

A structured review of chronic care model components supporting transition between healthcare service delivery types for older people with multiple chronic diseases

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Abstract

Objective: Older people with chronic diseases often have complex and interacting needs and require treatment and care from a wide range of professionals and services concurrently. This structured review will identify the components of the chronic care model (CCM) required to support healthcare that transitions seamlessly between hospital and ambulatory settings for people over 65 years of age who have two or more chronic diseases. **Method:** A structured review was conducted by searching six electronic databases combining the terms ‘hospital’, ‘ambulatory’, ‘elderly’, ‘chronic disease’ and ‘integration/seamless’. Four articles meeting the inclusion criteria were included in the review. Study setting, objectives, design, population, intervention, CCM components, outcomes and results were extracted and a process of descriptive synthesis applied. **Results and conclusion:** All four studies reported only using a few components of the CCM – such as clinical information sharing, community linkages and supported self-management – to create an integrated health system. The implementation of these components in a health service seemed to improve the seamless transition between hospital and ambulatory settings, health outcomes and patient experiences. Further research is required to explore the effect of implementing all CCM components to support transition of care between hospital and ambulatory services.

Keywords (MeSH)

information systems; decision support systems; clinical continuity of patient care; chronic care model; CCM; elderly; older people; chronic disease; ambulatory

Introduction

Both internationally and in Australia, chronic diseases are a leading cause of illness, disability and death (Australian Government Department of Health, 2015; World Health Organisation, 2016). The World Health Organization [The original spelling of the organisation “World Health Organization” has been retained. Please check and approve.] estimates that chronic diseases cause 60% of all deaths worldwide. In Australia, chronic disease accounts for approximately 90% of all deaths (Australian Institute of Health and Welfare, 2014). In most cases, death is associated with multiple chronic diseases; three diseases is average, and approximately 20% of deaths are associated with five or more chronic diseases (Australian Institute of Health and Welfare, 2014). The Australian Government Department of Health’s (2016) *National Strategic*

Framework for Chronic Conditions recognises the importance of improving current approaches to the management of chronic disease in the Australian healthcare systems.

The Australian healthcare system is designed to respond efficiently to single episodes of ‘acute’ medical illness or injury (Melbourne Primary Care Network, 2016). The

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focus of this acute care is on the immediate problem, its rapid definition, exclusion of more serious alternative diagnoses and initiation of professional treatment (Wagner et al., 2001). Increasing time demands and difficulties associated with resource allocations challenge primary care physicians' effective treatment of patients (Patrick et al., 2013). Busy practitioners may not know or follow established practice guidelines and may not have the time or facilities to coordinate all those involved in the care of a patient (National Health Committee, 2007; Starfield et al., 2003). These problems are magnified by the fragmented nature of medical care and frequently lead to poor communication and less than optimal follow-through care (Beach et al., 2003; Bouldin et al., 2002; Institute of Medicine, 2001). Nearly 50% of chronically ill patients in the United States, especially those over the age of 65 years, receive inadequate care (Moore et al., 2003). Older people with chronic disease often have complex and interacting needs and require treatment and care from a wide range of professionals and services concurrently (Smith and O'Dowd, 2007). There is an increased risk for gaps in care, fragmentation of care, lack of coordination between services or duplication of services when multiple staff, services, sectors and agencies are involved (Smith and O'Dowd, 2007). This breakdown in coordination of the care of older persons places increased pressure on services to respond in crisis (Reed et al., 2005; Smith and O'Dowd, 2007).

Internationally, the response to the distinctly different and more complex demands of long-term conditions continues to challenge health systems (Binstock et al., 1996; Singh and Ham, 2006). Programmes to manage these patients must overcome multiple challenges, including the recognised fragmentation and complexity of the healthcare system, poorly coordinated service planning and workforce inadequacies (Australian Government Department of Health, 2013; Melbourne Primary Care Network, 2016). In many successful programmes, care is provided in settings or episodes which focus on a single disease. While these programmes may allow for the streamlined, focused provision of care, comprehensive care for multiple chronic diseases is more difficult (Degeling et al., 2006).

The chronic care model (CCM), developed by Wagner, is an approach which has been widely used in a variety of healthcare settings to guide system improvement for chronic care.

