	+	+	NR	NR	+
Referral to substance abuse services	NR	+	+	NR	+	+	+	+	+	NR	+	+
Referral to pain services	NR	NR	NR	NR	NR	NR	+	+	NR	NR	NR	NR
Referral to psychiatric services	+	+	+	NR	NR	+	+	+	+	NR	+	+
Referral to social services	+	+	+	NR	+	+	+	+	+	NR	+	+
Assertive community outreach	NR	+	NR	NR	NR	+	NR	NR	NR	NR	+	NR
Multidisciplinary case conferences	+	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Individualized care plans	+	NR	+	NR	NR	NR	+	+	+	NR	+	+
Care coordination outside the ED	+	NR	NR	NR	+	+	+	NR	NR	NR	+	+
Individual and group supportive therapy	NR	+	NR	NR	NR	+	+	NR	NR	NR	+	NR
Liaison with other community agencies	NR	NR	NR	+	+	+	+	NR	NR	NR	+	+
Limitation of narcotics and benzodiazepines	NR	NR	NR	NR	NR	NR	+	+	NR	NR	NR	NR
Providing food services	NR	NR	NR	NR	+	NR	+	NR	NR	NR	+	NR
Transportation assistance (group meetings)	NR	NR	+	NR	NR	NR	NR	NR	NR	NR	+	+
Education about medical and social services available in community	NR	NR	+	NR	NR	NR	NR	NR	NR	NR	NR	NR
Goal creation and assistance	NR	NR	+	NR	NR	NR	NR	NR	NR	NR	NR	+

ED = Emergency Department; PCP = primary care physician; NR = not reported; + = intervention described and utilized in study.

In a prospective pre- and post-intervention analysis using a predominantly unemployed (100%), homeless (67%) population, CM intervention led to a 40% reduction in ED visits (33). Similarly, in a population of uninsured patients, Shah et al. showed a 32% reduction in ED attendance after enrollment in a CM program (39). Patients who were more actively engaged with the services arranged by case managers were significantly less likely to have subsequent ED visits compared to less active patients (39). In this same study, significantly lower ED utilization rates were seen in patients who had graduated from a CM program (i.e., when a case manager felt that the patient understood how to make appointments, receive medications, and follow-up on goals).

In a large retrospective study of 157 patients, Wassmer and colleagues demonstrated a reduction in ED use with CM (30). Likewise, in a small study of 24 patients, Pope et al. demonstrated a 72% reduction in ED visits from a median of 26.5 visits per year to 6.5 visits per year with CM intervention (34). In a study in Scotland, Skinner et al. reported a 64% significant reduction in ED attendance of frequent ED users over the course of 6 months with a CM intervention, with a reduction in median visits from 12 to six ED visits (36). Notably, 98% of participants in this study had an identifiable primary care physician (PCP) and all had access to the national health care system (36). However, an 85% reduction in ED attendance was noted in the patients who had not received CM, lending some ambiguity to the true effect attributed to CM in this study (36).

Among a predominantly insured population with stable permanent housing, an 83% reduction in ED attendance was observed with a CM intervention (35). The authors attributed this finding to inadequate medical management by PCPs and to limitation of narcotics in the ED, because the primary chief complaint among this sample population was chronic pain and desire for narcotics. In a smaller study of 33 participants, Sciorra et al. reported a reduction in ED visits with CM intervention, although the authors did not report the statistical significance of this finding (37). Substance abuse was associated with a 60% increase risk of return ED visit, and after adjusting for substance abuse, there was a 69% reduction in ED visits (37).

In a large prospective, randomized control trial of 252 patients, Shumway et al. found a similar overall reduction in ED attendance among CM patients when compared with usual care patients (29). Patients with >12 visits a year continued to use the ED more than those with lower levels of prior use (5–11 visits a year), although over time, their level of ED use decreased with CM (29). Patients in this study were largely homeless and uninsured, with high rates of alcohol abuse.

Two studies, including a smaller randomized control trial, failed to demonstrate a reduction in ED visits with CM intervention (28,32). A prospective randomized study by Spillane et al. of 70 patients demonstrated no reduction in ED utilization rates in frequent users enrolled in a CM program followed for 1 year compared to controls (28). In a pre- and post-intervention analysis, CM did not reduce ED visitation rates in frequent users (32). In this study of 50 participants, pain was cited as the predominant chief complaint, and CM intervention focused on limiting pain medications and referral to primary care physicians, medical social workers, and community programs (32). Interestingly, a retrospective study by Phillips et al. reported an increase in ED attendance, albeit non-significant, with CM intervention (31). This study included a majority of patients with substance abuse or psychiatric problems underlying the ED visits, suggesting CM may be less effective in reducing ED utilization in this population.

