

Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies

Volume 7—Care Coordination

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Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-Based Practice Centers (EPCs), sponsors the development of evidence reports and technology assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. The reports and assessments provide organizations with comprehensive, science-based information on common, costly medical conditions and new health care technologies. The EPCs systematically review the relevant scientific literature on topics assigned to them by AHRQ and conduct additional analyses when appropriate prior to developing their reports and assessments.

To bring the broadest range of experts into the development of evidence reports and health technology assessments, AHRQ encourages the EPCs to form partnerships and enter into collaborations with other medical and research organizations. The EPCs work with these partner organizations to ensure that the evidence reports and technology assessments they produce will become building blocks for health care quality improvement projects throughout the Nation. The reports undergo peer review prior to their release.

AHRQ expects that the EPC evidence reports and technology assessments will inform individual health plans, providers, and purchasers as well as the health care system as a whole by providing important information to help improve health care quality.

We welcome comments on this evidence report. They may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by e-mail to **epc@ahrq.gov**.

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* Appendixes cited in this report are provided electronically at <http://www.ahrq.gov/clinic/tp/caregaptp.htm>

Structured Abstract

Context: Quality problems and spiraling costs have resulted in widespread interest in solutions that improve the effectiveness and efficiency of the health care system. Care coordination has been identified by the Institute of Medicine as one of the key strategies for potentially accomplishing these improvements.

Objectives: The objectives of this project were to develop a working definition of care coordination, apply it to a review of systematic reviews, and identify theoretical frameworks that might predict or explain how care coordination mechanisms are influenced by factors in the health care setting and how they relate to patient outcomes and health care costs.

Data Sources and Review Methods: We used literature databases, Internet searches, and personal contacts to assemble background information on ongoing care coordination programs; potential definitions; conceptual frameworks and related empirical evidence; and care coordination measures. We also conducted literature searches through September 30, 2006 of MEDLINE[®], and November 15, 2006 for CINAHL[®], Cochrane database of systematic reviews, American College of Physicians Journal Club, Database of Abstracts of Reviews of Effects, PsychInfo, Sociological Abstracts, and Social Services Abstracts to identify systematic reviews of care coordination interventions. We excluded systematic reviews with a narrow focus, namely those conducted solely in the inpatient setting, or where the only two participants involved in care were the patient and a health care provider.

Results: We identified numerous ongoing programs in the private and public sector, most of which have not yet been evaluated. We identified over 40 definitions of care coordination and related terminology, and developed a working definition drawing together common elements: *Care coordination is the deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient's care to facilitate the appropriate delivery of health care services. Organizing care involves the marshalling of personnel and other resources needed to carry out all required patient care activities, and is often managed by the exchange of information among participants responsible for different aspects of care.*

We used this definition to develop our inclusion/exclusion criteria for selecting potentially relevant systematic reviews. Our literature search yielded 4,730 publications, of which 75 systematic reviews evaluating care coordination interventions, either fully or as a part of the review, met inclusion criteria. From these, we identified 20 different coordination interventions (e.g., multidisciplinary teams, case management, disease management) covering 12 clinical populations (e.g., mental health, heart disease, diabetes) and conducted in multiple settings (e.g., outpatient, community, home). Finally, we identified four conceptual frameworks (Andersen's behavioral framework, Donabedian's structure-process-outcome framework, Nadler/Tushman and others' Organizational design framework with Wagner's Chronic Care Model provided as an example of such design, and Gittel's Relational coordination framework) with potential applicability to studying care coordination by assessing baseline characteristics of the environment, specific coordination mechanism alternatives, and outcomes. The strongest evidence shows benefit of care coordination interventions for patients who have congestive heart

failure, diabetes mellitus, severe mental illness, a recent stroke, or depression, though evidence about key intervention components is lacking.

Conclusions: Care coordination interventions represent a wide range of approaches at the service delivery and systems level. Their effectiveness is most likely dependent upon appropriate matching between intervention and care coordination problem, though more conceptual, empirical and experimental research is required to explore this hypothesis.

Contents

Executive Summary	1
Technical Review	11
Chapter 1. Introduction	13
1A Report Scope and Organization	13
1B Key Research Questions.....	14
Background: Ongoing Efforts in Care Coordination and Gaps in the Evidence (Chapter 2)	14
Definitions of Care Coordination and Related Terms (Chapter 3)	14
Review of Systematic Reviews of Care Coordination Interventions (Chapter 4)	15
Conceptual Frameworks and Their Application to Evaluating Care Coordination Interventions (Chapter 5)	15
1C Peer Review.....	15
Chapter 2. Background: Ongoing Efforts in Care Coordination and Gaps in the Evidence	17
2A Care Coordination Vendors	18
2B Purchasers and Developers of Care Coordination Programs	19
Medicare	19
State Medicaid Programs	22
Department of Veterans Affairs.....	24
Other Federal Programs	25
Private Sector Developers and Purchasers.....	25
2C Professional Specialty Associations.....	26
2D Patient and Family Associations.....	27
2E Conferences	27
2F Other Activities Described by Care Coordination Professionals	28
Questions of Interest to Care Coordination Decisionmakers.....	28
Key Gaps in the Care Coordination Evidence Base	30
2G Summary Answers to Key Questions	30
Research Question 1: What Aspects of Care Coordination Are of Greatest Interest to Healthcare Decisionmakers?.....	30
Research Question 2: What Are the Key Gaps in the Care Coordination Evidence Base?	31
Chapter 3. Definitions of Care Coordination and Related Terms.....	33
3A Background and Objectives	33
3B Methodological Approach.....	33
3C Key Elements in Care Coordination Definitions.....	33
Participants Involved in a Patient's Care	39
Interdependence of Participants.....	40
Adequate Knowledge About Available Resources and Participants' Roles.....	40

Information Exchange Among Participants.....	41
The Aims of Care Coordination.....	41
3D Proposed Working Definition of Care Coordination	41
3E Terminology Closely Related to Care Coordination	41
Collaboration.....	42
Teamwork	42
Continuity of Care.....	42
Disease Management	43
Case Management	43
Care Management	43
Chronic Care Model.....	44
Care Navigator or Patient Navigator.....	44
3F Components of Care Coordination	45
3G Summary Answers to Key Questions	49
Research Question 3: What Definitions Exist for Care Coordination?	49
Research Question 4: What Definition Could be Formulated To Apply to Systematic Reviews?	49
Chapter 4. Review of Systematic Reviews of Care Coordination Interventions	51
4A Background	51
4B Methodological Approach.....	51
Inclusion and Exclusion Criteria.....	51
Search Strategy	51
Data Abstraction and Evaluation	52
Quality Assessment of Reviews.....	52
Statistical Analysis.....	52
4C Results	53
Results of Literature Search and Article Review Process	53
Summary of Reviews With Entire Focus on Care Coordination	54
Quality Assessment of Reviews.....	54
Systematic Review Characteristics	59
Care Coordination Strategies	61
Outcomes Reported.....	62
Costs.....	64
Narrative Syntheses of Selected Systematic Reviews by Care Coordination Strategy	67
Systematic Reviews Evaluating Multidisciplinary Teams as a Care Coordination Strategy	67
Systematic Reviews Evaluating Disease Management as a Care Coordination Strategy	70
Systematic Reviews Evaluating Case Management as a Care Coordination Strategy	72
Systematic Reviews Evaluating Integrated Care as a Care Coordination Strategy	73
Systematic Reviews Evaluating Interprofessional Education as a Care Coordination Strategy	74

Narrative Syntheses of Systematic Reviews by Selected Clinical Topic, Population, and Setting	74
Systematic Reviews of Care Coordination Strategies Among Patients With Mental Health Problems	74
Systematic Reviews of Care Coordination Strategies Among Patients With Heart Failure	75
Systematic Reviews of Care Coordination Strategies Among Patients With Diabetes.....	76
Systematic Reviews of Care Coordination Strategies Among Elderly Patients	76
Systematic Reviews of Care Coordination Strategies Across Settings	76
Summary of Reviews With Partial Focus on Care Coordination	95
Narrative Synthesis of Recent Systematic Reviews by Coordination Component.....	102
4D Discussion	105
4E Limitations.....	105
4F Summary Answers to Key Questions	106
Research Question 5: Which Care Coordination Interventions Have Been Evaluated by Systematic Reviewers and How Were They Defined?	106
Research Question 6: What is the Evidence Regarding the Health Benefits of These Care Coordination Interventions as Summarized in the Systematic Review(s)? In Particular, is the Effectiveness of Care Coordination Interventions Related to the Setting in Which Care is Being Coordinated, the Component of Care Being Coordinated, or the Type of Disease or Patients for Whom Care is Being Coordinated?	106
Research Question 7: Have the Costs of Care Coordination Interventions Been Evaluated in any of These Systematic Reviews, and if so What is Known?	107
Chapter 5. Conceptual Frameworks and Their Application to Evaluating Care Coordination Interventions	109
5A Background	109
5B Methodological Approach.....	109
Focusing the Conceptual Frameworks on Key Decisionmakers	110
5C Results	110
Model 1: The Andersen Behavior Framework	111
Model 2: Donabedian's Quality Framework	113
Model 3: The Organizational Design Framework	114
Model 4: The Relational Coordination Framework.....	119
Summary of Concepts From Frameworks	121
Measures Related to Care Coordination	122
5D Summary Answers to Key Questions	128
Research Question 8: What Concepts Are Important To Understand and Relate to Each Other for Evaluations of Care Coordination? What Conceptual Frameworks Could be Applied To Support Development and Evaluation Strategies To Improve Care Coordination?	128

Research Question 9: What Measures Have Been Used To Assess Care Coordination?	129
Research Question 10: How do These Frameworks Relate to Quality Improvement Strategies Evaluated in the Previous Closing the Quality Gap Series Reports?	130
Chapter 6. Conclusions	131
Improving Care Coordination	131
Recommendations for Future Research	136
References and Included Reviews	139
List of Acronyms/Abbreviations.....	157

Figures

Figure 1. Search results	53
Figure 2. Quality assessment of reviews	54
Figure 3. Andersen Behavior Framework	111
Figure 4. Donabedian's Quality Framework	113
Figure 5. Organizational Design Framework	116
Figure 6. Schematic of relationships between situational characteristics and appropriate care coordination approaches.....	117
Figure 7. Relational Coordination Framework.....	120

Tables

Table 1. Recent Medicare demonstration and pilot projects with care coordination Elements.....	20
Table 2. Medicaid research projects with elements of care coordination	23
Table 3. Example conferences in 2006 with care coordination themes.....	27
Table 4. Initial search strategies used to identify definitions of care coordination	33
Table 5. Definitions for care coordination and related concepts	34
Table 6. Components of care coordination	47
Table 7. Application of component list to well-described primary study.....	48
Table 8. Elements common to care coordination definitions, and linkage to our working definition	49
Table 9. Quality assessment of reviews with entire focus on care coordination	55
Table 10. Selected characteristics of reviews with entire focus on care coordination.....	59
Table 11. Distribution of reviews with entire focus on care coordination by care coordination intervention	62
Table 12. Quantitative outcomes reported by systematic reviews.....	63
Table 13. Reviews with entire focus on care coordination: cost results	65
Table 14a. Summary of reviews with entire focus on care coordination interventions: mental health.....	79

Table 14b. Summary of reviews with entire focus on care coordination interventions: heart failure	83
Table 14c. Summary of reviews with entire focus on care coordination interventions: diabetes	86
Table 14d. Summary of reviews with entire focus on care coordination interventions: asthma	87
Table 14e. Summary of reviews with entire focus on care coordination interventions: cancer	87
Table 14f. Summary of reviews with entire focus on care coordination interventions: multiple clinical topics	88
Table 14g. Summary of reviews with entire focus on care coordination interventions: pain management	88
Table 14h. Summary of reviews with entire focus on care coordination interventions: palliative care	89
Table 14i. Summary of reviews with entire focus on care coordination interventions: rheumatoid arthritis	89
Table 14j. Summary of reviews with entire focus on care coordination interventions: stroke	90
Table 14k. Summary of reviews with entire focus on care coordination interventions: no specific clinical topic	91
Table 15. Summary of reviews with partial focus on care coordination interventions	96
Table 16. Components described or evaluated by the systematic reviews	103
Table 17. Operational processes	118
Table 18. Summary of relationship of concepts across frameworks	121
Table 19. Instruments and measures related to care coordination mechanisms or patient/family perception of coordination	124
Table 20. Suggested approaches for improving care coordination	134

Appendixes

- Appendix A: Exact Search Strings
- Appendix B: Sample Data Abstraction Forms
 - Level One (Screening Title and Abstract) Form
 - Level Two (Full Text) Abstraction Form
- Appendix C: List of Excluded Reviews
- Appendix D: Technical Expert Panel and Peer Reviewers

Appendices and Evidence Tables for this report are provided electronically at <http://www.ahrq.gov/downloads/pub/evidence/pdf/caregap/caregap.pdf>.

Executive Summary

Overview

Many organizations and individuals are interested in care coordination, particularly as it relates to concerns about inefficiencies and suboptimal quality in the U.S. health care system. The Institute of Medicine (IOM) identified care coordination as one of 20 national priorities for action to improve quality along its six dimensions of making care safe, effective, patient centered, timely, efficient, and equitable. The burgeoning number of aging Americans with chronic illnesses and the increasing complexity of care create challenges to coordination experienced at every level—the patient, the clinical practice, and the system. Care coordination interventions are particularly attractive in that they have the potential to improve both efficiency and quality.

This final Evidence Report in the series “Closing the Quality Gap” by the Stanford-UCSF Evidence-based Practice Center (EPC) addresses the topic of care coordination. The other reports in the series have focused on specific clinical conditions (e.g., hypertension, diabetes, asthma), which lend themselves to a standardized approach for identifying and evaluating primary studies of quality improvement strategies. For the cross-cutting (applicable to all areas of health care) and more loosely defined topic of care coordination, we did not attempt to synthesize the evidence from the primary literature. Instead, the Report describes our working definition of care coordination, summarizes some of the evidence about the effectiveness of care coordination interventions from systematic reviews, and presents relevant frameworks for the development and evaluation of future interventions.

This approach may be useful to system-level policymakers, service-level decisionmakers, and patients. System-level policymakers (e.g., State Medicaid directors, Medicare officials, health plan managers) have responsibility for paying for health care services for large numbers of individuals (i.e., health plan enrollees, Medicare beneficiaries) and making decisions about how to coordinate care at a *system level* in ways that minimize their financial risks and maximize the health care received by their population of patients. Service-level decisionmakers (e.g., primary care doctors or managers of multi-specialty clinics) are involved in providing health care services to individual patients or a panel of patients, and therefore tackle care coordination at the *service delivery level*. Depending upon the particular local environment, they make decisions related to care coordination to maximize health care outcomes and use resources efficiently. *Patients* and their families are assuming increasingly active roles in health care decisionmaking and are navigating an increasingly complex health care system with consumer-driven health plans and other efforts to involve them more. The patient often experiences first-hand problems of coordination (e.g., missing medical records, duplicate testing, medical errors at transitions of care), and therefore may be just as interested as health care professionals in understanding care coordination.

Key Questions

The key questions addressed in this Report relate to four areas covered in each of the main Chapters of the report:

Ongoing Efforts in Care Coordination and Gaps in the Evidence (Chapter 2)

- What aspects of care coordination are of greatest interest to healthcare decisionmakers?
- What are the key gaps in the care coordination evidence base?

Definitions of Care Coordination and Related Terms (Chapter 3)

- What definitions exist for care coordination?
- What definition could be formulated to apply to systematic reviews?

Review of Systematic Reviews of Care Coordination Interventions (Chapter 4)

- Which care coordination interventions have been evaluated by systematic reviews and how were they defined?
- What is the evidence regarding the health benefits of these care coordination interventions as summarized in the systematic review(s)? In particular, is the effectiveness of care coordination interventions related to the setting in which care is being coordinated, the component of care being coordinated, or the type of disease or patients for whom care is being coordinated?
- Have the costs of care coordination interventions been evaluated in any of these systematic reviews, and if so what is known?

Conceptual Frameworks and Their Application to Evaluating Care Coordination Interventions (Chapter 5)

- What concepts are important to understand and relate to each other for future evaluations of care coordination? What conceptual frameworks could be applied to support development and evaluation of strategies to improve care coordination?
- What measures have been used to assess care coordination?
- How do these frameworks relate to quality improvement strategies evaluated in the previous Closing the Quality Gap series reports?

Methodology

This project focused on two major activities: 1) assembly of background information about ongoing efforts in care coordination, definitions of care coordination and related terms (including components of care coordination) and conceptual frameworks presented in Chapters 2, 3 and 5, and a systematic review of evidence from systematic reviews on care coordination presented in Chapter 4. The first activity used searches for information that were not meant to be exhaustive, but rather illustrative. The second activity involved standard methods for a systematic review,

though the included articles were themselves systematic reviews as opposed to primary studies. The following sections summarize the basic approaches for each part of the project.

Ongoing Efforts in Care Coordination and Gaps in the Evidence (Chapter 2)

Background literature review, Internet searches, and personal contacts were used to find policy papers, conference brochures and information about ongoing care coordination programs, demonstration projects, and gaps in the evidence base.

Definitions of Care Coordination and Related Terms (Chapter 3)

Iterative searches of PubMed[®], CINAHL[®] and Health and Psychological Instruments (HaPI) databases were supplemented with the information gathered for Chapter 2 to identify sources with definitions of care coordination and related terms.

Review of Systematic Reviews of Care Coordination Interventions (Chapter 4)

We searched MEDLINE[®] (through September 30, 2006), CINAHL[®], Cochrane database of systematic reviews, American College of Physicians Journal Club, Database of Abstracts of Reviews of Effects, PsychInfo, Sociological Abstracts and Social Services Abstracts (these databases searched through November 15, 2006) for systematic reviews of care coordination interventions to improve quality of care provided to patients.

Included Studies. English language systematic reviews of care coordination interventions, irrespective of clinical condition, patient population, or specific outcomes were included. Systematic reviews of interventions occurring solely in the hospital setting were excluded because findings would not be relevant to care across the continuum for those with chronic illnesses, a primary focus of the IOM's prioritization of care coordination. Interventions where the only two participants were a clinician and the patient were excluded because these situations presumably have lower demands for coordination activities. Articles were included if they reported any evaluation metrics.

Data Abstraction. From each of the included reviews, data were abstracted about whether the entire focus of the review was on care coordination or only a partial focus was on care coordination. For those reviews where the entire focus was on care coordination, abstracted data included: the research methodology used, setting of the care coordination intervention, terms and definitions used to describe the care coordination intervention, quality assessment variables, and the reported outcomes, including clinical outcomes, health services utilization, cost, cost-effectiveness, and quality of life. For those reviews which only partially focused on care coordination, we abstracted data about the purpose of the review, the care coordination strategies included, and outcomes.

Statistical Analysis. Results reported in the systematic reviews were reported separately and not synthesized quantitatively given the heterogeneity of the included articles. Narrative analysis was conducted.

Conceptual Frameworks and Their Application to Evaluating Care Coordination Interventions (Chapter 5)

We used articles identified in the Chapter 3 search to identify literature describing conceptual frameworks and associated empirical evidence related to care coordination. We also reviewed the theoretical work developed in the behavioral, organizational, and health services research fields to select well-established frameworks relevant to care coordination with complementary concepts. We identified measures/scales related to care coordination and summarized their relationship to the frameworks.