The model was developed in two parts: (1) from literature which reported successful practice and system changes resulting in improved care of patients with chronic illnesses and (2) from expert feedback and consensus (Degeling et al., 2006; Wagner, 1998). The aim of the CCM is to transform the nature of daily care for patients with chronic illnesses – specifically, from acute and reactive care to proactive, planned and population-based care. The CCM identifies elements desirable for an effective system-based model of chronic disease management, including patient self-management support, community resources, clinical information systems, delivery system redesign, decision support and healthcare organisation support (Wagner et al., 1996). The first two of these components

– patient self-management support and community resources – are patient centred and aim to empower patients to control their own health and their capacity to access healthcare (Fiandt, 2006). These components involve teaching problem-solving and decision-making skills as well as linking people with their community for support and coordination of care (Fiandt, 2006). The other four components – clinical information systems, delivery system redesign, decision support and healthcare organisation support – are practice strategies which aim to restructure care and care teams to better meet patient needs and to improve practice culture in relation to chronic disease management (Fiandt, 2006). These components, especially delivery system redesign (Bodenheimer et al., 2002), combine to create a proactive healthcare delivery team which communicates regularly with self-activated patients, thereby improving care.

Two published observational studies have researched implementation of the CCM in clinical practice and demonstrated its capacity to improve quality of care (Wagner, 2000; Wagner et al., 2001). However, these studies used uncontrolled before-and-after designs, making it difficult to conclude if changes in patient care resulted from the interventions or from other unmeasured factors (Pearson et al., 2005).

Each of the CCM components has been studied (Grover and Joshi, 2015; Wagner, 1998; Wagner et al., 1996, 2001), and when implemented, the CCM is likely to have a demonstrable impact on those with chronic disease (Coleman et al., 2009; Grover and Joshi, 2015). The CCM has been highlighted as an approach for organisations to translate general ideas for change into specific, locally distinctive applications (Wagner et al., 2001). From a broader perspective, recent randomised controlled trials, meta-analyses and observational studies address the importance of an integrated approach to improving chronic illness care (Barnett et al., 2012; Bleich et al., 2015; Davies, 1995; Duangbubpha et al., 2013; Ouwens, 2005; Smith et al., 2016; Tsai, 2005). The integration of acute and long-term care settings (e.g. hospital and primary care integration) to provide efficiency of healthcare service delivery, user satisfaction and better outcomes for people with disabilities and chronic illnesses has been reported in the United States and the United Kingdom (Davies, 1995; Tsai, 2005). However, these studies involve older people with single chronic diseases; this does not reflect the current situation where many older people have multiple chronic diseases. In a fragmented, time-poor and complex health system, it is a challenge to apply all six components of the CCM to achieve a new model of care for chronic conditions, and a disease-specific model which is patient centred for those with two or more conditions.

This review will identify the components of CCM required to support healthcare to achieve seamless transitions between hospital and ambulatory settings for people over 65 years of age who have two or more chronic diseases. There are many ways to interpret and understand comorbidity; the authors took a stance of defining comorbidity as being 'more than one' condition regardless of the

Table 1. Search strategy terms.^a

Setting 1: Hospital	Setting 2: Ambulatory	Cohort: Elderly/chronic disease	Intervention: Integrated/seamless
Acute care	Outpatient: Clinics/care/health/service	Aged	Discharge programme
Hospital	Primary care	Chronic disease	Integrated delivery system
Inpatient	Ambulatory care facilities	Chronic illness	Integrated healthcare system
Tertiary care centres	Community	Chronic condition	CCM
Emergency medical services	Rehabilitation	Non-communicable disease	Delivery system design
Specialist	Care centres	Complex, multiple, several	Clinical information sharing
	Non-hospital	Chronic health condition	Self-management
	General practitioner	Chronically ill	Decision support
		Frail	Community linkages

CCM: chronic care model.

^aSearch strategy example using Web of Science Database: TS = (('acute care' OR Hospital OR inpatient OR 'tertiary care cent*' OR emergency OR specialist)) AND TS = ((outpatient OR 'primary care' OR 'ambulatory care facilities' OR 'community' OR 'rehabilitation' OR 'care cent*' OR 'non-hospital care' OR 'general physician' OR 'family physician')) AND TS = ((aged OR elderly)) AND TS = (('chronic disease' OR 'chronic illness' OR 'chronic condition' OR 'complex, multiple, several conditions' OR 'chronic health condition')) AND TS = (('integrated delivery system' OR 'integrated healthcare system' OR 'discharge programme')) = 62 articles. Search strategy example using Embase Database: 'acute care'/exp OR 'acute care' OR 'hospital'/exp OR hospital AND ('community care'/exp OR 'community care' OR 'ambulatory care'/exp OR 'ambulatory care' OR 'primary care'/exp OR 'primary care' OR 'general practice'/exp OR 'general practice') AND ('elderly'/exp OR elderly) AND ('chronic disease'/exp OR 'chronic disease' OR 'chronic illness'/exp OR 'chronic illness') AND ('Health care organisation' OR 'Community capacity' OR 'Self-management support' OR 'Decision support' OR 'Delivery system design' OR 'Clinical information system') = 10 articles.

interaction/s present between conditions. The authors define 'seamless transition' using the same definition as Brand et al. (2004): inter-sectorial collaboration to achieve continuity of care and enable patients move easily and effectively between hospital and ambulatory settings. This review will identify models of care which localise components of the CCM to facilitate seamless transition across services, ascertain if the CCM can be utilised in a flexible way by applying selected components, and establish whether it can be applied to a cohort of people with multiple chronic conditions.