Costs

Of the four studies that reported cost outcomes, all cited a reduction in ED cost among patients enrolled in CM interventions (29,30,33,39). In three pre- and post-intervention studies, significant reductions in ED costs were noted (30,33,39). Okin et al. reported a 45% decrease in ED costs as well as a 67% reduction in medical inpatient costs (33). Homeless patients enrolled in a CM program who were no longer homeless at 12 months realized a greater reduction in hospital costs, whereas patients who remained homeless had the smallest reduction in hospital costs (33). No apparent changes in costs were noted in medical outpatient, psychiatric inpatient, psychiatric emergency, or ambulance services (33). Similarly, in a population of uninsured patients, Shah et al. demonstrated a significant reduction in both ED costs (26%) and inpatient costs (65%) (39). In a randomized controlled study, Shumway et al. demonstrated a reduction in ED costs with CM intervention (29). However, when the cost of the CM program was considered, total hospital costs were similar to those not involved in CM (29).

Disposition

Studies show disappointing results in regards to the effect of CM on hospital admission rates. In a large randomized control trial, CM intervention yielded only a small, non-significant reduction in hospital admission rates (29). Similarly, using a pre- and post-intervention study design, three studies found no significant difference in hospital admission rates with CM intervention (31,33,39). Interestingly, although Phillips et al. demonstrated no

significant reduction in inpatient admission rates, CM intervention did yield a significant increase in rates of ED overnight observation (31). No significant reduction in medical inpatient days, psychiatric emergency visits, psychiatric inpatient admissions, or psychiatric inpatient days was noted with CM intervention (29,33).

Psychosocial Variables

A few studies investigated the impact of CM interventions on various psychosocial variables such as homelessness, financial needs, and substance abuse. CM implementation was associated with improvements in mean housing status score (31). In addition, CM interventions led to a reduction in rates of homelessness as well as lack of health insurance, lack of social security income, and unmet financial needs (29,33,35).

The evidence for an impact of CM intervention on drug and alcohol use is mixed. Drug and alcohol use was significantly reduced with CM in two studies (29,33). However, Philips showed no change in rates of drug and alcohol use with CM (31). In a sub-group analysis by chief complaint (general medical, drug and alcohol, and psychosocial), CM did not affect any sub-group more than others in terms of drug and alcohol abuse outcomes (31).

Other Outcomes

CM interventions improved follow-up with primary care and community care programs (31,33,35). After CM intervention, a reduction in computed tomography scan use and consequent radiation exposure was observed (35). Among a group of patients with mental health and substance abuse, a significant decrease in use of emergency ambulance services was observed after CM intervention (38). However, in this study, patients who did not follow-up with CM intervention were used as comparison, limiting its utility as a control group.

DISCUSSION

Although there were noted differences in results across studies, the majority of the studies included in this review noted a reduction in ED visits after CM implementation. This reduction was found in different patient populations, including both uninsured, unemployed, homeless patients, and insured patients with stable housing, access to care, and an identifiable PCP.

Although the descriptions of the CM programs varied across studies, we are generally able to note that the intensity of the CM program seemed to correlate with improved ED outcomes. Pertinent aspects of the CM intervention that seemed to correlate with improved out-

comes include frequency of follow-up with case managers after the initial interview, availability of psychosocial services such as substance abuse counseling, assistance with attainment of financial entitlements, and the aggressiveness of outreach to participants. For example, studies that describe case managers actively involved in identifying patients on the streets or in their homes, meeting with patients regularly, or accompanying them to their appointments, found significant reductions in ED utilization (29,33,39). It is likely that the aggressiveness of the CM intervention contributed to reduction in ED use noted in these studies. On the other hand, less aggressive involvement such as PCP referrals without ensuring that participants actually attended their appointments may limit the potency of CM interventions.

It is also likely that the greater level of involvement of participants in care management plans can contribute to improved ED outcomes. For example, in the study by Shah et al., case managers worked closely with patients in care navigation and connection with support services (39). With time, case managers reduced their involvement and allowed participants to take a more active role in their own care. This gradual transition towards giving participants a sense of ownership in their own care may have facilitated adherence over time and ultimately, improvement in ED over-utilization.