Findings

Summary Answers to the Key Questions

Research Question 1: What Aspects of Care Coordination Are of Greatest Interest to Healthcare Decisionmakers? Health professionals raised concerns about the lack of a care coordination definition and conceptual model. They considered these deficiencies as barriers to effectively evaluating and assessing care coordination efforts. They also frequently expressed a need for additional evidence regarding the influence of care coordination programs on health, cost, and satisfaction outcomes. Many decisionmakers simply wanted to know if care coordination actually worked, and, if so, how it affects costs. Furthermore, those with responsibility for managing healthcare sought answers for what approaches to care coordination were likely to work, under which circumstances (e.g., by disease, setting, geographical region, payor, etc.), and for which patient populations. Finally, decisionmakers were keenly interested in the development of measures and approaches to examine the effectiveness and quality of care coordination interventions.

Research Question 2: What Are the Key Gaps in the Care Coordination Evidence Base? The care coordination field would benefit from consensus definitions, conceptual models, and measures of care coordination processes. However, the dearth of evidence surrounding the efficacy and cost-effectiveness of various care coordination programs are also pressing issues facing decisionmakers. They want practical answers about how to implement effective and efficient care coordination, and yet the field is only just emerging as an area of concerted study from a conceptual as well as a pragmatic perspective.

Research Question 3: What Definitions Exist for Care Coordination? The term, “care coordination,” is cited often in the health services literature, but is infrequently explicitly defined. We identified more than 40 definitions of coordination and they pertain to a diverse set of patient populations, healthcare scenarios, and organizational situations. While definitions vary depending on their purpose and audience, five common elements of care coordination were identified from our review of definitions and studies related to coordination:

1. Numerous participants (including the patient) are typically involved in care coordination;
2. Coordination is necessary when participants are dependent upon each other to carry out disparate activities in a patient’s care;
3. In order to carry out these activities in a coordinated way, each participant needs adequate knowledge about their own and others’ roles and available resources;

4. In order to manage all required patient care activities, participants rely on exchange of information; and
5. Integration of care activities has the goal of facilitating appropriate delivery of health care services.

Research Question 4: What Definition Could be Formulated To Apply to Systematic Reviews? We combined the common elements from many definitions to develop our following working definition, which we used to guide our review of systematic reviews on care coordination:

Care coordination is the deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient's care to facilitate the appropriate delivery of health care services. Organizing care involves the marshalling of personnel and other resources needed to carry out all required patient care activities, and is often managed by the exchange of information among participants responsible for different aspects of care.

Our working definition is purposely broad enough to include interventions that are sometimes defined by their own related terminology (e.g., disease management, case management, teamwork, collaboration, Wagner's Chronic Care Model and extensions). It is also applicable to programs, such as the Medicare demonstration projects to improve care for those with chronic illness. The objective of these interventions and programs is to improve quality of care, in part or in total by enhancing coordination between participants for the benefit of the patient (improved outcomes) and the system (reduced costs).

We also developed a list of components of care coordination (Table A) to support a more granular analysis of interventions. The components are separated into essential care tasks (e.g., identify participants and their roles), their associated coordination activities (e.g., coordinate among care plans), and common features of interventions to support coordination activities (e.g., standardized protocol, multidisciplinary team). The list draws extensively from components described by clinical professional organizations, recent consensus development efforts by the National Quality Forum, and intervention evaluators.

Research Question 5: Which Care Coordination Interventions Have Been Evaluated by Systematic Reviewers and How Were They Defined? Among our included reviews, we identified various care coordination interventions that have been evaluated. The terms used to define the care coordination strategies were highly heterogeneous. The 43 individual reviews that focused entirely on care coordination referred to 20 different care coordination interventions. The most common strategy evaluated the use of multidisciplinary teams involving two or more providers from different specialties providing care to a group of patients (15 reviews); the terms applied to this strategy included multidisciplinary teams, team coordination, assertive community treatment, collaborative care, integrated programs, and shared care. The next most common strategy evaluated was disease management (10 reviews). It was defined variably or not at all in the included reviews and there did not appear to be a consensus about the components that should be included in a disease management program; however, the intent of all the disease management programs reviewed was to improve the coordination of patient care, provide support to patients, and improve patient outcomes. Finally, nine reviews assessed the role of case management (also referred to as care management) which typically involves the assignment

Table A. Components of care coordination

Component	Comparable Domains Noted by Others
ESSENTIAL CARE TASKS and Associated Coordination Activity	
ASSESS PATIENT <i>Determine Likely Coordination Challenges</i>	Initial Assessment (M)
DEVELOP CARE PLAN <i>Plan for Coordination Challenges and Organize Separate Care Plans</i>	Proactive Plan of Care and Follow-up (NQF) Problem Identification and Care Planning (M)
IDENTIFY PARTICIPANTS IN CARE AND SPECIFY ROLES <i>Specify Who Is Primarily Responsible For Coordination</i>	Healthcare ‘home’ – source of usual care selected by patient (NQF) Program Staffing (M) Provider Practice (M)
COMMUNICATE TO PATIENTS AND ALL OTHER PARTICIPANTS <i>Ensure Information Exchange Across Care Interfaces</i>	Communication-available to all team members, including patients and family (NQF) Communication (M)
EXECUTE CARE PLAN <i>Implement Coordination Interventions</i>	Service Arranging (M)
MONITOR AND ADJUST CARE <i>Monitor For And Address Coordination Failures</i>	Ongoing Monitoring (M)
EVALUATE HEALTH OUTCOMES <i>Identify Coordination Problems That Impact Outcomes</i>	Quality Management/ Outcomes Measurement (M)
COMMON FEATURES OF INTERVENTIONS TO SUPPORT COORDINATION ACTIVITIES and Examples	
INFORMATION SYSTEMS <i>Electronic medical record; Personal health record; Continuity of care record, Decision support ; Used for population identification for intervention</i>	Information systems - the use of standardized, integrated electronic information (NQF) Information Technology and Electronic Records (M)
TOOLS <i>Standard protocols, Evidence-based guidelines, Self-management program, Clinician education on coordination skills, Routine reporting/feedback</i>	Patient Education (M)
TECHNIQUES TO MITIGATE INTERFACE ISSUES <i>Multidisciplinary teams for specialty and primary care interface; Case manager or patient navigators to network and connect between medical and social services; Collaborative practice model to connect different setting or levels of care; Medical home model to support information exchange at interfaces</i>	Transitions/Handoffs - transitions between settings of care (NQF)
SYSTEM RE-DESIGN <i>Paying clinicians for time spent coordinating care; Changes that reduce access barriers including system fragmentation, patient financial barriers - lack of insurance, underinsurance, physical barriers - distance from treatment facilities</i>	Environmental Level (e.g., consideration of alignment of incentives); Health care system reorganization (IOM)
NQF = National Quality Forum domain; M = Mathematica evaluation area; IOM = Factor noted in report on “Priority Areas for National Action”	

of a single person (case manager or “key worker”, so named in one study) who coordinates all aspects of a patient’s care (e.g., providing information to multiple providers, seeing that the patient receives services in a timely manner etc.). The qualifications and exact duties of case managers were poorly described in most reviews. Other strategies evaluated were integration of

care (three reviews), and interprofessional education, defined as the provision of training and education to professionals from different health and social areas, who learn together interactively (three reviews).

Research Question 6: What is the Evidence Regarding the Health Benefits of These Care Coordination Interventions as Summarized in the Systematic Review(s)? In Particular, is the Effectiveness of Care Coordination Interventions Related to the Setting in Which Care is Being Coordinated, the Component of Care Being Coordinated, or the Type of Disease or Patients for Whom Care is Being Coordinated? Among the 43 reviews that focused on care coordination interventions, and an additional 32 that included care coordination among other quality improvement approaches, the most common conditions targeted were mental health conditions (28 reviews), heart failure (14 reviews) and diabetes (seven reviews). Eleven reviews were not specific to any condition. Overall, the reviews reported a positive effect of the care coordination strategies on the outcomes studied, regardless of clinical topic. Multiple systematic reviews provided evidence of patient benefit resulting from multidisciplinary teams, disease management, and case management. Multidisciplinary team interventions improved service continuity for severely mentally ill patients (two reviews); reduced mortality and hospital admissions in heart failure patients (two reviews); reduced symptoms for terminally ill patients (one review); and reduced mortality and dependency in stroke patients (one review). Disease management programs reported improved depression severity and adherence to treatment in patients with mental illness (one review); reduced mortality and hospital admissions in heart failure patients (two reviews); and reduced glycated hemoglobin (one review) and improved glycemic control (one review) in patients with diabetes. Case management as a care coordination strategy appeared to improve re-hospitalization rates in patients with mental health problems (one review) and improved glycemic control in patients with diabetes (one review). While these and other care coordination interventions (e.g., integrated care, shared care, organized clinic) have been reported in systematic reviews covering other clinical areas such as rheumatoid arthritis, pain management, asthma and cancer, there is insufficient evidence to draw firm conclusions in these other instances.

Setting of Care. Interventions were conducted across different settings (home, community, outpatient clinic), with half of the reviews conducting interventions across multiple settings, an interface commonly noted as challenging for coordination of care. One review on heart failure reported that interventions with a home-based component or telephone follow-up were more effective than those based in the hospital or clinic, but there is little evidence to examine the effect of setting on the effectiveness of care coordination interventions. Furthermore, there was also insufficient evidence to determine the relative effectiveness of any particular care coordination intervention compared to others in improving patient outcomes across care boundaries.

Components of Care Coordination. Using a list of essential tasks of care for a patient, associated care coordination activities, and features to support the activities, we reviewed 15 recent systematic reviews to assess if the reviews provided any information on specific components of the care coordination intervention; 13 of these provided limited information. The descriptions of interventions presented in systematic reviews generally do not provide adequate information for complete categorization into components. The current evidence base does not support a granular, component-level analysis from systematic reviews.

Patient Population. Among our included systematic reviews, care coordination interventions were most frequently targeted at patients with mental health problems (multidisciplinary teams

and case management being the main interventions evaluated in this population); heart failure and diabetes were the next most frequently studied conditions. The main interventions evaluated for heart failure were multidisciplinary teams and disease management and while the reviews were consistent in reporting improved outcomes associated with both these interventions, there was considerable overlap of the included studies across the reviews studying patients with heart failure. Care coordination interventions were also evaluated among a diverse group of clinical conditions (diabetes, asthma, heart condition, stroke, rheumatoid arthritis, cancer, pain management). Most of the reviews reported improved outcomes for each strategy; however, there was insufficient evidence that one particular strategy was more effective than others in improving outcomes.

Most of the included systematic reviews evaluated care coordination interventions in adults in the general population of patients from primary care or hospital settings. Eight of the reviews evaluated interventions among the elderly, a vulnerable group more likely to have poorly coordinated care. The findings from these reviews suggest that care coordination strategies may improve outcomes among elderly patients (specifically by decreasing hospital admissions); however, the heterogeneity of the included strategies do not permit any further synthesis that would allow us to assess the effectiveness of one particular strategy over another.

Summary. The overall quality of the included systematic reviews was very good, with most reviews providing detailed search terms, inclusion/exclusion criteria and appropriate synthesis of their included articles. Therefore, the generally positive findings for many of the interventions are encouraging, and offer health professionals and system level decisionmakers with a range of options to test in their own environments.

Research Question 7: Have the Costs of Care Coordination Interventions Been Evaluated in Any of These Systematic Reviews, and if so What is Known? Costs were evaluated in approximately half of the included reviews that focused solely on care coordination; however, only one of the reviews reported findings on the cost-effectiveness/cost-benefit of the care coordination intervention. The evidence from this review suggests that comprehensive disease management programs are cost-effective for improving outcomes in patients with depression. The remaining reviews provided some cost estimates of the interventions evaluated; however, the evidence was insufficient to allow for any definitive conclusions regarding the costs and benefits of the care coordination interventions evaluated. Some studies reported increased utilization of services for the coordination intervention group.

Research Question 8: What Concepts are Important To Understand and Relate to Each Other for Evaluations of Care Coordination? What Conceptual Frameworks Could be Applied To Support Development and Evaluation of Strategies To Improve Care Coordination? We identified four well-established frameworks that complement each other in terms of developing and studying care coordination interventions. Taken together, the frameworks include a dozen concepts generally fitting into one of three domains: baseline assessment of the specific patient care situation, coordination mechanisms, and outcomes of care.

These frameworks provide evaluators of new interventions with a guide to exploring the possible relationships and connections between an intervention and patient outcomes. Developers and evaluators of interventions to improve coordination need to ask:

- What are the coordination needs related to patient care?
- Who are the participants in care, and how are they dependent on each other for a given care situation)?
- What are the factors already in place that may facilitate care coordination (e.g., personnel resources, information systems)? How does the intervention interact with or involve these factors?
- What are the factors that influence the motivation of those involved in coordination (e.g., attitudes, incentives)?
- How is the intervention expected to change the key coordination processes of 1) getting the necessary information across interfaces, such as different settings of care (i.e., “informational exchange” from one theory), and 2) establishing an understanding of the relationship of one individual’s work to the overall goals and to that of others involved in patient care (i.e., “relational awareness” from another theory)?
- How are the interactions of these factors and coordination processes expected to affect clinical processes and patient outcomes (e.g., what is the hypothesis about why the intervention will work)?

Research Question 9: What Measures Have Been Used To Assess Care Coordination?

Studies of care coordination have evaluated patient outcomes, including changes in mortality, symptoms, unemployment, staying connected to services, and adherence to medication. Cost and utilization outcomes, including hospitalizations, emergency department visits, and clinic visits were included in a number of studies. Also, patient and family satisfaction were reported in some instances.

We also separately searched the literature for instrument development related to care coordination, and found 20 instruments and approaches. About half of the instruments are targeted at patient and family members, and ask about perceptions of care, including items about coordination (e.g., “treatment was planned with appropriate considerations of previous course of the disease”,^{*} “told me which nurse was primarily responsible for coordinating my care.”^{**} Two of the instruments derive their data from chart reviews to assess the information exchanged between physicians. Seven instruments survey physicians or members of a defined care team to assess collaboration and teamwork processes and performance. Two instruments evaluate resources and structures (e.g., community linkages) that support care coordination. One of these instruments is for systems that care for adults with chronic illness, and the other is for primary care practices that have adopted a “medical home” approach to pediatric care.

The measurement field related to care coordination is in the early phases of its development. It is as yet unclear what approach or combination of approaches to measurement will adequately capture the processes driving an intervention’s effect, particularly outside well-defined care settings, where the challenges for coordination are most salient to patients and families.

^{*} Morita T, Hirai K, Sakaguchi Y, et al. J Pain Symptom Manage. 2004

^{**} Radwin L, Alster K, Rubin KM. Oncol Nurs Forum. 2003

Research Question 10: How do These Frameworks Relate to Quality Improvement Strategies Evaluated in the Previous Closing the Quality Gap Series Reports? The IOM Priorities Report highlighted care coordination as a topic that cut across other specific clinical areas that were priorities for national action (e.g., hypertension, diabetes, asthma, etc.) that were covered in previous reports from our Closing the Quality Gap series. The quality improvement strategies evaluated in these previous reports—namely patient education, self management, provider education, provider reminders, audit and feedback, relay of clinical data, organizational change, financial and regulatory incentives—are relevant to care coordination. While most do not target coordination of care, these strategies share the objective of improving care through changing patient, provider or organizational behavior, and can be viewed through the Andersen behavior framework, which highlights the importance of “predisposing” or “enabling” factors (e.g., financial incentives or provider education). In addition, many of the strategies relate to two other conceptual frameworks described in the report—the organizational design and relational coordination frameworks (e.g., provider reminders as an operational process that improves information transfer; patient education and self-management aimed at enhancing communication between patient and physician, which in turn might result in more coordinated care). Finally, many of the quality improvement interventions categorized as organizational change strategies are the same as those reviewed here as care coordination interventions (e.g., case management, disease management, creation of multidisciplinary teams). These reports were not included in our review, as they are all part of the Closing the Quality Gap series.

Discussion

The concept of care coordination is extremely broad, making it tempting to focus on specific terms or types of approaches—such as disease management, case management, teamwork, or Wagner’s Chronic Care Model—in order to provide an in-depth analysis on a limited area. However, the choice of approaches to coordinating care is likely to be tied to the specific circumstances and constraints of a given setting or patient population. Therefore, this Evidence Report aimed to produce a working definition of care coordination; a broad overview of potential care coordination interventions from a systematic review literature; and a description of ongoing programs, available evidence on their effectiveness, and several frameworks for thinking about key variables and measures relevant to studying care coordination in the future. The Report thus represents a starting point for understanding care coordination and its potential to improve patient outcomes and reduce health care costs. It concludes with specific actions that patients, providers and system-level decisionmakers might take now. Much further work is needed, however, and the Report also concludes with recommendations for future conceptual and evaluation research.

Technical Review

Chapter 1. Introduction

*“Like a sailing ship needs a navigator to avoid the rocks, patients need navigation to get all the way through the medical system as quickly as possible... We put Patient Navigators in place in Harlem Hospital in 1994, and we have found them to be very effective at getting people treated. We don’t lose patients anymore.” Dr. Harold P. Freeman**

The U.S. health care delivery system suffers from pervasive deficiencies and remarkable variation in patient safety and healthcare quality.²⁻⁵ While numerous factors may explain continued poor performance and variation, one commonly accepted belief is that improvements in care coordination can help reduce fragmentation of patient care, lead to better quality, and potentially, lower costs. In *Priority Areas for National Action: Transforming Health Care Quality*, the Institute of Medicine (IOM) suggested that improvements in care coordination could result in significant benefits “across the continuum of care across the life span,” and called for national action on this “cross-cutting” topic.⁶

Clinical vignettes of patients receiving care in a well-coordinated system provide a striking contrast to those of patients navigating the more typical uncoordinated system.^{2, 7} Patients with complex health care needs, their families, and their providers often must traverse numerous professional, geographical, information system, and organizational boundaries to ensure that necessary care activities are performed adequately.⁸⁻¹³ Failing to overcome these barriers may disrupt the flow of critical information and heighten patient vulnerability to medical errors; duplication, omission, or delay of services; and poor outcomes. However, the evidence base connecting care coordination to its potential positive effects is sparse, and the definitions and key concepts underlying the topic are unresolved.⁷

1A. Report Scope and Organization

This report is the sixth in the series “Closing the Quality Gap” by our Stanford-UCSF Evidence-based Practice Center (EPC), and addresses the topic of care coordination. The other reports in the series have focused on specific clinical conditions (e.g., hypertension, diabetes, asthma), which lend themselves to a standardized approach for identifying and evaluating primary studies of quality improvement strategies. However, for the broader and more ambiguous topic of care coordination, our objective was to identify and fill in some of the major gaps in the evidence regarding the key definitions and concepts of care coordination and provide an overview of the effectiveness of care coordination interventions on the processes and outcomes of care for outpatients, typically for those with chronic medical conditions. We did not aim to identify and present all of the primary evidence related to this broad topic. Instead, we set out to provide an overview of ongoing efforts in health care coordination, summarize some of the evidence about the effectiveness of care coordination interventions, and present relevant

* Quote from polo.com interview with Dr. Harold P. Freeman, past President of the American Cancer Society, explaining the need for patient navigation in a fragmented system with barriers to coordinated delivery of care, accessible to all people.

frameworks for the development and evaluation of future interventions. This background and approach may be useful to a variety of decisionmakers: for example, designers of interventions who need to make decisions about what to include in a package of interventions aimed at improving care coordination, evaluators of interventions who need to assess comparative effectiveness of different approaches to improving coordination, and purchasers of interventions to reduce the adverse consequences of fragmentation of health care services.