Method

A structured review of the literature was conducted, searching six pre-eminent electronic databases (EBSCO (Medline, CINAHL, PsycInfo), PubMed, Web of Science, Scopus, Embase and Proquest) from the earliest available date until 15 July 2013. These databases were strategically chosen because they contain an exhaustive range of literature from a variety of disciplines. Table 1 summarises the search terms, which were combined using Boolean operators.

Study selection

Inclusion criteria were that the study (i) involved a cohort of older people (aged >65 years) with two or more chronic diseases; (ii) involved healthcare delivery between hospital and non-hospital (i.e. primary healthcare, outpatient or community) services; (iii) involved at least two components of Wagner's CCM (i.e. healthcare organisation, self-management support, delivery system design, decision support, clinical information system and community capacity); (iv) reported at least one of the following outcomes: emergency presentations, hospital admissions, health outcomes for patients or patient and clinician satisfaction with

the integrated healthcare system; and (v) published in English language. Studies were excluded if they (i) were not original research articles, (ii) integrated services for one chronic disease or within a health setting or (iii) did not assess an outcome of interest. Study designs included were as follows: randomised controlled trials, non-randomised controlled trials, quasi-experimental, before-and-after, prospective and retrospective cohort, case control and analytical cross-sectional studies (Table 2). Three investigators (initials blinded for review) reviewed the search strategy by screening shortlisted titles, abstracts, full texts and final studies selected for review in study.

Quality assessment

The quality of each of the studies selected for a thorough full-text review was assessed independently by three reviewers using a 10-point scale developed by The Joanna Briggs Institute (2008). The use of a single tool enabled all included papers to be compared for quality. One paper was excluded at this stage (Table 3).

Data extraction and analysis

At the full-text level, a standardised abstraction form was used by a single reviewer to extract information about study objectives, study design, sample, intervention, comparison group, CCM intervention, outcomes measures and results; this was then checked by other members of the team (Table 4). The data were organised into a table to compare the characteristics and results of the included studies and analysed using a process of descriptive synthesis. Outcomes in each study, where possible, were reported in the following categories: admission avoidance, patient/clinician satisfaction and/or health quality. The CCM component for the data analysis was categorised by definitions (Table 5).

Table 2. Inclusion and exclusion criteria.

	Inclusion criteria	Exclusion criteria
Setting	<ul style="list-style-type: none"> • Hospital and non-hospital-based healthcare services providing chronic disease services (including emergency departments, GP clinics and community-based services) 	
Participants	<ul style="list-style-type: none"> • 65 years of age and over • Diagnosis of two or more chronic diseases 	
Types of intervention	<ul style="list-style-type: none"> • Integration of chronic disease services between a hospital and non-hospital-based service • Two or more components of the CCM were involved in the study 	<ul style="list-style-type: none"> • Integration of services within the same setting
Study designs	<ul style="list-style-type: none"> • Randomised controlled trials • Quasi-experimental • Before and after studies • Prospective and retrospective cohort studies • Case control studies • Analytical cross-sectional studies • Descriptive epidemiological study designs 	<ul style="list-style-type: none"> • Qualitative studies
Outcome measures	<ul style="list-style-type: none"> • Emergency presentations • Hospital admissions • Patient reported health outcomes (e.g. quality of life) • Patient and clinician satisfaction 	
Types of publications	<ul style="list-style-type: none"> • Original articles in peer-reviewed journals • English language 	<ul style="list-style-type: none"> • Commentaries • Conference proceedings • Unpublished dissertations • Review articles

CCM: chronic care model; GP: general practitioner.

Table 3. Quality criteria met by included studies, adopted by JBI CReMS.^a

Reference	JBI CReMS item number										Total
	1	2	3	4	5	6	7	8	9	10	
Boult et al. (2008)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	9
Brand et al. (2004)	Y	N	N	Y	Y	Y	Y	Y	Y	Y	8
Coburn et al. (2012)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	9
Coleman et al. (2006)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	9

^aJBI CReMS items: (1) subjects were randomly allocated to groups; (2) there was blinding of all participants in treatment allocation; (3) the allocation to treatment groups was concealed from the allocator; (4) the outcomes of people who withdrew were described and included in the analysis; (5) those assessing the outcomes were blind to treatment allocation; (6) the control and treatment groups were comparable at entry; (7) the groups were treated identically other than for the named intervention; (8) outcomes were measured in the same way for all groups; (9) outcomes were measured in a reliable way; (10) appropriate statistical analysis was used.