Although the majority of studies reported benefit, a minority of studies showed no reduction in ED utilization with CM interventions. The reasons for this are unclear, but may be due to the metric used for frequency of ED use, aggressiveness of the CM program, the patient population studied, or the length of follow-up. Both Spillane et al. and Lee and Davenport targeted patients with high rates of ED utilization, more than 10 visits a year and more than three ED visits a month, respectively (28,32). The frequency of ED use of participants at baseline is higher in these studies than other studies in which the majority included patients with ED utilization rates greater than five or six visits a year. CM may be less effective in patients with higher levels of ED use than patients with lower levels of ED use, as patients with higher levels of ED use may be more resistant to change. Shumway et al. found that although ED use did reduce over time for all patients, those with higher levels of prior ED use (>20 visits a year) continued to use the ED more than those with lower levels of prior use (5–11 visits a year) with CM intervention (29). These extreme, high ED utilizers may represent a more challenging group who require a more aggressive approach than the typical frequent ED utilizer. In addition, the relatively short follow-up period of 5 months in the study by Lee may not allow for adequate behavioral change in these higher-frequency ED utilizers (32).

The evidence for an impact of CM intervention targeting mentally ill and substance abuse populations is disparate. In six studies, mental health and substance abuse issues were cited as the chief complaint of these frequent ED utilizers, suggesting these issues underlie the recidivism in these patients (28,29,31,33,34,36). The majority of these studies demonstrated a benefit with CM in reducing ED visitation rates in these patients (29,33,34,36). However, the two studies that failed to demonstrate a benefit included a significant number of patients with substance abuse and psychiatric disorders (28,31). The reason for these conflicting findings is unclear, but may be related to the breadth and intensity of the CM intervention. It may be that patients with these disorders have more complex needs, are more resistant to change, and require more extensive CM interventions. Further research focusing on the specific interventions that are most successful in frequent ED users with psychiatric and substance abuse disorders is needed.

Mirroring the reduction in ED visitation rates, the literature supports the assertion that CM yields a reduction in ED costs among patients enrolled in CM interventions (29,30,33,39). However, only one study factored in the cost of the CM program in the analysis and found that the cost savings were offset by the cost of the CM program (29). Furthermore, CM relies on connecting patients with resources outside of the ED, such as substance abuse counseling and primary care follow-up. It is possible that the reduction in ED costs is counterbalanced by an increase in the cost of these programs. CM may improve cost-effectiveness but not necessarily cost savings among frequent users. It may be difficult to reduce costs significantly in this population as frequent users represent a sicker population with more social needs and may actually require additional services, which would be associated with additional costs.

Importantly, a small number of studies cited improvement in several psychosocial outcomes such as homelessness, housing status, lack of health insurance, and lack of social security income after CM implementation (29,31,33,35). Again, the intensity of the CM intervention including a breadth of available social services is likely conducive towards improved psychosocial outcomes.

Limitations

There are several limitations to our review. First, the heterogeneity across all studies in terms of sample size, methodology, definition of frequent users, and CM interventions makes direct comparisons difficult. Second, there is an over-reliance on both retrospective design and pre- and post-intervention analyses that use historical

controls in the literature of CM intervention. When each person serves as his or her own control, natural regression to the mean from extreme values can be misinterpreted as a positive intervention effect. In retrospective design, confounding and bias are difficult to eliminate. Third, the studies vary in the degree of detail used in describing their CM interventions, which makes it difficult to assess the breadth and intensity of the intervention. Fourth, several of the studies were limited by their small sample size. Fifth, many studies relied on patient referral from the ED for inclusion, raising concerns of selection bias. **Sixth, most studies focused on a single health care system without consideration of diversion of frequent users to nearby hospitals, which can skew results.**

CONCLUSION

From our review, CM seems to be successful in improving both clinical and social outcomes among frequent ED users. Reductions in ED visitation and ED costs are supported with the strongest evidence. The breadth of resources and intensity of intervention seems to correlate with better outcomes. Although the current literature supports the benefits of CM interventions, additional investigation is needed to determine what specific aspects of CM are most successful and cost effective. In addition, studies targeting especially challenging populations of high utilizers, including patients with substance abuse and psychiatric disorders and those with the highest frequency of ED use, are needed.

Acknowledgements—The authors thank Dominique L. Cosco, MD, and Carmen Mohan, MD, for their assistance with reviewing and editing the article.

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ARTICLE SUMMARY

1. Why is this topic important?

Frequent users are a small group of patients that utilize the ED at disproportionately high rates, increasing ED costs and straining limited health care resources. Case management interventions aimed at this group have the potential to improve care and reduce ED utilization rates of these patients.

2. What does this review attempt to show?

The current literature supports the benefits of case management in these patients. CM interventions have been shown to successfully improve both clinical and social outcomes among frequent ED users.

3. What are the key findings?

Of the 12 studies included, eight reported reduction in ED utilization and four reported reduction in ED cost with CM intervention. The breadth and intensity of the intervention correlates with better outcomes.

4. How is patient care impacted?

Implementation of case management strategies may allow for hospital systems to reduce cost while improving the care delivered to frequent ED user patient populations.