As a result, this report is organized differently than the others in the series. We first describe ongoing efforts in care coordination and describe the relevant information needed by decisionmakers involved in improving care coordination (Chapter 2). We synthesized this information from personal contacts with professionals currently leading care coordination efforts and Internet searches—it was not intended to be exhaustive. Second, we describe contemporary definitions of care coordination and related concepts from which we developed a working definition for use in identifying relevant evidence (Chapter 3). Third, we present a review of systematic reviews of the effects of care coordination interventions for outpatients (and inpatients whose care was not solely limited to that setting) who, in most cases, have chronic medical conditions (Chapter 4). Fourth, we describe conceptual frameworks from different fields that explore care coordination needs, approaches to coordinating care, and patient outcomes (Chapter 5). For Chapters 3, 4, and 5, we performed extensive literature searches, although only the review presented in Chapter 4 is completely systematic since its purpose is to synthesize information from evaluations of care coordination interventions. Finally, we conclude with a discussion of the future research required to further understand and benefit from care coordination efforts (Chapter 6).

1B. Key Research Questions

The key questions addressed in each of the chapters of this report are listed here and summarized at the end of each chapter:

Background: Ongoing Efforts in Care Coordination and Gaps in the Evidence (Chapter 2)

Research Question 1: What aspects of care coordination are of greatest interest to healthcare decisionmakers?

Research Question 2: What are the key gaps in the care coordination evidence base?

Definitions of Care Coordination and Related Terms (Chapter 3)

Research Question 3: What definitions exist for care coordination?

Research Question 4: What definition could be formulated to apply to systematic reviews?

Review of Systematic Reviews of Care Coordination Interventions (Chapter 4)

Research Question 5: Which care coordination interventions have been evaluated by systematic reviewers and how were they defined?

Research Question 6: What is the evidence regarding the health benefits of these care coordination interventions as summarized in the systematic review(s)? In particular, is the effectiveness of care coordination interventions related to the setting in which care is being coordinated, the component of care being coordinated, or the type of disease or patients for whom care is being coordinated?

Research Question 7: Have the costs of care coordination interventions been evaluated in any of these systematic reviews, and if so what is known?

Conceptual Frameworks and Their Application to Evaluating Care Coordination Interventions (Chapter 5)

Research Question 8: What concepts are important to understand and relate to each other for evaluations of care coordination? What conceptual frameworks could be applied to support development and evaluation of strategies to improve care coordination?

Research Question 9: What measures have been used to assess care coordination?

Research Question 10: How do these frameworks relate to quality improvement strategies evaluated in the previous Closing the Quality Gap series reports?

1C. Peer Review

A draft of the Evidence Report was sent to a panel of 21 experts in quality improvement, researchers in the area of care coordination, and other professionals with an interest in care coordination (Appendix D*). We compiled their comments and made appropriate revisions to the final Report. The revision included updating the systematic review search, which resulted in 22 additional reviews analyzed.

* Appendixes cited in this report are provided electronically at <http://www.ahrq.gov/clinic/tp/caregaptp.htm>

Chapter 2. Background: Ongoing Efforts in Care Coordination and Gaps in the Evidence

Given the fragmented nature of the U.S. healthcare system, healthcare providers have increasingly implemented programs aimed at coordinating the care patients receive. Although these programs vary widely in structure and style, the primary goals of care coordination programs—to improve disease outcomes while containing overall healthcare costs—tend to be consistent across organizations. Historically, most care coordination programs have targeted patients with chronic conditions, which are costly, especially if managed poorly. According to a 2004 Partnership for Solutions report, 48% of the U.S. population has one or more chronic conditions; all their care represents 83% of total healthcare spending.¹⁴ Patients with chronic conditions visit their health care providers, fill prescriptions, and are hospitalized more often than the general population.¹⁴ Furthermore, patients with chronic conditions are more likely to experience poorly coordinated care, which can lead to adverse drug interactions, unnecessary or duplicate tests or procedures, conflicting information from multiple providers, and increased health care costs.¹⁴

These issues have challenged care providers, health system designer, policymakers and the research community for many years, though pressures have mounted in recent years with changing demography and patterns of illness (from more acute orientation to chronic care). Traditionally, coordination interventions follow from several perspectives: medical versus social; short-term episodic or acute care versus chronic and long term care; and various points of access to the patient (e.g., patient targeting to find those in need of high intensity services, managed care organization, or physician office practice). In the 1980's the National Long term Care Demonstration Project, a large scale randomized control trial of community care which tested channeling patients at risk of deteriorating and needing nursing home care into enriched models of community care based on case management and varying levels of authority and financial incentives.¹⁵ This project, commonly referred to as “Channeling” found that risk prediction was problematic in some cases, there was no benefit in terms of cost or clinical outcomes, and increased caregiver satisfaction.^{16, 17} This project exemplifies the need to test complex interventions because findings are not always as expected. This study as well as other prominent work in the 1980's and 90's (especially the Social Health Maintenance Organization (S/HMO) Projects^{18, 19} and the Program of All-Inclusive Care for the Elderly (PACE^{20, 21})) also provided important lessons about linking medical and social models flexibly in order to achieve care coordination. Although the temptation in studying care coordination is to restrict the scope, historical experience demonstrates a need to consider interactions between separate systems of care (e.g., acute, community, long-term).

In the more recent past, care coordination programs initially gained a stronghold in the private sector, where managed care organizations, commercial vendors, academic medical centers, and private health insurers sought to implement coordinating mechanisms aimed at controlling costs, improving disease outcomes, quality of care, and patient satisfaction.²² Public sector programs, such as Medicare and Medicaid, followed suit with a series of congressionally mandated demonstration and pilot projects to test the efficacy of care coordination and disease management programs.

The goal of this chapter is to provide an overview of ongoing efforts in care coordination and key gaps in the evidence about the effectiveness of care coordination efforts. In the sections that follow, we first describe ongoing care coordination programs and related activities. Then, we present key questions related to the mechanisms and aims of care coordination of concern to health professionals. Finally, we highlight key gaps in the care coordination evidence-base.

Our approach to collecting the information presented in this chapter relied on background literature searches for policy papers, Internet searches using care coordination and related terminology for ongoing care coordination programs and demonstration projects, searches for conference brochures, and personal contacts with professionals currently leading care coordination efforts. This search was not intended to be exhaustive or fully systematic.

2A. Care Coordination Vendors

In the past decade, there has been a dramatic increase in the number of commercial companies selling care coordination services to healthcare providers. Many of these refer to their services as disease management or care management. The revenue associated with the sale of disease management services has increased more than ten-fold, from \$78 million in 1997 to \$1.2 billion in 2005.²³ Initially, disease management vendors tended to focus on a small number of chronic conditions, but more recently some of the larger companies have extended their services to cover more than 120 conditions.²³ These trends relate to outsourced disease management, and thus do not necessarily reflect disease management practices set up internally by some health care providers. The market has also expanded in terms of the types of providers of these services, including health plans, pharmaceutical companies, pharmacy benefit management companies, disease management companies, and even health and information companies selling specific disease management tools (e.g., physician alerts, 24-hour call centers, educational material, care monitoring software, etc.). While the industry has traditionally focused on physical health conditions, the public sector demands for integration and efficient resource use for mental health and substance abuse disorders have encouraged new roles for managed behavioral health organizations.²⁴

Perhaps one of the biggest issues facing care coordination vendors, and the field at large, is how to best measure and evaluate the effectiveness of their programs. Evaluators are interested linking specific components of care coordination and intensity of intervention (e.g., number of contacts, caseloads) to outcomes. Organizations, such as the Disease Management Association of America (DMAA), are currently working to develop standardized disease and care management measures. Other groups, such as the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), the Utilization Review Accreditation Commission (URAC), and the National Committee for Quality Assurance (NCQA) have initiated accreditation and certification programs for disease management programs. Efforts to evaluate effectiveness and efficiency are widespread, although the evidence from the peer-reviewed literature describing these efforts is mixed.²⁵ In general, vendors report positive return on investment (ROI) numbers, though buyers have expressed concern about biased methods and a lack of comparability across ROI analyses.²⁶⁻²⁸ Observers of the field have also voiced concerns about relying on potentially out-of-date findings from projects conducted in a dynamic health plan environment.^{29, 30}

2B. Purchasers and Developers of Care Coordination Programs

Medicare

Twenty-three percent of Medicare beneficiaries with five or more chronic conditions account for 68% of total Medicare spending.³¹ The care these individuals receive is often fragmented across settings and providers, with many providers failing to follow evidence-based guidelines and with patients not well versed in self-care management strategies.²² This lack of coordination often results in poor clinical outcomes, repeated hospitalizations, excessive utilization of prescription drugs, medical errors, dissatisfaction with care, and higher costs to the Medicare program.^{32, 33}

In response to this association between poorly coordinated care among Medicare beneficiaries with multiple chronic medical conditions and poorer outcomes of care, the Balanced Budget Act of 1997 mandated a coordinated care demonstration study for chronically ill fee-for-service Medicare beneficiaries.³² To determine the best practices in coordinated care and assess how best to structure the demonstration project, the Centers for Medicare & Medicaid Services (CMS) commissioned a report from Mathematica Policy Research, Inc. (Princeton, New Jersey) that examined existing care coordination schemes and proposed design options for future demonstration projects. Their 2000 report, entitled, “Best Practices in Coordinated Care,”³² made the following five recommendations:

1. “Programs should follow the three steps: Assess and Plan, Implement and Deliver, and Reassess and Readjust for all enrolled patients;
2. Programs should have express goals of prevention of health problems and crises, and of early problem detection and intervention;
3. Disease-specific programs should incorporate national evidence-based or consensus-based guidelines into their interventions;
4. Care coordinators should be nurses with at least a bachelor’s degree in nursing; and
5. Programs should have significant experience in care coordination and should have evidence of having reduced hospital use or total medical costs.”³²

Since the publication of this report, CMS has funded a number of care coordination and disease management demonstration projects designed to improve health outcomes without increasing costs. These projects have typically emanated from legislative mandates. For example, Congress established the Chronic Care Improvement Program (since termed Medicare Health Support) in the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003 (Public Law 108-173; section 721)^{34, 35} to test new incentives and approaches for improving care coordination for elders with high cost complex and chronic illnesses. We have provided a brief description of several Medicare care coordination demonstration projects in Table 1 and direct the interested reader to the Medicare Demonstration Projects Evaluation Web Site³⁶ for additional information and future updates.

Table 1. Recent Medicare demonstration and pilot projects with care coordination elements

Demonstration Project	Description	Project Goals	Status
Medicare Health Support: initially called Chronic Care Improvement Program Demonstration ³⁷	8 organizations called Medicare Health Support Organizations (MHSO), will each manage the care of about 20,000 traditional fee-for-service Medicare beneficiaries with congestive heart failure and/or diabetes among their chronic conditions. Programs focus on improving health outcomes through a variety of coordination approaches (care plans, patient monitoring, disease management, case management, information technologies, collaborations with physicians, etc.) for prospectively identified target populations where care has typically been fragmented. MHSO payments tied to performance. Program is voluntary for beneficiaries, with no change in where they seek care.	-Improve quality of life by helping participants avoid complications -Increase adherence to evidence-based care -Reduce unnecessary hospital stays and emergency room visits	-Organizations selected in summer 2004; MHSOs starting at various times from August 2005 to January 2006 -Results not reported yet -3-year operation and evaluation period planned for each program -Additional information: http://www.cms.hhs.gov/CCIP/downloads/factsheet.pdf
Care Management for High-Cost Beneficiaries Demonstration ^{38, 39}	Six organizations over a 3-year period will evaluate various care management models for high-cost beneficiaries in the traditional Medicare fee-for-service program. Approaches emphasize information technology and collaboration between physicians and specialists to enhance communication of clinical information.	-Increase adherence to evidence-based care -Reduce unnecessary hospital and emergency room visits -Help participants avoid complications	-Scheduled to begin late 2005, early 2006 -Results not reported yet -Additional information: http://www.cms.hhs.gov/DemoProjectsEvalRpts/downloads/CMHCB_GeneralInfo_FactSheet.pdf
Medicare Benefits Improvement and Protection Act (BIPA) Demonstration Project ⁴⁰	In Texas, Louisiana, California and Arizona up to 30,000 beneficiaries with diagnosed advanced-stage congestive heart failure, diabetes, or coronary disease will be randomized to receive disease management services and a comprehensive prescription drug benefit, or usual care.	-Lower total costs -Improve health outcomes	-3-year project started in early 2004 -Results not reported yet -Additional information: http://www.cms.hhs.gov/DemoProjectsEvalRpts/downloads/BIPAADM_Fact_Sheet.pdf

Table 1. Recent Medicare demonstration and pilot projects with care coordination elements (continued)

Demonstration Project	Description	Project Goals	Status
Medicare Coordinated Care Demonstration ⁴¹	15 sites were selected to test a variety of care coordination schemes in urban and rural settings. The selected projects include a mix of case and disease management models targeting complex chronic illnesses, including sites focused on congestive heart failure, coronary artery disease, and cancer.	-Reduce the number of hospitalizations -Improve health status -Reduce health care costs	-Site selection announced in January 2001 -Initial report with preliminary results published in 2004⁴² -Final report due not available as of January 2007 -Additional information: http://www.cms.hhs.gov/apps/media/press/release.asp?Counter=394
Physician Group Practice Demonstration ⁴³	During this 3 year demonstration, Medicare will provide financial incentives for 10 physician groups to improve patient outcomes at no additional cost through care coordination schemes. These include implementing disease and/or case management services; enhancing access to primary care physicians, geriatricians, and nursing staff; and using electronic medical records, disease registries, and evidence-based guidelines. While the demonstration requires large groups of physicians (200 or more), the arrangements between these physicians varies, including one network of small office-based physician practices.	-Prevent unnecessary hospitalizations and procedures -Improve quality of care -Prevent complications - Reduce health care costs	-Began 2005 -Final results not reported yet -Conference report on early experiences noted that “high-cost/high-risk patient management programs... target patients who have multiple chronic diseases. Transitional care interventions [enhance] hospital and emergency room discharge planning.”⁴⁴ -Additional information: http://www.cms.hhs.gov/DemoProjectsEvalRpts/downloads/PGP_Fact_Sheet.pdf

Medicare has implemented a variety of care coordination projects that differ in design and are currently in varying stages of implementation. At the time of publication of this report, however, comprehensive and finalized results of these demonstrations were not available. Similarly, specific details about financial arrangements and actual implementation experience are not generally available. Within the next one to three years additional information about the demonstration experiences, cost effectiveness, patient and provider satisfaction, and general effectiveness of care coordination programs within the Medicare system should be available.

State Medicaid Programs

Medicaid beneficiaries with chronic conditions account for more than three-quarters of current Medicaid spending.⁴⁵ State Medicaid programs have increasingly utilized care coordination programs in an effort to contain costs and better meet the needs of beneficiaries. The focus of most Medicaid programs, which have been implemented through vendors, has been on patient self-management support and nurse case-management.

According to a 2004 Kaiser Family Foundation survey of Medicaid directors, states have increasingly implemented disease management programs to contain costs for patients with chronic or disabling conditions.⁴⁶ Between 2002 and 2005, 42 states began a disease or case management program.⁴⁶ Additionally, state Medicaid programs have trended towards broader disease management programs that are not defined by specific conditions to help manage patients with multiple chronic and complex conditions.⁴⁷ The key findings of the survey of Medicaid directors' impressions indicate that disease management programs appear to lead to cost savings, and that carefully designed disease management programs, which go beyond teaching self-care principles to address the underlying infrastructure of care, have potential for the most success.⁴⁷

Across the U.S., state Medicaid programs vary in terms of their approaches to care coordination. For example, the 2004 report by the National Pharmaceutical Council identified four methods of delivering disease management to Medicaid recipients with asthma:

1. "Medicaid health outcomes partnerships are usually applied to an existing fee-for service primary care case management program. Medicaid programs focus on high-priority diseases, offering a number of support systems to help existing Medicaid providers better serve the patients assigned to them;
2. Disease management organizations are outside contractors who are retained by the state to address particular diseases, either by supplementing existing Medicaid providers and their case management activities or by taking over responsibility for targeted patients;
3. Pay for performance approaches establish new rules for scope of practice or referrals and involve nontraditional providers in the care of patients with specific diseases. The nontraditional providers are paid a special fee contingent on improving health outcomes or lowering costs;
4. Centers of excellence focus on particular disease episodes for high-cost, high-volume diseases and select a network of hospitals, physicians, and other providers who are already organized to receive a prospective, bundled payment per episode of care."⁴⁸

The January 1, 2006 implementation of Medicare Part D prescription drug benefit has resulted in some new concerns for the coordination of pharmaceutical coverage for some

Medicare and Medicaid recipients. Under the new Part D program, beneficiaries dually eligible for both programs will no longer be able to secure their prescription drug coverage through Medicaid and will be expected to enroll in a Medicare prescription drug plan, although there is uncertainty about whether they will receive equivalent coverage. A large proportion of chronically ill Medicaid patients are dually eligible, and state Medicaid officials are concerned that current disease management strategies may not be sufficient in the face of these changes.⁴⁹

We have provided a brief description of several Medicaid care coordination projects in Table 2 and direct interested readers to their website³⁶ for case studies of ongoing disease management efforts among states.

Table 2. Medicaid research projects with elements of care coordination

Report/Program	Description	Results/Status
Medicaid Disease Management: Issues and Promises, 2004 ⁴⁷	This report examines disease management programs in 9 states (CO, FL, IN, MD, MO, NY, NC, OR, WA) that target chronically ill beneficiaries in capitated managed care plans.	-Cost savings and quality results were promising, but not conclusive -Difficulties with enrollee retention and low payment rates hindered the success of the disease management programs -Programs that focused on patient self-care, rather than making more comprehensive reform health system reforms through disease management were potentially missing the opportunity to address underlying problems of “poor coordination and communication, lack of quality improvement infrastructure, and the lack of attention to helping people avoid, rather than treat, chronic disease”
Care Coordination and Medicaid Managed Care: Emerging Issues for States and Managed Care Organizations, 2000 ⁵⁰	This report examines 5 state care coordination programs in managed care (CO, DE, NM, OR, WA) aimed at people with special health care needs. The report discusses the structure of care coordination requirements, implementation efforts, best practices in coordinated care, and lessons learned.	-“Some states ... have led the way in mandating that Managed Care Organizations develop care coordination services to ensure that medical and social needs are identified and met” -“Care coordination programs take time to develop, but can be put in place even after a state has implemented Medicaid managed care” -“For the Medicaid managed care population, care coordination programs must be broader than simply expanding case management to include referrals for social service” -Creative problem-solving, through advocacy is emerging as an important new role for care coordinators”
Washington State Medicaid Integration Partnership, started in 2005 ⁵¹	This program targets elderly and disabled Medicaid beneficiaries in Snohomish county. Benefits include medical care, substance abuse treatment, and mental health treatment, with long term care to begin in 2006. The program involves care coordinators working with patients to identify health issues early, coordinate services, and help patients follow through with treatment.	The first year impact report is scheduled to be released February, 2007 For more information, go to: http://fortress.wa.gov/dshs/maa/mip/
Florida: A Healthy State Initiative ⁵²	Launched in 2001, Florida identified Medicaid beneficiaries with at least asthma, diabetes, congestive heart failure and/or hypertension who were high utilizers of specific medical services. These patients received an intensive care management program administered by an outside vendor.	Evaluations report favorable financial, clinical and participant (patient, physician, case manager) results. Specifics are available at: http://www.floridahealthy.org/resources/program-evaluation/

Although we have highlighted several Medicaid programs and studies, publicly available research is somewhat limited on the effectiveness of disease management in Medicaid populations. While several modes of delivering care coordination exist, it is difficult to state with certainty whether these programs are effective. Research in this sector appears promising, but there is a need for more in-depth evaluations of state Medicaid disease management programs.