Results

Yield

The initial searches returned 1293 results. Following removal of 312 duplicates, the remaining 981 titles and abstracts were screened to identify studies which merited full-text review; a further 925 studies were excluded at this stage. A total of 56 articles underwent full-text review; a further 51 articles were excluded at this stage due to failure to meet inclusion criteria, study design and lack of comparison group. Five studies were identified as relevant to the research topic. However, upon further scrutiny, one of these studies was excluded primarily due to a study design which was listed in 'exclusion' criteria (Table 2). Finally, four studies were included in this narrative review (Figure 1). There was no disagreement on the selected studies.

Characteristics of included studies

Three studies were conducted in the United States (Boult et al., 2008; Coburn et al., 2012; Coleman et al., 2006) and one study was conducted in Australia (Brand et al., 2004). All the studies involved participants aged ≥ 65 years with at least one chronic disease; the median ages of participants ranged from 74.8 years (Coburn et al., 2012) to 79.6 years (Brand et al., 2004). Patients received either (1) a type of coordinated transitional care or (2) standard care (Boult et al., 2008; Brand et al., 2004; Coburn et al., 2012; Coleman et al., 2006). Two studies were randomised controlled trials (Coburn et al., 2012; Coleman et al., 2006): one study was a cluster randomised controlled trial (Boult et al., 2008) and one study was a quasi-experimental design (Brand et al., 2004). Two of these studies were undertaken

Table 4. Summary of study characteristics.

Reference	Objective	Study design	Sample	Intervention	Comparison group	CCM intervention	Outcome measures	Results	Authors conclusions
Boult et al. (2008)	To enhance quality of care for older Americans with multiple chronic conditions by integrating a registered nurse into primary care practices to work with physicians in providing chronic care to patients.	Cluster-randomised controlled trial	Multimorbid people aged ≥ 65 years with high probability of using health services intensively/at high risk for incurring high healthcare costs in the coming year ($n = 2391$).	A registered nurse who has completed a supplemental educational curriculum works in a practice with several primary care practices to provide comprehensive chronic care to 50–60 multimorbid patients.	Primary care practices did not have a GC nurse service	GC: Integrating registered nurse (GC nurse) into primary care practice to collaborate with 2–5 physicians in providing comprehensive care to 50–60 patients. CIS: Clinical processes provided by GC nurse are guided by web-accessible electronic health records. CL: Establishing access to community resources for patients by GC nurse. DS: Education for GC nurses to provide comprehensive care; clinical processes provided by GC nurse are guided by scientific evidence. DSD: Comprehensive assessment at home; development care plan; monthly monitoring; support transitions into and out of hospitals; coordination of all providers of care by GC nurse. SM: Involvement of patient in developing self-care plan; referral to self-management course; coaching for self-management; education and support of family caregivers by GC nurse.	1. Quality of healthcare rated by participants at 6 months 2. Staff satisfaction rated by primary care physicians at 6 months	GC participants were more likely than UC participants to rate their care highly (adjusted odds ratio 2.0, 95% CI 1.2–3.4, $p = 0.006$), and primary care physicians were more likely to be satisfied with their interactions with chronically ill older patients and their families ($p < 0.05$).	
Brand et al. (2004)	To determine whether a nurse-led chronic disease management model of transitional care reduced readmissions to acute care.	Quasi-experimental controlled trial	General medical patients aged ≥ 65 years with either a history of readmissions to acute care or multiple medical comorbidities ($n = 166$).	The intervention group received a comprehensive care service with components allocated according to perceived and assessed need and patient preference.	The control group received UC. This included medical, nursing, and allied health intervention consistent with the patient's diagnosis and resources available on the general medical wards.	Translational care service model CL: Coordination of community services, allied health services and home visiting, as identified in action plan. CIS: Discharge summary report is faxed to GP and case conferencing between consultant and GP. DSD: Establishing a chronic disease outpatient service to assess, coordinate and deliver care to complex patients before discharge to home care GP. SM: Consultation with patient and identification of patient disease, medication, self-management and social issues. Coordination of care and reminders included to assist management of care. DS: MDT meetings prior to discharge with discharge planners, nursing staff and allied health to develop action plan. Case conference with GP to transfer information of care plan.	1. Primary outcome measures were unplanned acute care readmissions and emergency department presentations at 3 and 6 months 2. Secondary outcome measures were quality of life; discharge destination and primary healthcare utilisation at 3 and 6 months.	Study failed to demonstrate any impact on readmission rates (adjusted rate ratio for group was 0.91 (95% CI 0.59–1.40)), emergency department presentation rates (adjusted RR for group was 0.90 (95% CI 0.48–1.70)) or quality of life at 3 months (coefficient = 0.008; 95% CI -1.32 to 1.34). There was no difference between the groups in rate of visits to a GP for the 3 months following their index admission (median number of visits: control group = 3, intervention group = 3; Mann-Whitney U test = -0.813; $p = 0.42$).	No significant difference identified, may be because time frame for follow-up is too short or perhaps cohort is too complex that readmissions are genuine and cannot be reduced at this stage of condition