Department of Veterans Affairs

In 2003, the Department of Veterans Affairs (VA) established the Office of Care Coordination to support the implementation of a nationwide care coordination program. This effort is in addition to ongoing coordination activities (geriatrics evaluation and management units, coordinated spinal cord injury centers, aging interventions, integrated HIV care, etc), which are not covered further in this section. The VA's care coordination efforts (through the centralized office) focus on the use of appropriate information technologies to connect patients to healthcare services within the VA. Telehealth technologies, supported by the VA's existing computerized medical record system, are being used to help ensure that patients receive "the right care at the right time."⁵³ Specifically, telehealth is expected to reduce clinic visits, improve access to care, help avoid the cost and hassle of travel to distant VA facilities, enhance patient satisfaction, and be more cost efficient compared to usual care.⁵³

At present, the VA has initiated three telehealth care coordination systems. First, the Home Telehealth system allows patients to connect with providers from their homes. This program is targeted at patients with conditions that can impair their ability to make frequent office visits, such as diabetes, chronic heart failure, chronic obstructive pulmonary disease, post traumatic stress disorder, depression, and spinal cord injury. All patients involved with the VA's Care Coordination/Home Telehealth (CCHT) programs are supported by a care coordinator, who can be a physician, but is usually a registered nurse, a nurse practitioner, or a social worker.⁵⁴ Care coordinators manage between 90 and 150 patients, depending on the complexity of the patient population.⁵⁴ As of September 2005, almost 9,000 patients were enrolled in CCHT care, with 21,000 to 25,000 expected to be enrolled in September of 2006.⁵⁴

Second, the General Telehealth system allows patients to connect with remote specialists via telehealth technologies within a VA clinic. The principal areas of interest for this program are telemental health, telerehabilitation, teleendocrinology, and telesurgery. Third, the Store-and-Forward approach to digital imagery enables digital images to be obtained and reviewed by a specialist remotely. This approach is common in the fields of radiology, dermatology, and retinal imaging—especially for patients with diabetes.⁵³

According to the May 18, 2005 congressional testimony of Patricia S. Ryan, the Director of the Community Care Coordination Service in Veterans Integrated Service Network 8, patient satisfaction with the care coordination process as well as ease in use of the telehealth technology was above 95% for the past several years.⁵⁵ A non-randomized study of a CCHT program for diabetes showed a reduction in hospitalizations, emergency room use, and the average number of bed days of care, and improvements with respect to health-related quality of life.⁵⁶ Other recent studies of the VA's telehealth care coordination efforts, including those with more rigorous designs, report favorable results in terms of patient and provider satisfaction,^{57, 58} utilization (including reductions in primary care visits initiated by a care coordinator,⁵⁹ bed days, and urgent visits),⁶⁰ clinical outcomes,⁶¹ and cost.⁶⁰

Other Federal Programs

The U.S. Congress passed the Patient Navigator Outreach and Chronic Disease Prevention Act of 2005, and the President signed the bill on June 29, 2005, to authorize the Secretary of the Department of Health and Human Services—through the Administrator of the Health Resources and Services Administration, and with participation of the Indian Health Service, the National Cancer Institute, the Office of Rural Health Policy—to make grants for the development and operation of demonstration programs to provide patient navigator services to improve health care outcomes.⁶² Two of the roles stated for a patient navigator by the legislation explicitly involve coordination: 1) assisting in the coordination of health care services and provider referrals, for individuals who are seeking detection services or follow-up for cancer or other chronic disease; and 2) coordinating with the health insurance ombudsman programs to address coverage needs. The legislation authorized appropriations of \$25 million over five years starting in fiscal year 2006.

Another recent national effort to enable care coordination (among other improvements to the health care delivery system) took the form of an executive order: “Incentives for the Use of Health Information Technology and Establishing the Position of the National Health Information Technology Coordinator.”⁶³ To provide leadership for the development and nationwide implementation of an interoperable health information technology infrastructure that does not rely on federal funding, but rather develops through collaboration between public and private interests, the President ordered a new position within Health and Human Services, “The National Health Information Technology Coordinator (National Coordinator).” The policy directive to the Coordinator specifies development of “an effective infrastructure for the secure and authorized exchange of health care information” that “improves the coordination of care and information among hospitals, laboratories, physician offices, and other ambulatory care providers.”

Private Sector Developers and Purchasers

In 2002, a survey found that nearly 90% of healthcare systems and managed care organizations reported they had or were developing disease management programs.⁶⁴ Health insurers and integrated systems are among the biggest customers of care coordination and disease management vendor services. Expanded coverage of drugs by Medicare has led pharmacy benefits management firms to work with disease management vendors in product offerings to the private sector.⁶⁵ These same organizations sometimes develop their own disease-focused coordination programs. Recently, reports about obesity management have indicated that health insurers are certifying centers of excellence for bariatric surgery, and playing a patient channeling and coordinating role themselves.⁶⁶ Some integrated health systems, such as Kaiser, have in-house care management programs⁶⁷ that they have developed. Other groups have developed their own programs for the Medicare Coordinated Care Demonstration, including one integrated delivery system (Carle Foundation), four hospitals or academic medical centers, one hospital consortium, a retirement community, a long-term care provider and a hospice. The other six organizations in this demonstration are working with care coordination providers (outsourcing services).⁴²

2C. Professional Specialty Associations

Specialty associations, representing the diverse views of physicians, nurses, pharmacists, patients, and care management advocates have increasingly developed policy statements regarding key aspects of the care coordination debate. Physician groups, such as the American Academy of Pediatrics,⁶⁸ the American Academy of Family Physicians (AAFP),⁶⁹ the American College of Physicians (ACP),⁷⁰ the Society of General Internal Medicine (SGIM),⁷¹ the Society for Primary Care,³³ and the American Geriatric Society (AGS)⁸ generally support care coordination efforts and have even advocated financial incentive programs for physicians performing coordination tasks. In his 2004 testimony, before the Practicing Physicians Advisory Council, Thomas J. Weida of the AAFP called for a care management reimbursement fee for patients with chronic conditions stating that, “Effective chronic care management involves developing a partnership with each patient, developing a care plan, ongoing communication and coordination of disparate systems to integrate their care, patient education resources and delivery systems, and more. This consumes additional physician time and resources and requires different models of delivering care.”⁷² Similarly, Robert Berenson of the Urban Institute, in his 2004 congressional testimony, advocated physician reimbursement for chronic disease care management and criticized Medicare’s current approach as a “corporate one, focused on providing contracts to third-party vendors, rather than directly enabling professionals to better serve their patients.”⁷³ Recently, the ACP published a policy monograph on “The Advanced Medical Home: A Patient-Centered, Physician-Guided Model of Health Care” that calls upon fundamental changes to the health care system, where “physicians are once again partners in coordinating and facilitating care to help patients navigate the complex and often confusing health care system by providing guidance, insight and advice in language that is informative and specific to patient needs.”⁷⁴

Other specialty groups, such as the American Psychological Association and the American Academy of Pediatrics Council on Children with Disabilities, have highlighted the unique care coordination needs of children and adolescents with mental health issues and other special needs. A 2005 Society of Primary Care policy paper entitled, “Healthy, Wealthy and Wise: Expanding the Medical Home,” proposed the development of centers that would coordinate and integrate a host of medical and social programs, such as disease management, case management, home visits, financial and debt management, exercise programs, and life skills training to vulnerable populations.⁷⁵

Groups like the Disease Management Association of America (DMAA) and Case Management Society of America (CMSA) are also working to bring attention to their causes. The DMAA is undertaking research efforts involving the standardization of disease management definitions, the standardization of outcomes evaluation metrics, and the development of a disease management patient and provider satisfaction measurement tools, among other activities. They have also recently published a dictionary of disease management terminology and a guide to disease management program evaluation, both of which are tools to help examine disease management program performance.⁷⁶ Likewise, the CMSA also works to shed light on the importance of case management by educating healthcare consumers, providers, payers, and regulators.⁷⁷

2D. Patient and Family Associations

Patient advocacy groups have also taken a keen interest in care coordination activities. The Palliative Care Policy Center's Care Coordination Coalition put forth recommendations at the 2005 White House Council on Aging, which included paying for physician's care coordination services and ensuring continuity of patient records across settings and time.⁷⁸ At a 2002 conference supported by the Commonwealth Fund, the Center for Medicare Advocacy also developed a set of recommendations for a Medicare coordinated care benefit, which called for improved care but not reduced costs to be the primary goal of services to patients and advocated the use of a care coordinator to oversee the health and social services for patients.⁷⁹

Caregiver alliances, such as the National Family Caregivers Association and the National Alliance for Caregiving, also highlight the role of caregivers as care coordinators, and even provide information about services offered by independent caregivers.⁸⁰

2E. Conferences

There has been a proliferation of conferences providing an opportunities to discuss contemporary issues in care coordination.⁸¹⁻⁸⁴ For example, the 2002 Aspen Transitional Care Conference sought to explore reasons for failures to appropriately provide transitions in care between settings, to define the responsibility for care transitions for health professionals, and to develop a research agenda for interventions designed to evaluate and improve transitional care.⁸² The seventh annual conference of The Disease Management Association (DMAA) discussed the standardization of disease management measures and processes to evaluate both clinical effectiveness and return on investment.⁸⁵ Other organizations across the public and private sectors held care coordination conferences or workshops in 2006 (Table 3).

Table 3. Example conferences in 2006 with care coordination themes

Organization/Conference Title/Date	Conference Highlights
Managed Healthcare Executive, 3 rd <i>Annual Optimizing the Implementation of Predictive Modeling</i> , March 2006 ⁸⁶	Sessions include: -“Leveraging predictive modeling to improve outcomes in population care management”; - “Moving from traditional medical management to care coordination and health promotion”
Department of Health Policy Jefferson Medical College, <i>The Disease Management Colloquium</i> , May 2006 ⁸⁷	Sessions include: -“Achieving and measuring return on investment (ROI) from disease management initiatives; -Case studies in the Medicare and Medicaid initiatives in chronic care; -The role of disease management in consumer driven health plans; -The role of financial incentives, including pay for performance, in implementing disease management programs; -The role of health information technology in implementing disease management programs”
Case Management Association of America, <i>One Purpose, Many Paths</i> , June 2006 ⁸³	Keynote talk on “Integrated Care Management: Moving from Vision to Reality” to address the issue that “patients want to have a seamless, personal and holistic experience.”
Disease Management Association of America, <i>Disease Management Leadership Forum</i> , December 2006. ⁸⁸	Focus on personalized health care, information technology and association's roll-outs of participant satisfaction survey tool, consensus guidelines on measuring outcomes, and care management predictive modeling.

The themes of these conferences suggest a growing interest in the many dimensions of care coordination programs, as health care decisionmakers strive to gain a better understanding of conceptualizing, implementing, measuring, and evaluating coordination processes.

2F. Other Activities Described by Care Coordination Professionals

Through a series of Internet and literature searches using care coordination terminology, we identified and spoke with professionals actively involved in care coordination efforts to learn more about the key issues facing the field. Our professional contacts ranged from people involved with federal efforts to implement care coordination programs to private sector disease management companies, policy institutes that work with State Medicaid directors, health provider organizations, health plans, academic researchers, foundations, specialty advocacy group representatives, and clinical professional organizations. Through our conversations with care coordination professionals, we aimed to identify critical areas of controversy and common interest in the field, and the key gaps in the care coordination evidence base.

Questions of Interest to Care Coordination Decisionmakers

Defining and Conceptualizing Care Coordination.

- How should care coordination be defined?
- How can care coordination be conceptualized for purposes of implementation and evaluation?
- How do various professions (e.g., nurses, physicians, hospice and social workers) understand care coordination? What are the similarities and differences in their points of view?

Structuring Care Coordination Programs.

- What would the optimal care coordination program look like?
- How to coordinate care for multiple chronic conditions?
- What existing systems do you need in place for care coordination to be most effective?
- How to increase access to care coordination schemes?
- How to apply a care coordination model to every day people, not just those with high risk, chronic conditions?
- How do you best train people to do care coordination? What is the ideal training/skill set/caseload?
- What is the role of information technology in care coordination?
- Who should pay for care coordination? What financial incentives are needed?

Coordination Settings.

- Where in the care continuum is coordination most likely to break down?
- How to coordinate care across settings?

- How to coordinate care that falls outside of traditional healthcare setting, such as consumer directed healthcare purchases, and work and school based management programs?
- What care coordination program will work best in my setting (or across settings that my organization might influence)?

Patient Groups To Target.

- Which patient groups would benefit most from care coordination?
- Which patient groups are most likely to have poor coordination experiences?
- How does care coordination vary by disease, race, and/or age of the population?

Provider and Patient Roles.

- What should be the patient's role in a given care coordination scheme?
- How does care coordination differ according to the health care provider's role? Is what a physician does to promote care coordination different from what a nurse does?
- Who is responsible for coordinating care of a complex patient who is managed in multiple settings by multiple providers?
- What's the best provider skill mix to make care coordination happen? What methods work to obtain buy-in for coordinating care from usual care physician?
- How do recent efforts in pay for performance and consumer driven health care influence respectively provider and patient coordination responsibilities?

Assessing Care Coordination.

- How should care coordination be measured?
- How much do care coordination programs cost? Are they cost effective?
- What outcomes should be measured to ascertain if care coordination is making a difference? Over what period of time?
- Does care coordination lead to decreased hospitalization and repeat testing?
- Will care coordination demonstrate a return on investment? What methods are appropriate to measure return on investment?
- Will people be less sick if care coordination is implemented?
- Is coordinating care better than doing nothing?
- Are patients more satisfied with care when it is coordinated better?
- Is care coordination more apt to increase the timeliness of care?
- What is the impact of care coordination on caregivers? Are caregivers satisfied and does it help?
- What is the relationship between the way care coordination is structured and its effectiveness?
- Does the degree of a health plan's integration affect how well care coordination works?

Key Gaps in the Care Coordination Evidence Base

Measures.

- Care coordination metrics to measure if coordination is occurring and how it is working.
- Metrics for calculating costs and savings associated with care coordination.

Evidence.

- Evidence on the efficacy of care coordination.
- Identification of best practices for care coordination.
- Guidelines for coordination of care of patients with multiple chronic conditions.
- Research on care coordination as it pertains to patients with chronic conditions.
- Relative effectiveness of integrated, practice-centered approaches versus “carve out” approaches (e.g., vendor supplied disease management or external case management).

Conceptual Frameworks.

- A consensus definition of care coordination.
- Common terminology/vocabulary for describing and evaluating care coordination.
- A model for implementing and evaluating care coordination.
- Framework for describing and relating the elements of care coordination.
- Different considerations and needs depending upon perspective (e.g., broad systems level perspective with responsibility for longitudinal, population-based care versus health care delivery perspective concerned with managing handoffs between care providers).
- Research models on how best to coordinate care for specific healthcare settings and patient populations.
- A model of communication that will allow diverse provider groups to better interact.

Other.

- Effects of widespread use of electronic medical record to help facilitate coordination.
- Caregivers role in care coordination schemes.
- Effects of reimbursement for performing care coordination tasks.
- Effects of improved integration across specialties.

2G. Summary Answers to Key Questions

Research Question 1: What Aspects of Care Coordination Are of Greatest Interest to Healthcare Decisionmakers?

Among health professionals, the lack of a care coordination definition and conceptual model were key areas of concern. These deficiencies were considered barriers to effectively evaluating and assessing care coordination processes. Additional evidence regarding the influence of care

coordination programs on health, cost, and satisfaction outcomes was also frequently noted. Many decisionmakers wanted to know if care coordination actually worked, and, if so, how it affects costs. Furthermore, those with responsibility for managing health care sought answers for what approaches to care coordination were likely to work, under which circumstances (e.g., by disease, setting, geographical region, payor), and for which patient populations. Finally, of interest to all decisionmakers, was the development of measures and approaches to examine the effectiveness and quality of care coordination interventions.

Research Question 2: What Are the Key Gaps in the Care Coordination Evidence Base?

The care coordination field would benefit from consensus definitions, conceptual models, and measures of care coordination processes. However, the dearth of evidence surrounding the efficacy and cost-effectiveness of various care coordination programs are also pressing issues facing decisionmakers. They want practical answers about what to implement to improve care coordination, and yet the field is only just emerging as an area of concerted study from a conceptual as well as a pragmatic perspective. Additionally, the private sector is playing a major role in providing care coordination services, yet specific details about the extent and the effectiveness of their programs is not generally available to the public.

Chapter 3. Definitions of Care Coordination and Related Terms

3A. Background and Objectives

Confusion about the definition of care coordination makes studying this topic particularly challenging. Throughout the project, experts have underscored the critical need for a consensus definition. Without a common definition, it was not feasible to determine what should be included as a care coordination intervention in our review of systematic reviews. As a result, we aimed in this chapter to develop a list of available definitions, discuss their common elements, and ultimately present a working definition to guide our review of systematic reviews. Although a more involved consensus process is advisable for developing a universally accepted definition, we expect that the development of our working definition will be a helpful initial step for others attempting standardization in this area.

3B. Methodological Approach

We adopted an iterative literature search approach to identify definitions of care coordination, from which we developed a preliminary working definition of care coordination. Table 4 presents examples of targeted literature search strategies of the PubMed[®], CINAHL[®], and Health and Psychological Instruments (HaPI) databases. Articles from these searches fell broadly into three categories: 1) presentations of explicit definitions or conceptual frameworks related to care coordination, 2) empirical studies that directly evaluated coordination processes, and 3) studies describing the development of measures of coordination processes. Given the breadth of coordination-related research identified in our preliminary searches, and because the purpose of this report was to provide a cross-cutting overview of the state of the science of care coordination research, searches were not used to perform a systematic review of primary studies of care coordination interventions. We instead retrieved selected articles from these searches for this chapter and Chapter 5 (conceptual frameworks), and did not attempt to be exhaustive.

Table 4. Initial search strategies used to identify definitions of care coordination

Database	Search criteria
PubMed	“Coordination” and ((provider*) or (physician*)) and (“care” or (practice*) or (service*) or (task*)) and (“communication” or (organization*) or “programming” or “feedback”)
	Coordinat* and “care” and ((theor*) or “model” or “framework” or (concept*) or (defin*))
	Coordinat* and “care” and measure* and (“testing” or “validation”)
CINAHL	((Coordinat\$ and care.mp and (instrument.mp or exp Instrument Validation/)
HaPI	Coordinat\$ and care.mp

* and \$ are truncation symbols so that all terms starting with the letters before the truncation symbol are searched. For example, searching with the term theor* would include terms such as theory and theoretical.

3C. Key Elements in Care Coordination Definitions

Our searches found more than 40 distinct definitions of care coordination that were extremely heterogeneous (Table 5).

Table 5. Definitions for care coordination and related concepts

Citation	Definition
AAP 1999 ¹³ AAP 2005 ⁶⁸	"Care coordination is a process that links children with special health care needs and their families to services and resources in a coordinated effort to maximize the potential of the children and provide them with optimal care." (1999) "Care coordination is a process that facilitates the linkage of children and their families with appropriate services and resources in a coordinated effort to achieve good health." (2005)
Allred 1995 ⁸⁹	"Coordination is the ability to achieve the requisite unity of effort or teamwork across individuals, departments, and organizations so that the activities necessary for the organization's success do not go unperformed. Coordination implies collaboration or an integration of efforts, of which communication among individuals and groups is the basis."; "Coordination is the technique used to satisfy the information needs of the numerous and diverse providers (differentiation) that are required to contend with patient care problems that arise in a complex, rapidly changing, unpredictable, and uncertain practice environment." (citing Charns 1976)
Allred 1995 ⁹⁰	"Coordination refers to the regulation of activity between the nurse and the case manager so that necessary patient activities do not go unperformed" (citing Charns 1976)
Bickell 2001 ⁹¹	"We developed a conceptual framework that posited 6 dimensions of coordination for early-stage breast cancer: standardization of work, feedback mechanisms, patient support, monitoring the quality of care, information systems, and location of care sites."
Bodenheimer 1999 ⁹²	"The PCP [primary care practitioner] as coordinator assists patients in receiving the full range of medical services from the multitasking team of specialists and other caregivers"
Bolland 1994 ⁹³	- "Coordination is a term that is often used without any exact referent, and in some cases, researchers report lack of coordination without either (a) indicating an empirical basis for their conclusions, or (b) indicating what empirical findings they would accept as evidence of coordination"; - "Integrative coordination": "when the interorganizational system is structurally fragmented, coordination is low; when it is structurally integrated, coordination is high"
Brown 2004 ⁴²	"The term 'care coordination' has no well-established definition. Rather, it is generally understood to mean a process of improving communication among the various medical professionals with whom patients come in contact and between these professionals and the patients themselves (and their families)."
Cassady 2000 ⁹⁴	"Coordination addressed only the actual integration of services between a primary care provider and specialty care, because consumers might not know the characteristics of the practice (structure) that facilitate coordination of care"
Chen 2000 ³²	- "There does not seem to be a clear, universally accepted definition of coordinated care for chronic illness." - "Coordinated care programs, by our definition, are those that target chronically ill persons 'at risk' for adverse outcomes and expensive care and that meet their needs by filling the gaps in current health care. They remedy the shortcomings in health care for chronically ill people by (1) identifying the <i>full</i> range of medical, functional, social, and emotional problems that increase patients' risk of adverse health events; (2) addressing those needs through education in self-care, optimization of medical treatment, and integration of care fragmented by setting or provider; and (3) monitoring patients for progress and early signs of problems. Such programs hold the promise of raising the quality of health care, improving health outcomes, and reducing the need for costly hospitalizations and medical care."

Table 5. Definitions for care coordination and related concepts (continued)

Citation	Definition
Cooley 2003 ⁹⁵	Coordination themes: role definition, family involvement, child and family education, assessment of needs/plans of care, resource information and referrals, advocacy
Fletcher 1984 ⁹⁶	- Coordinated care components: "written evidence that the other physician was aware of the primary physician's involvement, and that 1) the primary physician arranged visit to the other physician or knew about it beforehand; or 2) the primary physician was aware of the patient's visit to the other physician after the visit" - Fletcher et al. "did not consider these components acts of coordination in themselves, but rather conservative markers of the coordinating process."
Flocke 1998 ⁹⁷	"Coordination of care refers to the incorporation of information from referrals to specialists and previous health care visits into the current and future medical care of the patient."
Flocke 1997 ⁹⁸	"Coordination of care is defined as the patients' perception of their physician's knowledge of other visits and visits to specialists, as well as the follow-up of problems through subsequent visits or phone calls."
Forrest 2000 ⁹⁹	"Optimal coordination involves the documentation of patient care activities, interprovider communication, and the integration of service delivery into a single medical home" (citing Institute of Medicine 1996 ¹⁰⁰ and Starfield 1998 ¹⁰¹)
Gilbert 1995 ¹⁰²	"Coordinated care is a multi-disciplinary approach that focuses on achieving patient outcomes within effective time frames which have been established by all members of the health care team involved in the treatment of specific patient populations. The key to this model is the development of critical paths which serve as a guideline for interventions to be accomplished to achieve the desired outcome. Deviations from the critical path are documented and analyzed to determine system issues. An assigned coordinator is responsible for initiating the critical paths and monitoring patient progress."
Gittell 2000 ¹⁰³	"Relational co-ordination: co-ordination carried out by front-line workers with an awareness of their relationship to the overall work process and to other participants in that process. Relational co-ordination is characterized by frequent, timely problem solving communication and by helping, shared goals, shared knowledge, and mutual respect among workers. It is essentially a network of communication and relationship ties among workers, and can be thought of as a form of organizational social capital likely to enhance organizational performance."
Gittell 2002 ¹⁰⁴	"Coordination may be facilitated by certain design elements but it is more fundamentally a process of interaction among participants...Relational coordination reflects the role that frequent, timely, accurate, problem-solving communication plays in the process of coordination, but it also captures the oft-overlooked role played by relationships...specifically, coordination is carried out through relationships of shared goals, shared knowledge, and mutual respect."
Gittell 2004 ¹⁰⁵	Coordination is an "activity that is fundamentally about connections among interdependent actors who must transfer information and other resources to achieve outcomes"
Glasgow 2005 ¹⁰⁶	Follow-up/Coordination: "Arranging care that extends and reinforces office-based treatment, and making proactive contact with patients to assess progress and coordinate care"
Guastello 2005 ¹⁰⁷	"Coordination occurs when two or more people do the same or complementary tasks simultaneously."
Healey 2004 ¹⁰⁸	"Coordination refers to a team's performance enhancement of function through managing and timing activities and tasks."

Table 5. Definitions for care coordination and related concepts (continued)

Citation	Definition
Hoenig 2001 ¹⁰⁹	"Coordination of care was measured according to (a) number of different staff meetings, b) how often the therapists at team meetings (rounding therapists) were the same therapists treating the patient (treating therapists) versus someone providing a report from the treating therapist, and (c) use of paid escorts to transport patients to therapy."
IOM 1996 ¹⁰⁰	"Coordination ensures the provision of a combination of health services and information that meets a patient's needs and specifically means the connections within and across those services and settings - putting them in the right order and appropriately using resources of the community. The goal is to focus on interactions with patient and family and their health concerns, clarify clinical care decisions, advise hospitalized patients and their families, and help patients and their families cope with the social and emotional implications of disease or illness."
IOM 2004 ¹¹⁰	"To establish and support a continuous healing relationship, enabled by an integrated clinical environment and characterized by the proactive delivery of evidence-based care and follow-up. Clinical integration is further defined as the extent to which patient care services are coordinated across people, functions, activities and sites overtime so as to maximize the value of services delivered to patients. Coordination encompasses a set of practitioner behaviors and information systems intended to bring together health services, patient needs, and streams of information to facilitate the delivery of care in accordance with the six aims set forth in the <i>Quality Chasm</i> report. Such coordination can be facilitated by procedures for engaging community resources, including social and public health services." (synthesized from several sources ^{2, 6, 111})
Kibbe 2001 ¹¹²	" <i>Care coordination</i> is a term that encompasses a variety of care management methods - from case to disease management - that aim to improve the quality of care provided to patients with chronic illness while decreasing avoidable costs associated with their delivery...care coordination is viewed by its practitioners (mostly specially trained nurse case managers) as a method for decreasing the fragmentation of health delivery sites and, through better planning and monitoring of patient care plans, ending the confusion and uncertainty that often attend care for patients with complicated illnesses or multiple medical problems. Care coordination also is a means to increase the likelihood that patients with chronic illness will achieve recommended care and adhere to best practices for specific illnesses and conditions. Finally, care coordination is a collaborative and team approach that recognizes the importance of keeping the attending physicians informed while enhancing information sharing and communication among providers so as to maintain a fabric of continuity."
Kinsman 2000 ¹¹³	- "[Coordination] pertains to the systems aspect of the service delivery system." - "[Coordination requires models of team functioning. The complexity of spina bifida...requires the perspectives, knowledge bases and skills of a wide variety of professionals. How these different groups work together and integrate is what comprises [coordination]."
Kodner 2002 ¹¹⁴	" <i>Coordination</i> , the middle ground in integrated care, entails the development of formal structures and mechanisms to bridge the gap between providers and institutions, as well as work around system weaknesses and barriers, without fundamentally changing these systems <i>per se</i> . A variety of techniques are employed, including uniform assessment procedures, care management, joint care planning, team care, standardized guidelines and protocols, and common clinical and service records."

Table 5. Definitions for care coordination and related concepts (continued)

Citation	Definition
Lima & Brooks 1985 ¹¹⁵	Assessment of coordination between medical and community mental health center: "Coordination of care with the [community mental health center] was noted as present if a telephone call, or letter, or a review of the psychiatric chart had taken place...coordination with the medical clinic could have taken place through a telephone call, a letter, or a review of the medical chart."
Longest & Klingensmith 1994 ¹¹⁶	- "Conceptually and historically, coordination has been defined as the conscious activity of assembling and synchronizing differentiated work efforts so that they function harmoniously in attainment of organization objectives." - Extending the definition to encompass both inter- and intraorganizational situations: "coordination is conscious activity aimed at achieving unity and harmony of effort in pursuit of shared objectives within an organization or among a set of organizations participating in a multiorganizational arrangement of some kind."
Malone & Crowston 1994 ¹¹⁷	"Coordination is managing dependencies between activities."
Massachusetts Consortium for Children with Special Health Care Needs Care Coordination Work Group 2006 ¹¹⁸	"Care coordination is a central component of an effective system of care for children and youth with special health care needs and their families. Care coordination is an ongoing process which engages families in development of a care plan and links them to health and other services that address the full range of their needs and concerns. Principles of care coordination reflect the central role of families and the prioritization of child and family concerns, strengths and needs in effective care of children with special health care needs. Activities of care coordination may vary from family to family, but start with identification of individual child and family needs, strengths and concerns, and aim simultaneously at meeting family needs, building family capacity and improving systems of care."
McGuiness & Sibthorpe 2003 ¹¹⁹	"We conceived of coordination as a complex construct, incorporating both overall impacts of care as well as discrete key processes. Questionnaire items were designed to capture aspects of coordination that were grouped into six domains: identification of need, access to care (drugs, tests or imaging, and services); patient participation, including empowerment; patient-provider communication; inter-provider communication; and global assessment of care."
National Quality Forum 2006 ¹²⁰	"Care coordination is a function that helps ensure that the patient's needs and preferences for health services and information sharing across people, functions, and sites are met over time. Coordination maximizes the value of services delivered to patients by facilitating beneficial, efficient, safe, and high-quality patient experiences and improved healthcare outcomes."
Ohlinger 2003 ¹²¹	Coordination components: communication, multidisciplinary input, consistency in practice
Parchman 2005 ¹²²	"Coordination of care refers to the degree to which information from various sources is incorporated by the physician into the care the patient receives."
Parkerton 2004 ¹²³	"Practice Coordination" is referred to as "system continuity"
Pollack 2003 ¹²⁴	Coordination construct: "Degree to which relationships with other units in the hospital facilitate ICU performance"

Table 5. Definitions for care coordination and related concepts (continued)

Citation	Definition
Reid 2002 ¹²⁵	- "The core element of the interaction between an individual and health care providers helps distinguish continuity from other concepts that are often used synonymously. For instance, if the focus is on the interaction among providers, then the concept reflects co-ordination and integration not continuity. As [the] Director of Research at the Alberta Mental Health Board ... said, 'Continuity is how patients experience co-ordination between providers.'" - Management continuity refers to "the provision of separate types of healthcare over time in ways that complement each other so required services are not missed, duplicated or poorly timed." - "Although co-ordination refers specifically to the interaction between providers – and thus is not strictly continuity – it should result in the patient sensing 'management continuity', which means the care received from different providers is connected in a coherent way." - Management "continuity is measured by the extent to which care is given in the correct sequence, at the proper time and in the clinically appropriate manner."
Rosenbach & Young 2000 ⁵⁰	- "There is no standard definition of care coordination." - "Care coordination programs tend to use a broader social service model that considers a patient's psychosocial context (such as housing needs, income, and social supports...may coordinate a full range of medical and social support services offered within and outside the managed care plan...typically arrange covered and non-covered services for patients."
Shortell 1994 ¹²⁶	"Coordination refers to the extent to which functions and activities both within the unit and between units are brought together in a way that promotes cost-effective continuous care." (citing Longest & Klingensmith 1994¹¹⁶)
Sprague 2003 ¹²⁷	"All of these concepts [disease management, case management, care coordination, care management] have in common the principle of getting a person clinically appropriate care in a timely manner without wasting resources. Care coordination seeks primarily to help a patient navigate the system, working across care settings and providers and frequently accessing other services, such as personal care or community programs, as well."
Starfield 1979 ¹²⁸	"Coordination of care was defined as the recognition of information (problems, therapies, intervening visits and tests) about patients from one visit to a follow-up visit."
Temkin-Greener 2004 ¹²⁹	"The degree to which: work activities within a team are coordinated through formal plans, protocol, schedules; and face to face interactions are perceived as effective."
U.S. Department of Veterans Affairs Office of Care Coordination ⁸⁴ (Accessed August 29,2005)	"Care coordination in VHA is the wider application of care and case management principles to the delivery of health care services using health informatics, disease management, and telehealth technologies to facilitate access to care and improve the health of designated individuals and populations with the intent of providing the right care in the right place at the right time"
Van de Ven 1976 ¹³⁰	"Coordination means integrating or linking together different parts of an organization to accomplish a collective set of tasks."

Table 5. Definitions for care coordination and related concepts (continued)

Citation	Definition
Wehr 2000 ¹³¹	- "No validated measure of the quality of care coordination exists. Indeed, there is no single, generally accepted definition of 'care coordination'." - "Care coordination was 'opening doors' to needed services for Medicaid enrollees and helping them with non-medical problems that could compromise their health." - "The purpose of care coordination is to assist persons with special health care needs and their families gain access to services covered under their Medicaid managed care plan and to other services available in their communities." - "Care coordination is support by an information system dedicated to care coordination and linked to other MCO information systems...requires a written plan of care based on a comprehensive assessment of the goals, capacities, and medical condition of the consumer and the needs and goals of family caretakers...includes monitoring to assure that services are received, to identify problems in the quality of care, to reassess and revise care plans, and to advocate on behalf of enrollees and family caretakers."
Wenger 2004 ¹³²	Coordination is a "process by which the elements and relationships of medical care during any one sequence of care are fitted together in an overall design....coordination involves the sharing of information about past findings, evaluation, and decisions, and the use of these in current management, among a number of providers to achieve a coherent scheme of management"(citing Donabedian 1980 ¹³³); "matching the patient's needs with the appropriate level and type of medical, health, and social services" (citing JCAHO ¹³⁴)
Young 1998 ¹³⁵	"Coordination has been defined as the conscious activity of assembling and synchronizing differentiated work efforts so that they function harmoniously in attainment of organizational objectives." (citing Haimann & Scott 1990)

From a review of these definitions and related studies, we identified five key elements comprising care coordination:

1. Numerous participants are typically involved in care coordination;
2. Coordination is necessary when participants are dependent upon each other to carry out disparate activities in a patient's care;
3. In order to carry out these activities in a coordinated way, each participant needs adequate knowledge about their own and others' roles, and available resources;
4. In order to manage all required patient care activities, participants rely on exchange of information; and
5. Integration of care activities has the goal of facilitating appropriate delivery of health care services.

The subsequent sections provide more detail about each of these five themes and how they relate to the health care setting.

Participants Involved in a Patient's Care

Patients, family caregivers, physicians, nurses, pharmacists, social workers, other professionals, and support staff are often involved in delivery of health care services. As care needs become more complex, the number of potential participants and relationships among

participants tends to increase. For example, care of an otherwise healthy patient with uncomplicated hypertension may be effectively managed by a single primary care physician. In contrast, care for seriously mentally ill patients could typically include physicians, nurses, social workers, psychologists, and pharmacists as core team members, but might also involve occupational or recreational therapists, dietitians, and chaplains depending on the specific patient's unique needs.¹³⁶ Similarly, management of care for frail community-dwelling elderly people optimally involves primary care physicians, nurse practitioners, clinic and home health nurses, social workers, occupational and physical therapists, dietitians, healthcare workers or aides, recreation therapists, and transportation workers, as evidenced by the Program of All-Inclusive Care for the Elderly (PACE).¹²⁹ Regardless of the number of participants, the patient and his or her needs are highlighted in care coordination definitions from several prominent organizations (e.g., AAP, IOM, NQF).

Interdependence of Participants

Coordination for patients with complex health care needs often involves multiple participants who individually provide specialized knowledge, skills, and services*, and who together potentially provide a comprehensive, coherent, and continuous response to a patient's unique care needs.** Three vignettes in a recent policy monograph by the American College of Physicians provide concrete examples highlighting the need for highly coordinated delivery of care when multiple participants depend on each other to provide appropriate care.†

Adequate Knowledge About Available Resources and Participants' Roles

In order to make appropriate and timely medical decisions, participants in patient care activities require information about available resources (e.g., information systems, urgent care facility availability at a particular hour, standardized protocols). They also need adequate information about the experience, skills, plans, relationships, and preferences of all participants in order to determine a plan of care.^{13, 95, 103, 104, 113, 116, 137-139} Clinicians involved in a patient's care may also have differing opinions about the roles they and others should assume in a patient's care.¹⁴⁰ Such discrepancies in perceptions about roles may lead to ineffective navigation back and forth across boundaries related to professions, geography, information systems, and organizations.^{8, 9, 12, 141} Effective coordination depends on adequate knowledge

* Organizational theory refers to this concept as “differentiation,” while health care often uses the term specialization.

** Similarly, organizational theory calls this concept “complementarity,” while the health care field would simply refer to this situation as providing patient care.

† In one of the cases, an internist asked a home healthcare nurse to assess an 85-year old woman with congestive heart failure, atrial fibrillation, type 2 diabetes mellitus, and possible dementia who had been deteriorating at home. After evaluating the patient, the nurse provided a video link to the patient's home and discussed the patient's situation with the internist who recommended that paramedics be called. While the paramedics prepared to transfer the patient to the hospital, the nurse notified the granddaughter. The patient was stabilized in the hospital, received a cardiology consultation, and was finally discharged home with ongoing monitoring supported by the home healthcare nurse, granddaughter, and internist.

about roles and interdependencies among participants,¹¹⁷ and ways to reduce system weaknesses and barriers through “bridging gaps” in information flow.¹⁴²

Information Exchange Among Participants

Many of the definitions in Table 5 and studies of coordination interventions describe the pivotal role of exchange of critical patient-related information to facilitate effective coordination and medical decisionmaking.^{90, 96, 98, 99, 102, 115, 122, 143, 144} Several studies have found that referring clinicians and specialists exchange information infrequently^{99, 145, 146} and in non-standardized ways that may have adverse consequences for patient care.⁹¹

The Aims of Care Coordination

Most definitions of care coordination state a purpose for coordination. While approaches to coordinating care may vary greatly, the general intent of these strategies is to facilitate delivery of the right health care services in the right order, at the right time, and in the right setting.^{100, 127, 147} Thus, care coordination occurs with the deliberate purpose of achieving a goal, such as the appropriate delivery of health care. Such delivery is particularly challenging wherever care must span role, physical, or time boundaries (e.g., the primary care/specialty care interface; the health care/community interface; continuity of services among various care sites such as inpatient, outpatient, and nursing home for the elderly; and transitions over time in cases such as adolescents moving into adult services).

3D. Proposed Working Definition of Care Coordination

We brought together the key elements found in the published definitions of care coordination and developed a definition that addresses these elements in a single brief statement. We also recognized that we would need to apply the proposed working definition to our literature review, and therefore attempted to keep it as simple and inclusive as possible. We purposefully chose to be broad and inclusive because we did not want to miss systematic reviews that might be relevant to any reasonable concept of care coordination. Narrower definitions may be useful for other purposes. In Section 3F, we introduce a components list to guide analysis of care coordination interventions.