(continued)

Table 4. (continued)

Reference	Objective	Study design	Sample	Intervention	Comparison group	CCM intervention	Outcome measures	Results	Authors conclusions
Coburn et al. (2012)	To test the impact nurse care management programmes have on improving the long-term health outcomes of chronically ill older adults.	Randomised control trial	Adults aged >65 years, with ONE or more eligible chronic condition (coronary heart disease, heart failure, diabetes, asthma, hypertension, hyperlipidaemia) (n = 1736).	Comprehensive, integrated and tightly managed system of care coordination, disease management and preventive services provided by community-based nurse care managers working collaboratively with primary care providers.	UC	HQP model of community-based nurse care management CIS: Database developed by HQP to track their activities and participant contacts as well as key assessments and clinical data on participants. Additional paper-based documentation and assessment tools were organised and maintained in participant chart records. CL: Nurses collaborated with the participants' primary care physicians and specialists on an as-needed basis to help participants achieve target clinical goals and receive appropriate care. DSD: A broad portfolio of evidence-based preventative and care management interventions delivered longitudinally by nurse care managers in collaboration with local healthcare and social service providers. SM: Health education and self-management.	1. Mortality rates	Overall, a 25% lower RR of death was observed among intervention participants (HR 0.75 (95% CI 0.57–1.00), p = 0.047) with 86 (9.9%) deaths in the intervention group and 111 (12.9%) deaths in the control group during a mean follow-up of 4.2 years.	
Coleman et al. (2006)	To test the ability to reduce rehospitalisation rates by encouraging patients and caregivers to assert a more active role during care transitions.	Randomised control trial	Adults aged >65, at least 1 or 11 chronic conditions (n = 750).	Intervention group received (1) tools to promote cross-site communication, (2) encouragement to take a more active role in their care and to assert their preferences and (3) continuity across settings and guidance from a 'transition coach'.	UC	The care transitions intervention CIS: A patient-centred record owned and maintained by the patient to facilitate cross-site information transfer. CL: Linkages to community and primary care supports. DS: Timely follow-up with primary or speciality care and continuity across settings and guidance from a 'transition coach'. Series of visits and calls with transition coach. SM: List of red flags indicative of a worsening condition and instructions how to respond. Assistance with medication self-management.	1. Hospitalisation rates 2. Hospital use costs	Intervention patients had lower rehospitalisation rates at 30 days (8.3 vs. 11.9, p = 0.048) and at 90 days (16.7 vs. 22.5, p = 0.04) than control subjects. Intervention patients had lower rehospitalisation rates for the same condition that precipitated the index hospitalisation at 90 days (5.3 vs. 9.8, p = 0.04) and at 180 days (8.6 vs. 13.9, p = 0.046) than controls. The mean hospital costs were lower for intervention patients (US\$2058) versus controls (US\$2546) at 180 days (log-transformed p = 0.049). The mean hospital costs were lower for intervention patients (US\$2058) versus controls (US\$2546) at 180 days.	

CCM: chronic care model; GC: guided care; UC: usual care; GP: general practitioner; RR: relative risk; CI: confidence interval; HR: hazard ratio; HQP: health quality partners; CIS: clinical information systems; CL: community linkages; DS: decision support; DSD: delivery system design; SM: self-management; MDT: multidisciplinary team.

Table 5. Classification of CCM components.

CCM component	Feature
Organisational influence	Organisational goals and resources for chronic illness care Quality improvement strategies Incentives
Community linkages	Linking patients to outside resources Activities with community-based organisations Professionals working out in the community
Self-management support	Interventions based on technological aids to promote self-care Self-help groups Family-oriented supports Motivational support Behaviour therapy
Decision support	Practice guidelines Provider education Involvement of specialists in improving primary care
Delivery system design	Practice team functioning Patient care planning and follow-up Coordination between primary care and specialist services
Clinical information systems	Disease registry Reminders to providers Feedback to providers

CCM: chronic care model.

in a hospital setting (Brand et al., 2004; Coleman et al., 2006) and the other two studies were undertaken in ambulatory care settings (Boult et al., 2008; Coburn et al., 2012). The studies took place in either metropolitan areas (Boult et al., 2008; Brand et al., 2004) or a combination of metropolitan and regional areas (Coburn et al., 2012; Coleman et al., 2006).

Overview of included studies

The sample size of the included studies ranged from 166 patients (Brand et al., 2004) to 2391 patients (Boult et al., 2008). In total, data were collected from 5043 patients across all of the studies. All settings used integration models in wider mainstream health settings. Outcome measures varied across each study but included data related to patient and clinician satisfaction, health service usage, quality of life, mortality rates and hospitalisation rates with associated cost analysis. These outcomes were not consistent between studies and could not be pooled for effect size to assess overall impact of intervention components.

Types and numbers of components used in interventions

All four studies reported clinical information sharing, community linkages and supported self-management to create an integrated health system (Boult et al., 2008; Brand et al., 2004; Coburn et al., 2012; Coleman et al., 2006). Delivery system design was also included in all the studies. Nurses

were identified as the principal healthcare professionals involved in community linkages, coordinating care and in providing self-management education to patients in all included studies. All healthcare providers in an integrated model of care had decision support processes in place to ensure timely access to clinical decision support and clear pathways across health services. All studies reported a specific chronic disease clinic in the integrated model of care as necessary to providing a comprehensive, multidisciplinary clinical intervention. In addition, a clinical information system was established in each model to allow patient information to be shared across all the healthcare providers included in integrated model, thereby improving coordination and continuity of care.

Impact of different integrated model of care

As reported in Table 4, one study reported significant improvements in health service utilisation and lower service costs than previous standard models of care; this study found intervention patients had lower rehospitalisation rates at 30 days (8.3 vs. 11.9, $p = 0.048$) and at 90 days (16.7 vs. 22.5, $p = 0.04$) than control patients, and lower hospital costs than intervention patients (US\$2058) versus controls (US\$2546) at 180 days (US\$2058 vs. US\$2546, log-transformed $p = 0.049$) (Coleman et al., 2006). A second study found intervention patients were more likely than control patients to rate their care highly (adjusted odds ratio 2.0, 95% confidence interval (CI) 1.2–3.4, $p = 0.006$), and that participating physicians were more likely to be satisfied with their patient interactions ($p \leq 0.05$) (Boult et al., 2008). A third study found a 25% lower relative risk (RR) among intervention patients (hazard ratio 0.75 (95% CI 0.57–1.00), $p = 0.047$) (Coburn et al., 2012). These studies involved sample sizes from 750 (Coleman et al., 2006) to 2391 (Boult et al., 2008) participants and evaluated the model of care over an average of 6 months (Boult et al., 2008; Coleman et al., 2006) to 4.2 years later (Coburn et al., 2012). One study (Brand et al., 2004) had negative results, with the intervention patients recording no change in readmission rates (adjusted rate ratio for group was 0.91 (95% CI 0.59–1.40)), emergency department presentation rates (adjusted RR for group was 0.90 (95% CI 0.48–1.70)) or quality of life at 3 months (coefficient = 0.008; 95% CI –1.32 to 1.34). This study incorporated the same model components for integrated care as the other three studies but had a smaller sample size ($n = 166$) and evaluated acute health service usage, primary healthcare usage and quality of life at 3 and 6 months.

Discussion

The CCM identifies elements desirable for an effective system-based model of chronic disease management, including patient self-management support, community resources, clinical information systems, delivery system redesign, decision support and healthcare organisation support (Wagner et al., 1996). This structured review found four studies used components of the CCM to support