We define care coordination as *the deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient’s care to facilitate the appropriate delivery of health care services. Organizing care involves the marshalling of personnel and other resources needed to carry out all required patient care activities, and is often managed by the exchange of information among participants responsible for different aspects of care.*

3E. Terminology Closely Related to Care Coordination

Several terms have often been used synonymously or in conjunction with care coordination: collaboration, teamwork, continuity of care, disease management, case management, care

management, Chronic Care Model, and care or patient navigator. As is the case with care coordination, some of these terms lack a consensus regarding their definition and use in actual practice,^{64, 125, 148-150} making it difficult to interpret how these concepts relate to each other and to care coordination. However, each of these models seeks to reduce fragmentation and improve health care delivery through better coordination.^{32, 42, 151, 152}

Since the boundaries between these terms is blurry and each of the models they represent have substantial overlap with care coordination (as described in our working definition), we retained these additional terms in our searches to identify articles possibly relevant to care coordination.

Collaboration

Numerous investigators have defined inter-professional collaboration¹⁵³⁻¹⁶³ as interactions based on shared power and authority¹⁵³ and mutual respect for the unique abilities of each participant.¹⁵⁴ Ideal collaborative relationships among health professionals result in cooperative problem-solving and decisionmaking,¹⁵⁵ where participants achieve better patient care by working together than would have been possible individually.¹⁵⁶ While some classify coordination as a concept that is a subset of collaboration,¹⁶³ others describe collaboration as one possible approach to coordinating care.¹¹⁷ Thus, there is agreement that the concepts of collaboration and coordination are related, even if there is ambiguity about how they overlap.

Teamwork

In health care, multidisciplinary teams commonly include “individuals from different disciplines who contribute specialized knowledge in nonhierarchical relationships and who act according to situational demands rather than traditional organizational roles.”¹³⁶ Identifying determinants of successful teamwork in health care has generated much interest.¹⁶⁴⁻¹⁶⁸ For example, mutual adjustments among participants to coordinate care is logically necessary as the level of interdependence among the participant’s separate activities increases.¹³⁰

Continuity of Care

This concept is often mentioned in conjunction with care coordination or care transitions,^{96, 132, 169} and also has multiple definitions.¹⁷⁰⁻¹⁷⁸ Described by some as the “existence of some thread, individual, practitioner, group, or medical record that binds together episodes of care,”⁹⁶ continuity of care has also been defined as “effective information exchange, within satisfactory patient-clinician relationships”.¹⁷⁹ While some investigators define coordination as one of several domains within continuity of care,¹⁸⁰ others suggest that coordination results from continuity of care.¹²⁵

The interested reader is referred to discussion papers^{125, 181, 182} and a recent review commissioned by several Canadian organizations¹⁸³ for a synthesis of the conceptual work on continuity of care. In brief, their work organizes continuity of care into three dimensions: informational continuity, or the “use of information on past events and personal circumstances to make current care appropriate for each individual;” interpersonal continuity, defined as an “ongoing therapeutic relationship between a patient and one or more clinicians;” and

management continuity, defined as a “consistent and coherent approach to management of a health condition that is responsive to patient’s changing needs.” Continuity of care represents an individual patient’s experience of coordination over time with either a single clinician or with multiple clinicians (i.e., the extent to which the appropriate care is perceived to occur at the right time and in the right order).^{125, 181, 183}

Disease Management

The Disease Management Association of America defines this term as “a system of coordinated healthcare interventions and communications for populations with conditions in which patient self-care efforts are significant. Disease management supports the physician or practitioner/patient relationship and plan of care, emphasizes prevention of exacerbations and complications utilizing evidence-based practice guidelines and patient empowerment strategies, and evaluates clinical, humanistic, and economic outcomes on an ongoing basis with the goal of improving overall health.”¹⁸⁴ Full-service disease management programs include the following six components: processes to identify specific population, evidence-based practice guidelines, practice models based on collaboration between physicians and other supporting service providers, self-management education for patients, measurement of process and outcomes, routine reporting to provide a feedback loop among participants.¹⁸⁴ In addition, disease management and case management programs have been included together under the umbrella of “coordinated care models” in reports intended to guide the Medicare Coordinated Care Demonstration Projects.^{32, 42}

Case Management

The Case Management Society of America defines case management 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”.¹⁸⁵ According to a Mathematica report that included case management in its definition of care coordination, “case management implicitly enhances care coordination through the designation of a case manager whose specific responsibility is to oversee and coordinate care delivery [targeted to] high-risk patients [with a] diverse combinations of health, functional, and social problems.”³²

Care Management

This term is often used interchangeably with care coordination. In a background paper, Mechanic states “care management programs apply systems, science, incentives, and information to improve medical practice and help patients manage medical conditions more effectively. The goal of care management is to improve patient health status and reduce the need for expensive medical services. The principal challenge is finding effective ways to change physician and patient behavior.”⁶⁷

Chronic Care Model

Initially named by Wagner and colleagues as a “Model for Effective Chronic Illness Care”, the basic premise of this model is that “effective chronic illness care requires an appropriately organized delivery system linked with complementary community resources available outside the organization” and is sustained by productive interactions between multidisciplinary primary care teams and “activated patients.”^{142, 149, 186-189} A multidisciplinary primary care practice team has responsibility for organizing and coordinating care through a number of activities: performing comprehensive patient assessments; helping patients set goals and solve problems for improved self-management; applying clinical and behavioral interventions that prevent complications and optimize disease control and patient well-being; and ensuring continuous follow-up. To achieve effective patient management, the Chronic Care Model promotes comprehensive system change encompassing six broad areas: health care organization, linkages to community resources, self-management support, delivery system redesign, decision support, and information systems. Further extensions (Barr et al’s Expanded Chronic Care Model¹⁹⁰, WHO Model of Innovative Care),¹⁹¹ include components that provide more detail on community linkages, offer supplementary aims of population health through preventive services and health promotion, and add a policy environment level.

Care Navigator or Patient Navigator

These terms appear on web sites of health care organizations, particularly for cancer care, and in reports in the medical literature.¹⁹² Recent studies report patient navigator interventions in inner-city women with breast abnormalities,¹⁹³ a university hospital head and neck cancer service,¹⁹⁴ a community hospital using lay people as navigators for cancer patients,¹⁹⁵ and as part of a collaborative community health initiative for uninsured patients.¹⁹⁶ While there is no standard definition of a patient navigator, authors of a literature review recently recommend defining a navigator as “someone who helps assist patients overcome barriers to care,” instead of employing the other common service-based definition.¹⁹² Thus, patient navigation refers to the assistance offered to patients in “navigating” through the complex health-care system to overcome barriers in accessing quality care and treatment (e.g., arranging financial support, coordinating among providers and setting, arranging for translation services, etc). The National Cancer Institute also emphasizes a patient-centric model, noting that “a navigator is someone who understands the patient's fears and hopes, and who removes barriers to effective care by coordinating services, increasing a cancer patient's chances for survival and quality of life.”¹⁹⁷ Although more commonly available for cancer patients, patient navigation is used for underserved patients with other chronic conditions.

One other related area deserves special mention: **telehealth** and **information systems**. As noted in Chapter 2, the VA’s central care coordination program relies on the role of information technologies to connect patients to services. This approach is covered by two other AHRQ Evidence Reports, and is therefore not duplicated in our review. The RAND EPC produced both a searchable tool¹⁹⁸ and a review of the evidence from existing published articles regarding the costs, benefits, and barriers to implementing health information technologies.¹⁹⁹ The Oregon Health Sciences EPC recently updated an evidence report on telemedicine for the Medicare population that focused on health outcomes and access to care for store-and-forward, home-

based and office/hospital-based services.²⁰⁰ While neither of these reports directly addressed the role of information systems to improve care coordination, they both offer some relevant findings. The Oregon report identified several studies showing benefits of home-based telemedicine interventions in chronic diseases, apparently resulting partially from enhanced communication with health care providers and dependent to some degree upon changes in staffing as well as the technology enhancements. The RAND report concluded that the evaluative evidence base for effects of information technologies on patient-centeredness is sparse, and described only one study that commented on enhanced coordination. A recent overview noted that the emerging telehealth environment poses a critical need to clarify roles and assess skills for effective interaction between patients and clinicians.²⁰¹

3F. Components of Care Coordination

Peer reviewers of a draft of this report suggested that care coordination be broken into component parts for the purpose of analysis of care coordination interventions. Since there is no standard set of components of care coordination, we developed our own list of components that make up various care coordination interventions. We assembled this list from multiple sources, including the ongoing demonstration projects noted in Chapter 2, elements of our working definition and related terms discussed earlier in Chapter 3, ideas from the concepts present in frameworks described in Chapter 5, and recent work by the National Quality Forum (NQF)¹²⁰ and Mathematica under contract to CMS.²⁰² We then grouped related ideas and developed a more parsimonious list of tasks related to care coordination and features to support the tasks. The essential *tasks* are focused on the clinician-patient interaction (e.g., assess the patient), and the associated *coordination activities* (e.g., identify need for coordination), while the common *features* typically involve systems, resources or even policy changes to enable these tasks (e.g., personal health record to supply necessary information to multiple providers). Table 6 summarizes our component list and the correspondence of each component to the domains (and principles) from two other systems (NQF, Mathematica). The NQF system aimed to provide a framework for development of measures of care coordination, and drew from medical home concepts articulated by AAP, AAFP and ACP as well as other input from multiple sources. Mathematica has been evaluating best practices in care coordination to guide CMS demonstration projects, and continues to evolve a classification framework with readily observed program features, in order to relate domains of care coordination to program impacts.

The goal of our list of components of care coordination is to help answer the question: what intervention components are required for each permutation of specific circumstances that complicate the delivery of coordinated care? We could hypothesize that patients who have mental illnesses see multiple caregivers, and therefore interventions with components that emphasize communication among caregivers might be particularly important to successful coordination. In other words, an intervention without this active ingredient—an effective communication strategy, perhaps depending on a feature such as the proposed Continuity of Care Record^{203, 204}—would not improve coordination among mentally ill patients. Likewise, we might hypothesize that medication reconciliation is vital for frail elderly patients transitioning between settings, and that interventions with systems that support this activity (e.g., a standard procedure to review medications with a patient or family member prior to prescribing) would work better than those without such a component. As various interventions are developed, the common

features list could be expanded—with new categories and more examples. In addition, the task categories may be more or less than needed.

We developed this list as a tool to characterize the presence and absence of intervention components in recent systematic reviews. We demonstrate the approach here with a recent article of an ongoing study, “Geriatric Resources for Assessment and Care of Elders (GRACE) model”, that was devoted entirely to a comprehensive description of an intervention to improve coordination and delivery of high quality care to low-income seniors, a group particularly vulnerable to system disconnects.²⁰⁵ Table 7 shows our decomposition of this intervention into coordination-related components from our list.

Table 6. Components of care coordination

Component	NQF Domains and Principles	Mathematica Domains
ESSENTIAL CARE TASKS and Associated Coordination Activity		
ASSESS PATIENT <i>Determine Likely Coordination Challenges</i>	Highlights specific populations more vulnerable to disconnected care [Principle]	Initial Assessment
DEVELOP CARE PLAN <i>Plan for Coordination Challenges and Organize Separate Care Plans</i>	“Proactive Plan of Care and Follow-up-established and current care plan”[Domain]	Problem Identification and Care Planning
IDENTIFY PARTICIPANTS IN CARE AND SPECIFY ROLES <i>Specify Who Is Primarily Responsible For Coordination</i>	“Healthcare ‘home’ – source of usual care selected by patient” [Domain]	Program Staffing Provider Practice
COMMUNICATE TO PATIENTS AND ALL OTHER PARTICIPANTS <i>Ensure Information Exchange Across Care Interfaces</i>	“Communication-available to all team members, including patients and family” [Domain]	Communication
EXECUTE CARE PLAN <i>Implement Coordination Interventions</i>		Service Arranging
MONITOR AND ADJUST CARE <i>Monitor For And Address Coordination Failures</i>		Ongoing Monitoring
EVALUATE HEALTH OUTCOMES <i>Identify Coordination Problems That Impact Outcomes</i>	As appropriate, measurement targeted all participants [Principle]	Quality Management/ Outcomes Measurement
COMMON FEATURES OF INTERVENTIONS TO SUPPORT COORDINATION ACTIVITIES and Examples		
INFORMATION SYSTEMS <i>Electronic medical record; Personal health record; Continuity of care record, Decision support ; Used for population identification for intervention</i>	“Information systems - the use of standardized, integrated electronic information” [Domain]	Information Technology and Electronic Records
TOOLS <i>Standard protocols, Evidence-based guidelines, Self-management program, Clinician education on coordination skills, Routine reporting/feedback</i>		Patient Education
TECHNIQUES TO MITIGATE INTERFACE ISSUES <i>Multidisciplinary teams for specialty and primary care interface; Case manager or patient navigators to network and connect between medical and social services; Collaborative practice model to connect different setting or levels of care; Medical home model to support information exchange at interfaces</i>	“Transitions/Handoffs - transitions between settings of care are a special case because currently they are fraught with numerous mishaps” [Domain]	
SYSTEM RE-DESIGN <i>Paying clinicians for time spent coordinating care; Changes that reduce access barriers including system fragmentation, patient financial barriers - lack of insurance, underinsurance, physical barriers - distance from treatment facilities</i>		

Table 7. Application of component list to well-described primary study

<i>Intervention Description</i>	<i>Component Categorization</i>	<i>Rationale</i>
<i>GRACE support team acts as catalyst, provides care management, and consists of a nurse practitioner and a social worker</i>	<i>Care Task: Identify Participants/ Specify Roles</i> <i>Associated Coordination Activity: Specify Who is Responsible for Coordination</i>	<i>Support team members specified and given role of coordinator</i>
<i>Upon enrollment, the GRACE support team meets with the patient in the home to conduct an initial comprehensive geriatric assessment</i>	<i>Care Task: Assess Patient</i> <i>Associated Coordination Activity: Determine Coordination Challenges</i>	<i>Comprehensive assessment anticipates social, medical and other needs for coordination</i>
<i>The support team meets with GRACE interdisciplinary team (including a geriatrician, pharmacist, physical therapist, mental health social worker, and community-based services liaison) to develop an individualized care plan including activation of GRACE care protocols for common geriatric conditions</i>	<i>Care Task: Identify Participants</i> <i>Care Task: Develop Care Plan</i> <i>Feature to Support Coordination Activities: Tools</i>	<i>Interdisciplinary team members identified explicitly</i> <i>Standard protocols are tools to support coordination with primary care physician and other participants</i>
<i>The GRACE support team meets with the patient's primary care physician (PCP) to discuss and modify the plan</i>	<i>Care Task/Coordination Activity: Communicate/ Ensure Information Exchange Across Care Interfaces</i> <i>Feature to Support Coordination Activity: Technique to Mitigate Interface Issues</i>	<i>Primary care-specialty care interface addressed with a technique-- a meeting</i>
<i>Collaborating with the PCP, the support team implements the plan</i>	<i>Care Task: Execute Care Plan</i>	
<i>With support of electronic medical record and longitudinal Web-based care management tracking system, the GRACE support team provides ongoing care management and coordination of care across geriatric syndromes, providers, and care sites</i>	<i>Care Task/Coordination Activity: Monitor and Adjust Care/ Monitor and Address Coordination Failures</i> <i>Features to Support Coordination Activity: Information Systems, Tool, Technique to Mitigate Interface Issues</i>	<i>Electronic medical record (info system), a tracking tool (tool) and support team (technique) used to monitor coordination across providers and settings</i>
<i>The goal of the GRACE model is to optimize health and functional status, decrease excess healthcare use, and prevent long-term nursing home placement</i>	<i>Care Task: Evaluate Health Outcomes</i> <i>Coordination Activity: Identify Coordination Problems that Impact Outcomes</i>	<i>Evaluation built into model, including measures to flag coordination issues</i>

3G. Summary Answers to Key Questions

Research Question 3: What Definitions Exist for Care Coordination?

The term, “care coordination,” is referred to often in the health services literature, but is less frequently explicitly defined. The more than 40 definitions of coordination identified in our search pertain to a diverse set of patient populations, healthcare scenarios, and organizational situations. While definitions vary depending on their purpose and audience, they share common elements. We combined these elements into a working definition for application to our systematic review, and potential use by others. Table 8 shows how these common elements are specified in our working definition.

Table 8. Elements common to care coordination definitions, and linkage to our working definition

Common element	Phrase from our working definition
Coordination has a purpose or goal	“the deliberate organization...to facilitate the appropriate delivery of health care services”
Numerous participants involved in a patient’s care	“organization of patient care activities between two or more participants involved in a patient’s care”
Adequate knowledge about available resources and participants’ roles	“organizing care involves the marshalling of personnel and other resources needed to carry out all required patient care activities”
Information exchange among participants	“managed by the exchange of information among participants”
Coordination is necessary when participants are interdependent	“participants responsible for different aspects of care”

Research Question 4: What Definition Could be Formulated To Apply to Systematic Reviews?

Systematic reviews require clear definitions to determine reliably which articles are within the scope of a review. We chose to define care coordination to meet two objectives: 1) to incorporate the main elements of other definitions, and 2) to simplify decisions about whether an article is pertinent to the topic of care coordination or not. Our working definition of care coordination presented in this chapter is purposely broad enough to include interventions that are sometimes defined by their own related terminology (e.g., disease management, case management, teamwork, collaboration, Chronic Care Model). It is also applicable to programs, such as the Medicare demonstration projects to improve care for those with chronic illness. The objective of these interventions and programs is to improve quality of care, in part or in total by enhancing coordination between participants for the benefit of the patient (improved outcomes) and the system (reduced costs).

We also developed a list of components of care coordination to support a more granular analysis of interventions. The components are separated into essential care tasks (e.g., identify participants and their roles), their associated coordination activities (e.g., coordinate among care plans), and common features of interventions to support coordination activities (e.g., standardized protocol, multidisciplinary team). The list draws extensively from components described by clinical professional organizations, recent consensus development efforts by the National Quality Forum, and intervention evaluators.

Chapter 4. Review of Systematic Reviews of Care Coordination Interventions

4A. Background

Increasingly, aspects of care coordination are being evaluated. In this chapter we provide a summary of this evidence by synthesizing systematic reviews of care coordination interventions intended to improve the quality of care of outpatients. Our intent was to describe the broad extent of the care coordination literature regarding outpatient care coordination programs. We did not limit our review to a specific clinical area or patient population.

4B. Methodological Approach

We sought articles reporting systematic reviews of care coordination interventions to improve quality of care provided to patients. We used our working definition of care coordination presented in the previous chapter to inform our inclusion and exclusion criteria.

Inclusion and Exclusion Criteria

We searched for English language systematic reviews of care coordination interventions, irrespective of clinical condition, patient population, or specific outcomes. We considered an article to be a systematic review, if, at a minimum, the authors described conducting a systematic review, and performed a defined literature search.

We included reviews in which interventions were conducted either exclusively in an outpatient setting or were conducted across settings and included the outpatient setting (i.e., were started in an in-patient setting but continued in the outpatient setting). We also included systematic reviews where only a part of the review evaluated a care coordination intervention (typically, these were articles in which the reviews had a broader focus than care coordination but where some of the included articles met our definition of care coordination).

We excluded reviews where the only two participants were a clinician and the patient because these situations presumably have lower demands for coordination activities. We also excluded reviews that did not report evaluations of care coordination interventions and those reviews that were conducted solely in an inpatient setting.