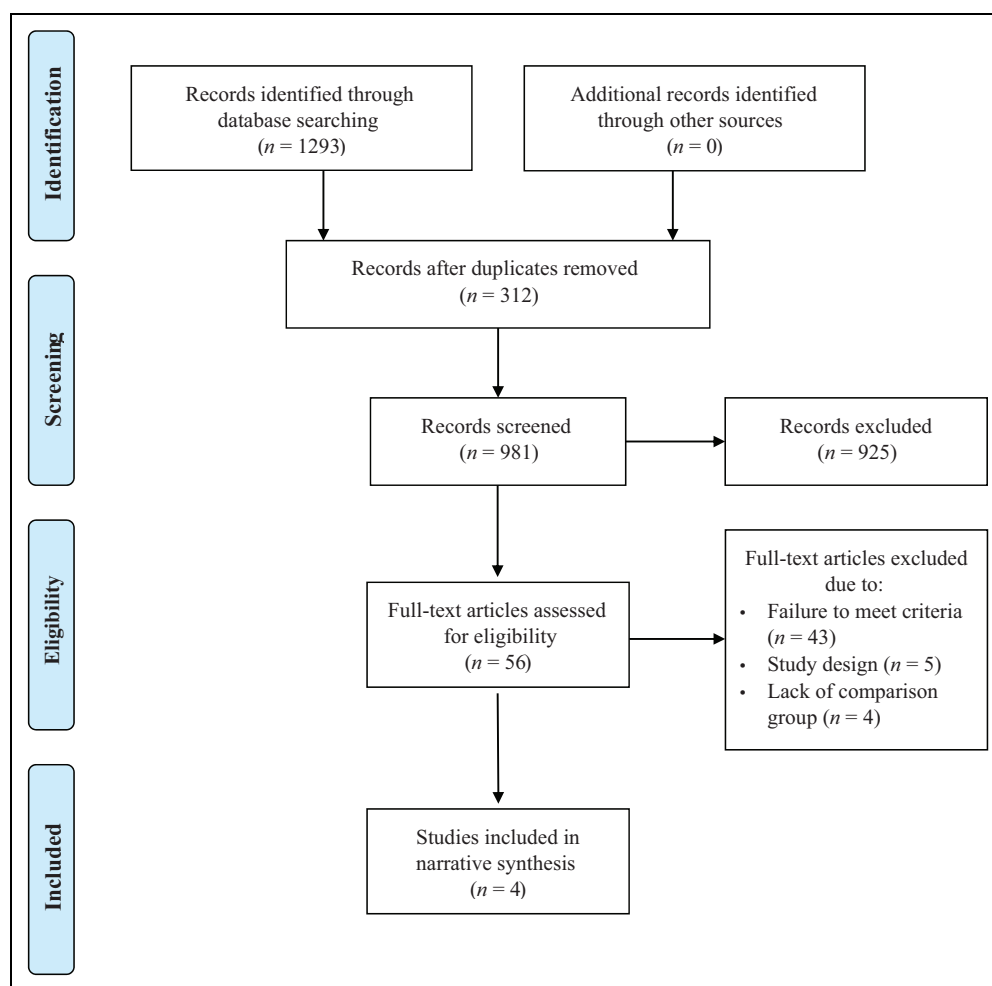


Figure 1. Review process (PRISMA flow chart). Source: Moher et al.; The PRISMA Group (2009).

healthcare which transitions seamlessly between hospital and ambulatory settings for people 65 years of age and over, who have two or more chronic diseases. The included studies lacked homogeneity; while there was some support for CCM components, this was not consistent across the studies. Each of the studies used clinical information sharing, community linkages and supported self-management components of the CCM to create a seamless transition across services for older people with two or more chronic diseases. Two other components, delivery system design and decision support, were also included in some studies (Boult et al., 2008; Brand et al., 2004; Coburn et al., 2012). Health system organisation was not explicitly identified in any model; however, all studies included a chronic disease clinic which was part of a larger health system. The studies suggest there is little evidence about the effective 'seamless' transition of care for older people with two or more chronic diseases, including in terms of quality of life and related clinical outcomes. These findings are inconsistent with previous research which indicates that CCM can improve quality of life and quality clinical outcomes (Wagner, 2000; Wagner et al., 2001). However, this review suggests older people with chronic disease comorbidity would benefit from models of care that coordinate and integrate with support services and employ clinicians

who provide holistic health reviews with a focus on proactive planning and management – as opposed to the existing models of single disease diagnosis, reactive treatment and isolated services (Bayliss et al., 2015; National Health Committee, 2007; Starfield et al., 2003; Wagner et al., 2001).

Each study applied a localised, or healthcare facility-specific, model of care which implemented initiatives underpinned by some components of the CCM to create a seamless transition of care across services. Initiatives included in the models of care included a nurse to provide care coordination, the delivery of self-management education and the coordination of health stakeholders. The nurse was pivotal in supporting clinical decision-making by communicating with and coordinating all members of the multi-disciplinary team involved in providing care. Each health system included in each study established a chronic disease clinic at one setting (in hospital or in the ambulatory service) to deliver holistic, coordinated chronic disease care with appropriate health pathways across services. While individual components of the CCM are adaptable and measurable, it is the principles of the model itself which have the potential to be generalised to a broader range of settings.

The key system enabler to provide and facilitate navigation, coordination and communication in these studies

was a dedicated nurse, often working between both hospital and ambulatory services (Boult et al., 2008; Brand et al., 2004; Coburn et al., 2012; Coleman et al., 2006). A growing body of research suggests better patient outcomes are associated with improved clinician–patient rapport and the establishment of effective therapeutic relationships (Barnett, 2001). Patient and clinician satisfaction (Bertakis et al., 1991; Suchman et al., 1993), adherence (DiMatteo et al., 1993; Squire, 1990), malpractice risk (Beckman et al., 1994; Donovan and Blake, 1992; Entman et al., 1994) and health outcomes (Stewart, 1995) have all been shown to be directly related to the interpersonal skills of clinicians. The involvement of nurses in the CCM is particularly significant, with one recent study finding advanced practice nurses' involvement in CCM delivery decreased lengths of hospitalisation, lowered costs of care and increased patients' self-care behaviours (Duangbubpha et al., 2013). However, more research is required to strengthen this evidence.