Search Strategy

We initially searched the following databases with the help of a research librarian: MEDLINE[®] (through April 7, 2005), CINAHL[®] (through May 17, 2005), Cochrane database of systematic reviews (through June 2, 2005), American College of Physicians Journal Club (through June 2, 2005), Database of Abstracts of Reviews of Effects (through June 2, 2005), PsychInfo (through June 2, 2005), Sociological Abstracts (through June 3, 2005), and Social Services Abstracts (through June 3, 2005). We searched with terms that were either synonymous with the term “coordination” or terms which have been used in the literature to suggest care

coordination, as indicated by our work on definitions of care coordination (Chapter 3) and discussions with experts and librarians, including: “disease management,” “case management,” and “patient care planning.” We restricted our search to systematic reviews using the search strategy developed by Shojania et al.²⁰⁶

In response to comments received by our peer reviewers, we updated our search through to September 30, 2006 for MEDLINE® and to November 15, 2006 for the remaining databases. Complete search strategies for each database are presented in Appendix A*. We performed additional data abstraction (described below) on these additional reviews, referred to as “the most recent reviews.”

Data Abstraction and Evaluation

A single investigator reviewed titles and abstracts of each article identified in our search to determine whether the article met inclusion criteria. Investigators identified those articles about which they were unsure. These articles were then reviewed and discussed by the full research team and agreement on inclusion or exclusion for full text review was reached by group consensus. Two independent investigators reviewed and abstracted all articles requiring full text review. Disagreements on extracted data were discussed and resolved by the research team by reviewing the article. Additionally, the investigators met regularly and engaged in an active dialogue about specific articles.

From each of the included reviews, we abstracted data about whether the entire focus of the review or only a partial focus was on care coordination. For those reviews where the entire focus was on care coordination, we abstracted data on the research methodology used, setting of the care coordination intervention, terms and definitions used to describe the care coordination intervention, and the reported outcomes. For those reviews that only partially focused on care coordination, we limited our data abstraction to the purpose of the review, the care coordination strategies included, and outcomes. The complete full-text abstraction form is provided in Appendix B*.

In response to comments received from our peer reviewers, we also abstracted information, from the most recent reviews, on specific components of the care coordination intervention (Chapter 3, Table 6). We sought information on components of the specific care coordination intervention (e.g., case management, disease management) as well as whether details about the care coordination components were provided by the review.

Quality Assessment of Reviews

We assessed the quality of the systematic reviews by abstracting information about specific systematic review research methodology criteria (Appendix B). These criteria have been used previously by the drug effectiveness review project of the Oregon Evidence-based Practice.²⁰⁷

Statistical Analysis

Given the heterogeneity of the included articles, we were limited in our ability to conduct quantitative analyses of the data. We report the results of our review as a narrative synthesis.

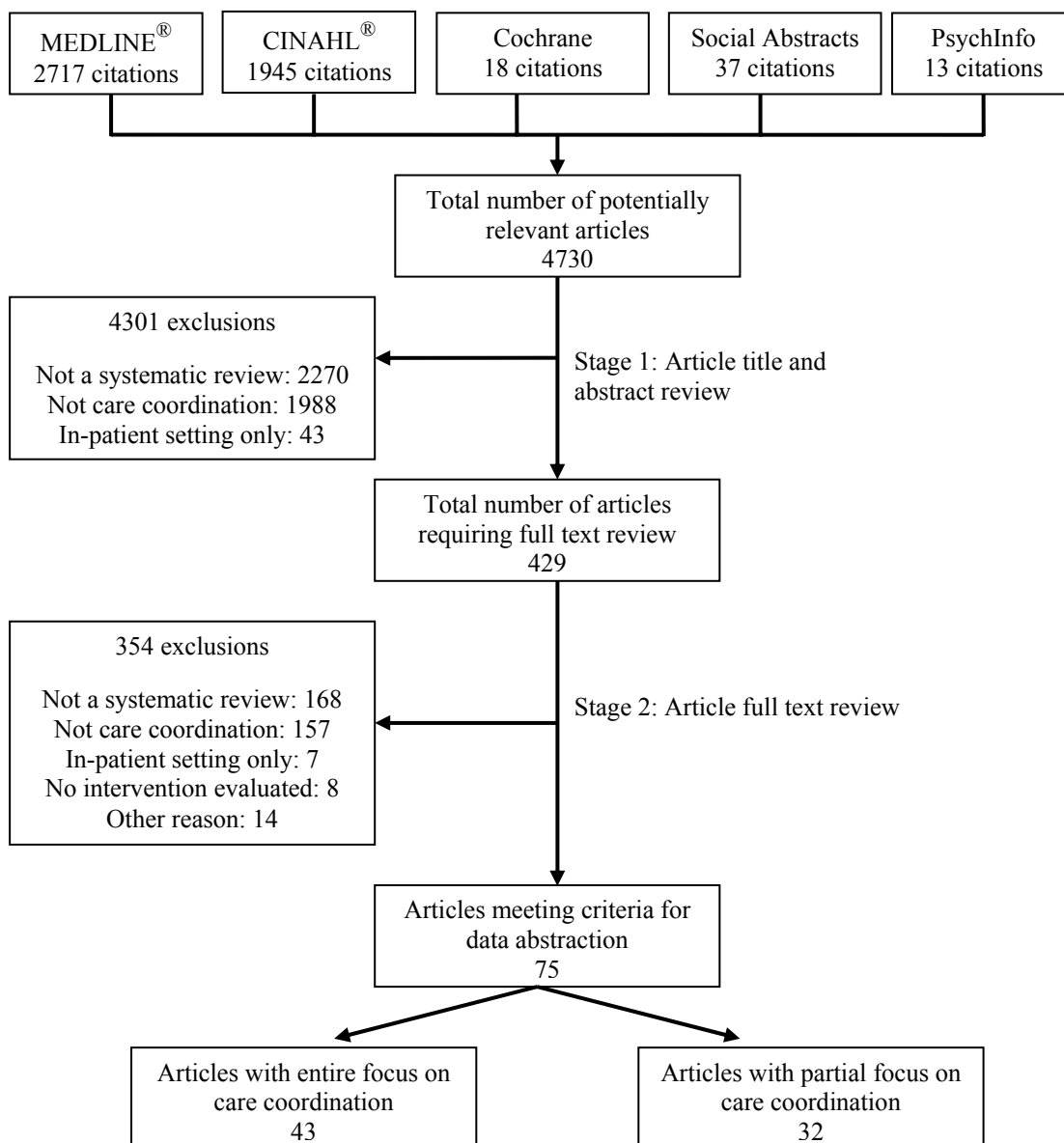
* Appendixes cited in this report are provided electronically at <http://www.ahrq.gov/clinic/tp/caregaptp.htm>

4C. Results

Results of Literature Search and Article Review Process

The results of our search strategy and article review process are presented in Figure 1. Our searches yielded 4,730 potentially relevant articles of which 429 articles merited full-text review. Of these, 75 systematic reviews met our eligibility criteria for data abstraction. Appendix C* provides the citations of articles excluded after the full text review, along with the reason for exclusion.

Figure 1. Search results



* Appendixes cited in this report are provided electronically at <http://www.ahrq.gov/clinic/tp/caregaptp.htm>

In the sections that follow, we present 1) the results of the 43 reviews for which care coordination was the sole focus of the systematic review, 2) narrative syntheses of systematic reviews by common care coordination strategies and common patient populations, followed by the results of the 32 systematic reviews for which care coordination was only a partial focus and, 3) components of the interventions described in the most recent systematic reviews.

Summary of Reviews With Entire Focus on Care Coordination

We identified 43 reviews that focused entirely on one or more care coordination strategy. These reviews were highly heterogeneous with respect to the care coordination interventions evaluated, their definitions, and the clinical topics evaluated (Tables 16a-k).

Quality Assessment of Reviews

Table 9 presents the results of our quality assessment of the included reviews. Overall, most of the reviews were rigorously conducted. All of them reported a research question. All but three of the reviews reported the specific search terms used and time frame covered by the search; five reviews did not provide specific inclusion/exclusion criteria. The quality of the reviews regarding the data abstraction process was mixed: 18 of the 43 reviews reported title/abstract review by at least two reviewers; 23 reported data abstraction by at least two reviewers and explained how disagreements between reviewers were resolved. About three-quarters of the included reviews provided some assessment of the validity of the articles they included in their analysis, almost all provided sufficient details on each individual article, and all provided an appropriate synthesis (either narrative, quantitative or both) of their results. Seven reviews reported using a research librarian to help with their search and 19 reviews included a topic or methods expert as part of their team (Figure 2).

Figure 2. Quality assessment of reviews

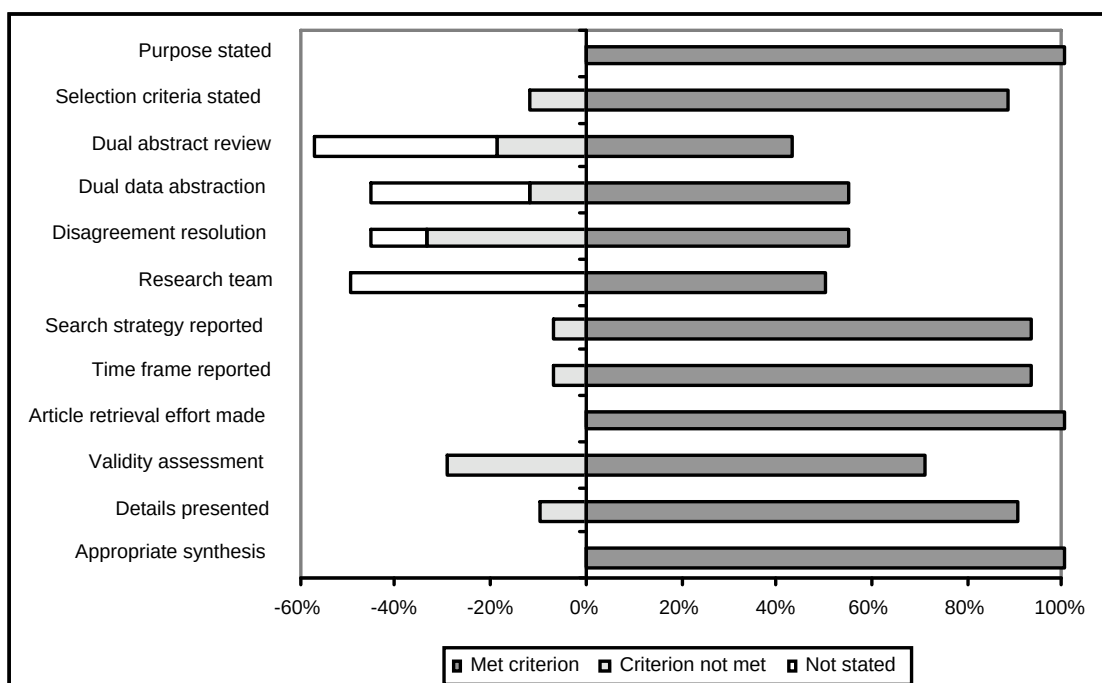


Table 9. Quality assessment of reviews with entire focus on care coordination

Reference	Purpose stated	Inclusion/exclusion criteria stated	Dual title/abstract review	Dual data abstraction	How disagreements resolved	Research team	Search terms reported	Time frame covered	Effort made to find all articles	Validity assessment of included articles	Sufficient details of included articles presented	Appropriate synthesis of included articles
Multidisciplinary teams												
Mental health												
Bower 2000 ²⁰⁸	●	●	○	●	●	Not stated	●	●	●	●	●	●
Craven 2006 ²⁰⁹	●	●	Not stated	●	●	■, ▲	●	●	●	●	●	●
Gunn 2006 ²¹⁰	●	●	○	○	●	■, ▲	●	●	●	○	●	●
Latimer 1999 ²¹¹	●	○	○	○	○	Not stated	○	○	●	●	●	●
Marshall 2000 ²¹²	●	●	●	●	○	Not stated	●	●	●	●	●	●
Simmonds 2001 ²¹³	●	●	●	●	●	Not stated	●	●	●	●	●	●
Wadhwa 1999† ²¹⁴	●	●	Not stated	●	●	Not stated	●	●	●	●	●	●
Ziguras 2000† ²¹⁵	●	●	Not stated	Not stated	○	▲	●	●	●	●	●	●
Heart failure												
Holland 2005 ²¹⁶	●	●	●	●	●	■	●	●	●	●	○	●
McAlister 2004 ²¹⁷	●	●	●	●	●	▲	●	●	●	●	●	●
McAlister 2001* ²¹⁸	●	●	●	●	●	▲	●	●	●	●	●	●
Stroke												
Langhorne 2005 ²¹⁹	●	●	●	●	●	■, ▲	●	●	●	●	●	●

Table 9. Quality assessment of reviews with entire focus on care coordination (continued)

Reference	Purpose stated	Inclusion/exclusion criteria stated	Dual title/abstract review	Dual data abstraction	How disagreements resolved	Research team	Search terms reported	Time frame covered	Effort made to find all articles	Validity assessment of included articles	Sufficient details of included articles presented	Appropriate synthesis of included articles
Palliative care												
Higginson 2003 ²²⁰	●	●	●	●	○	▲	●	●	●	●	●	●
No specific clinical focus												
Lemieux-Charles 2006 ²²¹	●	●	Not stated	Not stated	Not stated	Not stated	●	●	●	○	●	●
Richards 2003† ²²²	●	●	Not stated	●	○	▲	●	●	●	●	●	●
Disease management												
Mental health												
Neumeyer-Gromen 2004 ²²³	●	●	Not stated	Not stated	○	Not stated	●	●	●	●	●	●
Heart failure												
Göhler 2006 ²²⁴	●	○	Not stated	●	●	▲	●	●	●	○	●	●
Roccoforte 2005 ²²⁵	●	●	●	○	●	▲	●	●	●	○	●	●
Whellan 2005 ²²⁶	●	○	Not stated	Not stated	Not stated	Not stated	●	●	●	○	●	●
Yu 2006 ²²⁷	●	●	Not stated	Not stated	Not stated	Not stated	●	●	●	○	●	●
Diabetes												
Knight 2005 ²²⁸	●	●	●	Not stated	●	▲	●	●	●	●	○	●
Norris 2002† ¹⁵²	●	●	Not stated	Not stated	○	▲	●	●	●	●	●	●
Multiple clinical focus												
Krause 2005 ²²⁹	●	●	○	○	○	Not stated	●	●	●	○	○	●

Table 9. Quality assessment of reviews with entire focus on care coordination (continued)

Reference	Purpose stated	Inclusion/exclusion criteria stated	Dual title/abstract review	Dual data abstraction	How disagreements resolved	Research team	Search terms reported	Time frame covered	Effort made to find all articles	Validity assessment of included articles	Sufficient details of included articles presented	Appropriate synthesis of included articles
Rheumatoid arthritis												
Badamgarav 2003 ²³⁰	●	●	●	●	●	Not stated	●	●	●	●	●	●
Case management												
Mental health												
Gorey 1998 ²³¹	●	○	Not stated	Not stated	○	Not stated	●	●	●	○	●	●
Marshall 1998 ²³²	●	●	●	●	●	Not stated	●	●	●	●	●	●
Heart failure												
Windham 2003 ²³³	●	●	Not stated	Not stated	○	▲	●	●	●	●	●	●
No specific clinical focus												
Payne 2002 ²³⁴	●	●	●	●	●	■, ▲	○	●	●	●	●	●
Integrated care												
Mental health												
Jeffery 2000† ²³⁵	●	●	●	●	●	▲	●	●	●	●	●	●
No specific clinical focus												
Briggs 2006 ²³⁶	●	●	○	●	●	▲	●	●	●	●	●	●
Johri 2003 ²³⁷	●	●	Not stated	Not stated	Not stated	Not stated	●	●	●	●	●	●
Interprofessional education												
Mental health												
Reeves 2001 ²³⁸	●	●	○	●	●	Not stated	●	●	●	●	○	●
Pain management												
Irajpour 2006 ²³⁹	●	●	Not stated	Not stated	Not stated	Not stated	●	●	●	●	●	●

Table 9. Quality assessment of reviews with entire focus on care coordination (continued)

Reference	Purpose stated	Inclusion/exclusion criteria stated	Dual title/abstract review	Dual data abstraction	How disagreements resolved	Research team	Search terms reported	Time frame covered	Effort made to find all articles	Validity assessment of included articles	Sufficient details of included articles presented	Appropriate synthesis of included articles
No specific clinical focus												
Zwarenstein 2001 ²⁴⁰	●	●	●	●	●	Not stated	●	●	●	NA	NA	NA
Other care coordination interventions												
Heart failure												
Philbin 1999 ²⁴¹	●	●	Not stated	Not stated	○	▲	●	●	●	○	●	●
Diabetes												
Greenhalgh 1994 ²⁴²	●	○	Not stated	Not stated	○	■, ▲	○	○	●	○	●	●
Asthma												
Ram 2005 ²⁴³	●	●	●	●	●	■	●	○	●	●	●	●
Cancer												
Dohan 2005 ¹⁹²	●	●	Not stated	Not stated	Not stated	Not stated	●	●	●	○	○	●
No specific clinical focus												
Grimshaw 2006 ²⁴⁴	●	●	●	●	●	▲	●	●	●	○	●	●
Gruen 2003 ²⁴⁵	●	●	●	●	●	Not stated	●	●	●	●	●	●
McCusker 2006 ²⁴⁶	●	●	○	●	●	Not stated	●	●	●	○	●	●
Mitchell 2002 ²⁴⁷	●	●	●	Not stated	○	Not stated	●	●	●	●	●	●
Zwarenstein 2000 ²⁴⁸	●	●	○	○	○	Not stated	●	●	●	●	●	●

● Yes ○: No ■: Research librarian assistance

▲: Topic or methods expert

NA: not applicable (no included studies)

* disease management programs; † case management

Systematic Review Characteristics

The characteristics of each systematic review are presented in Table 10. Most of the included reviews restricted their included articles to either randomized controlled trials (RCT), or other controlled trials. Nine reviews did not restrict their inclusion criteria by study design.

The clinical topics that the included reviews addressed were varied. Care coordination interventions for improving care to patients with mental health problems (13 reviews) was the most common topic studied followed by heart failure (9 reviews) and diabetes (3 reviews). Eleven reviews did not have a specific clinical area of focus but instead studied interventions that crossed diseases, such as discharge planning or interprofessional education (i.e., training individuals from different professions interactively).

Eight of the reviews focused on elderly populations while most of the remaining reviews focused on adults in the general population for the specific disease of interest. Surprisingly, given the interest in care coordination for special need children, we did not find any reviews pertinent to this topic.

Interventions in about half the reviews were conducted across multiple settings, for example, from hospital to home or community, in outpatient clinics and at home or in outpatient and specialist clinics. Five of the reviews did not provide information on the specific settings of the interventions. Few studies provided detail on other setting-related factors (e.g., public versus private, HMO versus not, etc.).