Lack of trust between the hospital and ambulatory clinical workforces can create barriers to referring to other existing services and the shared care of a person requiring clinical management by multiple healthcare providers (Johnson and Arora, 2009). This lack of trust can be a result of a fragmented health system which does not provide transparency of care, access to information regarding clinical services (scope, clinical workforce skillset/competence and referral eligibility, etc.) or clear health pathways across hospital and ambulatory services (Gill and Mainous, 1998; Jeffcott et al., 2009). There are also system drivers which reinforce internal, ongoing management of persons with chronic disease, including funding models, key performance indicators and workforce culture (Nolte and McKee, 2008). To positively influence policy and internal system drivers, health system organisation tools need to be applied at all levels of management (Wagner et al., 2001).

Evidence from this review indicates that a model of care established for people 65 years of age and over with two or more chronic diseases which involves clinical information sharing, community linkages and supported self-management, at a minimum, will improve health outcomes and quality of life and may reduce health service usage and health service costs. In addition to these components, decision support and delivery system design should also be incorporated where possible. Health services would benefit from the establishment of a dedicated chronic disease clinic, which delivers individually tailored care which is proactive, holistic and coordinated across primary and secondary care services. A central resource in this chronic disease clinic would be a nurse, whose role is to coordinate and facilitate communication and health service delivery across all clinical services involved in the care of a patient. The nurse also serves as a consistent contact for the patient throughout their healthcare journey, developing rapport, providing self-management education and proactively screening health to deliver the proactive and holistic management of chronic conditions.

Limitations

This review has several limitations. First, a wide range of relevant and broad search terms were used. However, search terms such as 'transitional care', 'coordinated care', 'discharge' and 'chronic disease management' were not explicitly used, as they were considered too general. This may have resulted in some studies relevant to this review being overlooked. Second, the studies focused on implementation strategies to create a seamless transition of care between acute and ambulatory services, which were classified against the CCM framework and components. The reviewers' classification of the CCM components was consistent with the defined terminology in Table 5; however, the interventions applied in the included studies were matched against this terminology by the reviewers and there is a risk these components could be misclassified due to lack of detailed description included in the study. Third, as only one member of the reviewing team conducted the initial search and created a shortlist for review by other members, the initial results may be subjected to errors of omission. However, interrater reliability checks were undertaken with the aim of minimising these errors. Finally, the purpose of this review was to identify studies involving cohorts of older people with two or more chronic diseases. All four studies included in this review provided insufficient detail about methods to assess the intensity of the intervention, calculate the effect size of model components or standardise results across all studies to calculate total effect size; hence, it was not possible to conduct a meta-analysis.

Conclusion

In Australia, the healthcare systems, both in primary and secondary care, are designed for single, acute medical conditions and are organised to rapidly and efficiently respond to any presenting illness or injury. The focus is on the immediate problem, its rapid definition, exclusion of more serious alternative diagnoses and initiation of professional treatment. Internationally, the response to the distinctly different and more complex demands of long-term conditions continues to challenge health systems. Programmes to manage these patients must overcome multiple challenges, including the recognised fragmentation and complexity of the healthcare system, misaligned incentives, a focus on acute problems and a lack of team-based care.

The CCM, developed by Wagner, is an approach which has been widely used in a variety of healthcare settings to guide system improvement for chronic care. The model was developed from literature which reported successful practice and system changes leading to improved chronic illness care and is based on consensus among experts. The literature suggests each CCM component has been reasonably well studied. There is evidence to suggest the CCM leads to improved clinical quality when built on the inter-relationships between all six evidence-based components. The literature also indicates the model has a demonstrable impact on select disease groups in specific disease

management settings, with a focus on delivery of the model in primary care.

This structured review found that community linkages, clinical information sharing, delivery system design, self-management and clinical decision support are common components of a model of care for older people with two or more chronic disease. However, the review did not find any study incorporating all the components of the CCM. Four studies show some positive outcomes, both qualitatively (patient and clinician satisfaction) and quantitatively (health status, mortality), can be gained from the implementation of a limited number of CCM components. The implementation of these components in a health service has the potential to improve the seamless transition between hospital and ambulatory settings for those older than 65 years with two or more chronic conditions. Further research is warranted to measure the effect of implementing all CCM components for patients with multiple chronic diseases who transition between acute hospital and ambulatory services.

This structured review will allow practitioners to identify successful strategies to apply in their health system to improve the transition between hospital and ambulatory settings for people over 65 years of age who have two or more chronic diseases. Applying these strategies will assist in delivering patient-centred care by improving coordination of services, increasing the transparency of care, ensuring a holistic review of healthcare services and developing clear pathways across the continuum of care. Improving seamless transition of care between hospital and ambulatory services creates sustainability, cost-effectiveness and delivery of quality care.

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