Table 10. Selected characteristics of reviews with entire focus on care coordination

Reference	Study designs included	Clinical focus	Population studied	Intervention setting
Multidisciplinary teams				
Bower 2000 ²⁰⁸	RCT, CBA, ITS	Mental health	General population	Outpatient
Craven 2006 ²⁰⁹	All study designs	Mental health	General population	Community, outpatient clinic, specialist facility
Gunn 2006 ²¹⁰	RCT	Depression	Adult general population	Outpatient clinic
Latimer 1999 ²¹¹	All study designs	Severe mental illness	General population	Outpatient clinic, home
Marshall 2000 ²¹²	RCT	Severe mental illness	General population	Community
Simmonds 2001 ²¹³	RCT, quasi-RCT	Severe mental illness	General population	Community, home
Wadhwa 1999† ²¹⁴	RCT, quasi-RCT	Mental illness; terminal illness	General population	Home, community, hospice
Ziguras 2000† ²¹⁵	Controlled studies	Severe mental illness	General population	Community
Holland 2005 ²¹⁶	RCT	Heart failure	General population	Home, hospital, outpatient clinic
McAlister 2004 ²¹⁷	RCT	Heart failure	Not stated	Home, specialist facility
McAlister 2001* ²¹⁸	RCT, quasi-RCT	IHD	General population	Not stated
Langhorne 2005 ²¹⁹	RCT	Stroke	Elderly	Community, hospital

Table 10. Selected characteristics of reviews with entire focus on care coordination (continued)

Reference	Study designs included	Clinical focus	Population studied	Intervention setting
Higginson 2003 ²²⁰	All study designs	Palliative care	General population	Outpatient clinic, managed care, home, hospice
Lemieux-Charles 2006 ²²¹	All study designs with a comparison group or analyzed across time	No specific focus	General population	Outpatient clinic, home, Community, hospital
Richards 2003† ²²²	RCT	No specific focus	Elderly	Outpatient clinic, hospital
Disease management				
Neumeyer-Gromen 2004 ²²³	RCT	Major depression	General population	Managed care
Göhler 2006 ²²⁴	RCT	Heart failure	General population	Not stated
Roccoforte 2005 ²²⁵	RCT	Heart failure	General population	Outpatient clinic, hospital, home
Whellan 2005 ²²⁶	RCT	Heart failure	General population	Home, clinic
Yu 2006 ²²⁷	RCT	Heart failure	Elderly	Home, hospital, outpatient clinic
Knight 2005 ²²⁸	RCT, CBA	Diabetes	Not stated	Not stated
Norris 2002† ¹⁵²	All comparative studies	Diabetes	General population	Community, managed care
Krause 2005 ²²⁹	Controlled studies; before-after studies	Asthma, diabetes, heart failure	General population	Home, hospital, outpatient clinic
Badamgarav 2003 ²³⁰	RCT, quasi-RCT, CBA, ITS	Rheumatoid arthritis	General population	Outpatient clinic
Case management				
Gorey 1998 ²³¹	RCT, quasi-RCT, pre-experimental	Severe mental illness	General population	Community
Marshall 1998 ²³²	RCT	Severe mental illness	General population	Community
Windham 2003 ²³³	All study designs	CHF	Elderly	Outpatient clinic, home, specialist facility
Payne 2002 ²³⁴	All study designs	No specific focus	Elderly	Community, hospital, home, nursing home
Integrated care				
Jeffery 2000† ²³⁵	RCT	Severe mental illness; substance abuse	General population	Specialist facility
Briggs 2006 ²³⁶	RCT, CBA, ITS	No specific focus	General population	Outpatient clinic
Johri 2003 ²³⁷	RCT, quasi-RCT	No specific focus	Elderly	Community

Table 10. Selected characteristics of reviews with entire focus on care coordination (continued)

Reference	Study designs included	Clinical focus	Population studied	Intervention setting
Interprofessional education				
Reeves 2001 ²³⁸	All study designs	Mental health	General population	Not stated
Irajpour 2006 ²³⁹	RCT, quasi-RCT	Pain management	General population	Community, hospital
Zwarenstein 2001 ²⁴⁰	RCT, CBA, ITS	No specific focus	Not applicable – no included articles	Not applicable – no included articles
Other care coordination interventions				
Philbin 1999 ²⁴¹	RCT, quasi-RCT, CBA	CHF	Elderly	Not stated
Greenhalgh 1994 ²⁴²	All study designs	Diabetes	General population	Outpatient clinic, specialist facility
Ram 2005 ²⁴³	RCT	Asthma	General population	Outpatient clinic
Dohan 2005 ¹⁹²	Not specified	Cancer	General population	Community, clinic
Grimshaw 2005 ²⁴⁴	RCT, CBA, ITS	No specific focus	General population	Outpatient clinic
Gruen 2003 ²⁴⁵	All study designs	No specific focus	General population	Outpatient clinic, hospital
McCusker 2006 ²⁴⁶	All study designs	No specific focus	Elderly	Community, hospital, home, outpatient clinic
Mitchell 2002 ²⁴⁷	RCT	No specific focus	General population	Outpatient clinic, hospital, home
Zwarenstein 2000 ²⁴⁸	RCT, quasi-RCT, CBA, ITS	No specific focus	General population	Hospital

RCT: randomized controlled trial; CBA: controlled before-after study; ITS: interrupted time-series design; * disease management programs; † case management; CHF: congestive heart failure; HTN: hypertension; CAD: coronary artery disease; IHD: ischemic heart disease

Care Coordination Strategies

The terms used to define the care coordination strategies were highly heterogeneous; 43 individual reviews reported 20 different care coordination interventions (Table 11). Most reviews reported on a single care coordination intervention, however, six reviews reported at least two types of interventions.^{152, 214, 217, 219, 222, 235} The most commonly used terms were multidisciplinary teams, case management, and disease management. Across reviews, there were varying definitions of the same care coordination term used (Tables 16a-k). For example, all ten reviews reporting on disease management^{152, 218, 223, 230} defined it differently (Tables 16a-k). Nine reviews^{217, 224-226, 233, 235, 241, 244, 246} failed to provide a clear definition for the intervention under study; we included these reviews because the descriptions of the interventions of their included articles related to a care coordination strategy.

Our review of the evidence, provided in the sections that follow, suggests that care coordination strategies may improve health outcomes. Given the heterogeneity of the different interventions studied, it is unclear whether one particular strategy is more likely to work than

others; however, interventions using multidisciplinary teams and disease management programs consistently reported improved outcomes. We provide further evidence to support this finding in our summary tables (Tables 16a-k) and in our narrative synthesis section below.

Table 11. Distribution of reviews with entire focus on care coordination by care coordination intervention

Care Coordination Intervention	No. of Reviews
Assertive community treatment	3 ^{211, 212, 215}
Case management	8 ^{152, 214, 215, 222, 231-233, 235}
Collaborative care	1 ²⁰⁹
Disease management	10 ^{152, 218, 223-230}
Geriatric assessment/evaluation and management	2 ^{222, 246}
Integrated programs	3 ²³⁵⁻²³⁷
Interprofessional education	3 ²³⁸⁻²⁴⁰
Key worker assigned coordination function	1 ²³⁴
Multidisciplinary clinic	1 ²¹⁷
Multidisciplinary program (comprehensive)	1 ²⁴¹
Multidisciplinary teams	10 ^{208, 210, 213, 214, 216-218, 220-222}
Navigation program	1 ¹⁹²
Nurse-doctor collaboration	1 ²⁴⁸
Organized specialty clinic	1 ²⁴³
Organized cooperation	1 ²⁴⁷
Shared care	1 ²⁴²
Specialist outreach clinic	1 ²⁴⁵
System level interventions	1 ²¹⁰
Team coordination and delivery	1 ²¹⁹
Team coordination	1 ²¹⁹

Note: The intervention terms used in this table are the terms used by the systematic reviews; similar interventions may have slightly different terms.

Outcomes Reported

Due to the heterogeneity of clinical topics, settings, patient populations and interventions, the systematic reviews reported a broad range of endpoints. In many cases, there was not any quantitative summary across included studies. For the 16 systematic reviews with some patient or utilization outcome synthesized, Table 12 summarizes the specific endpoints reported quantitatively for five general categories: clinical outcomes, adherence outcomes, other patient experience outcomes, and utilization outcomes. Specific quantitative results are provided in the summary tables (Tables 16a-k).

Table 12. Quantitative outcomes reported by systematic reviews

Reference	Care coordination intervention	Clinical Outcomes	Adherence Outcomes	Other Patient Experience Outcomes	Utilization Outcomes
Gunn 2006 ²¹⁰ Marshall 2000 ²¹²	System level interventions Assertive community treatment (ACT)	Recovery from depression	Remain in contact with service	Live independently; Become homeless; Unemployed	Hospital admissions
Holland 2005 ²¹⁶	Multidisciplinary interventions	All-cause mortality			All-cause admissions; heart failure admission
McAlister 2004 ²¹⁷	Multidisciplinary teams	All-cause mortality			All-cause admissions; heart failure admission
Langhorne 2005 ²¹⁹ Higginson 2003 ²²⁰ McAlister 2001 ²¹⁸	Multidisciplinary teams Palliative care teams Multidisciplinary disease management	Death or dependency Pain; other symptoms Recurrent myocardial infarction; all-cause mortality		Satisfaction Cardiovascular risk factors; quality of life	Hospital admission; length of stay
Neumeyer-Gromen 2004 ²²³ Göhler 2006 ²²⁴	Disease management programs Disease management programs	Depression severity All-cause mortality	Treatment adherence	Patient satisfaction	All-cause hospitalizations
Roccoforte 2005 ²²⁵	Comprehensive disease management program	Mortality			All-cause admissions; heart failure admission
Yu 2006 ²²⁷	Disease management program	Mortality		Quality of life	Hospital readmission
Knight 2005 ²²⁸ Norris 2002 ¹⁵²	Disease management Disease management; case management	Glycated hemoglobin Glycated hemoglobin			
Badamgarav 2003 ²³⁰ Irajpour 2006 ²³⁹	Disease management Interprofessional education	Pain severity	Documentation of pain history	Functional status	
Philbin 1999 ²⁴¹	Comprehensive, multidisciplinary program			Functional status; aerobic capacity; satisfaction	Hospital admission

Costs

Background. Given the costs associated with poorly coordinated care, even intensive care coordination interventions have the potential to be cost-saving.

Results. 22 reviews reported some cost estimates or comparisons for the care coordination intervention under study (Table 13). The reported results were extremely heterogeneous. Only one review reported results from cost-effectiveness/cost-utility analysis²²³ that suggested disease management programs were cost-effective. Another review²²⁹ conducted a meta-analysis to evaluate the economic effectiveness of disease management programs. Krause²²⁹ reports economic effectiveness in terms of effect size which is a summary outcome measure created from the direct economic outcome measures (cost, hospitalizations, clinic visit, emergency department visit) reported in each individual study. The findings from this review suggest that disease management programs were economically effective. Nine reviews^{213, 215, 217-219, 222, 227, 231} reported lower costs for the care coordination intervention when compared to usual care; however, none of these reviews conducted any formal cost-effectiveness analysis. Seven reviews reported mixed cost results of the intervention^{208, 214, 220, 226, 233, 245, 247} and five reviews reported insufficient evidence to draw any definitive conclusions about the costs of interventions.^{211, 212, 232, 236, 241} (Table 13).

Summary. We conclude that there is insufficient evidence from the included reviews to draw definitive conclusions about the costs associated with care coordination interventions.

Table 13. Reviews with entire focus on care coordination: cost results

Reference	Intervention	No. of articles reporting cost data	Results
Bower 2000 ²⁰⁸	On-site mental health worker	3	Cost results were mixed; no formal cost-effectiveness analysis. There were increased costs for some patient groups and decreased costs for others.
Latimer 1999 ²¹¹	Assertive community treatment (ACT)	34	ACT appears to have lower costs; however, reducing costs for ACT programs will be determined by the reduction in hospital use.
Marshall 2000 ²¹²	Assertive community treatment (ACT)	9	There was insufficient cost data reported in the articles to enable comparisons between ACT and the control intervention.
Simmonds 2001 ²¹³	Community mental health team management	5	Reported total cost of care; lower costs for community mental team management compared to standard care (difference ranged from 12% to 53%); data reported from articles was highly skewed
Wadhwa 1999 ²¹⁴	Multidisciplinary teams; case management	10	Cost data provided in the 10 articles was insufficient to enable a summary analysis. Half of the articles showed no difference in costs between the intervention and control group. The other half showed significant differences between the two groups with one article reporting higher costs for the intervention group.
Ziguras 2000 ²¹⁵	ACT; Case management	5	Case management was associated with lower total costs of care when compared to usual treatment [Weighted mean $r = 0.13$ (95% CI for r : 0.07-0.19), $p=0.043$].
McAlister 2004 ²¹⁷	Multidisciplinary teams	18	No formal cost-effectiveness analysis conducted. 15 of 18 articles reported interventions to be cost-saving; 3 reported interventions to be cost-neutral
McAlister 2001 ²¹⁸	Multidisciplinary disease management	3	No articles reported cost-effectiveness analysis; 2 articles reported their interventions to be cost saving.
Langhorne 2005 ²¹⁹	Team coordination/delivery	11	Total costs estimated; median cost reduction in the early supported discharge group of 20% (range 4-30).
Higginson 2003 ²²⁰	Palliative care teams	14	Only one article reported the intervention as cost-effectiveness analysis. The remaining articles reported costs and resource use. The results from these articles were heterogeneous.
Richards 2003 ²²²	Comprehensive discharge planning and implementation	2	Both articles showed lower intervention costs. Mean cost per patient was lower in one article (1989-1992 values) among those receiving the intervention (\$8956.44 vs. \$9262.20); average cost per patient (1982-1996 values) in the other article was significantly lower compared to controls (\$3630 vs. \$6661)
Neumeyer-Gromen 2004 ²²³	Disease management	6	Results from cost effectiveness/cost utility analysis; cost utility ratios ranged from \$9,051 to \$48,500 per quality-adjusted life year

Table 13. Reviews with entire focus on care coordination: cost results (continued)

Reference	Intervention	No. of articles reporting cost data	Results
Whellan 2005 ²²⁶	Disease management	10	5 of the articles reported significantly lower intervention costs compared to usual care; one reported significantly higher intervention costs; and the other 4 reported no difference between the two groups.
Yu 2005 ²²⁷	Disease management	11	8 effective and one ineffective disease management program reported lower costs per case; one effective and one ineffective disease management program reported no significant differences in cost.
Krause 2005 ²²⁹	Disease management	67	Overall, disease management programs were economically effective [effect size 0.311 (95% CI: 0.272-0.35)].
Gorey 1998 ²³¹	Case management	6	5 of the 6 articles reported lower intervention costs.
Marshall 1998 ²³²	Case management	6	The cost data reported in the articles were insufficient to allow for drawing of any definitive conclusions.
Windham 2003 ²³³	Care management	17	6 articles showed significant reduction in intervention costs compared to the control group; 6 found no difference; 5 did not report comparisons.
Briggs 2006 ²³⁶	Integration of services	2	Inconclusive evidence of integration on cost impacts. One article found costs per patient to be higher for usual care; the other article found integration to be less costly.
Philbin 1999 ²⁴¹	Comprehensive, multidisciplinary program	3	2 articles reported decreased costs in the intervention group; however, these were associated with decreased hospitalizations. Overall, no compelling evidence.
Gruen 2003 ²⁴⁵	Specialist outreach clinics	4	Cost per patient. 2 articles found the intervention to be more expensive (\$487 and \$296 respectively) more per patient); however, one of these articles reported their intervention to be 7.4% more cost-effective when health outcomes were considered. 2 articles reported lower costs per patient (71 pence and AUD\$173 respectively)
Mitchell 2002 ²⁴⁷	Organised cooperation	2	Cost results were mixed.

Given the heterogeneity of the included reviews, we did a separate synthesis for selected care coordination strategies, clinical topics, vulnerable populations, and across settings. We report the results of our narrative synthesis in the following sections; the synthesis includes reviews that focused entirely on care coordination and where possible, those that focused partially on care coordination.

Narrative Syntheses of Selected Systematic Reviews by Care Coordination Strategy

We identified five care coordination strategies that were reported in more than one systematic review: use of teams (usually multidisciplinary), case management, disease management, integrated care, and interprofessional education. Thus, we were able to provide a narrative synthesis of the evidence on each of these care coordination strategies.

Systematic Reviews Evaluating Multidisciplinary Teams as a Care Coordination Strategy

Background. Multidisciplinary teams usually involve two or more providers from different specialties providing care to a group of patients. Presumably, teams consisting of health care personnel from different fields are more likely to address all the components of patient care, are more likely to share information and thereby, provide more coordinated care. Interventions that involve the use of multidisciplinary teams in managing a patient's care may be associated with better outcomes.²¹⁷

Results. Among the reviews that focused entirely on care coordination, we found 15 reviews²⁰⁸⁻²²² that evaluated the effects of multidisciplinary teams (Table 14a, Table 14b, Table 14g, Table 14i, Table 14j); among the reviews that partially focused on care coordination, 11²⁴⁹⁻²⁵⁹ included multidisciplinary teams as part of their interventions (Table 15).

Mental Health. Two systematic reviews^{212, 215} examined the effect of assertive community treatment for patients with severe mental disorders (Table 14a). Assertive community treatment (ACT) has been defined as an approach to providing care that is characterized by a multidisciplinary team who care exclusively for a group of patients and share responsibility for their patients; it emphasizes team work and coordination of activities. Marshall and Lockwood²¹² included 26 articles in their review of severely mentally ill patients, and found significantly improved outcomes for patients receiving ACT when compared to standard care, or hospital-based rehabilitation. Patients receiving ACT were less likely to be admitted to a hospital [0.59 (0.41-0.85)], be unemployed [0.31 (0.17-0.57)], or become homeless [0.24 (0.08-0.65)]. They were also more likely to remain in contact with services [OR: 0.51 (95% CI: 0.37-0.70)], and more likely to be living independently [0.46 (0.25-0.86)] when compared to standard care. These findings were consistent when compared to hospital-based rehabilitation; there was insufficient data to allow comparison to case management. In their meta-analysis of 19 articles that compared ACT to usual treatment, Ziguras and Stuart²¹⁵ found improved outcomes for assertive community treatment for severely mentally ill patients when compared to standard care (Table 14a). ACT had a significant positive effect on hospital days [Weighted mean $r = 0.28$ (95% confidence interval 0.24-0.32), $p < 0.001$]; clients receiving ACT were likely to have more contact with mental health services [0.18 (0.12-0.23), $p < 0.001$]; lower dropout rates from mental

health services [0.37 (0.27-0.46), $p < 0.001$) and greater family satisfaction [0.46 (0.33-0.58), $p < 0.001$). The review also found that both assertive community treatment and case management reduced hospitalization, but assertive community treatment was more effective in reducing hospitalization ($p < 0.001$ for difference in effect sizes between the two groups).

Gunn et al.²¹⁰ also studied the effect of “system interventions” to improve recovery from depression (Table 14a). Their definition specifically included multidisciplinary teams and enhanced communication. They included eight trials that reported an increase in the proportion of patients recovering from depression in favor of the intervention group (range 10% to 33%); however the included studies did not account for attrition rates ranging from 5% to 50%.

Wadhwa and Lavizzo-Mourey²¹⁴ studied whether multidisciplinary teams and case management models improved care for patients with either mental or terminal illness. Neither of these interventions improved functional, clinical, or psychological outcomes; although multidisciplinary teams were effective in reducing hospitalizations among mentally ill patients (Table 14a).

Craven and Bland²⁰⁹ evaluated the effectiveness of collaborative care for mental health; however, their definition of collaborative care includes health care professionals from different disciplines working together (Table 14a). The authors did not conduct a quantitative analysis, but provide data on each included study. They reported the following best practices for collaborative care: collaborative relationships at either a system-level or provider level require time, supportive structures and preparation; the degree of collaboration does not appear to predict outcomes; for collaboration to be effective, it should be paired with treatment guidelines; collaboration works best when clinicians and specialists are located in the same place; systematic followup was a strong predictor of positive clinical outcomes; patient choice about treatment may be important; and collaborative care interventions established as part of a research study may be difficult to sustain once the study is complete. Based on their review, it was not possible to evaluate the effectiveness of different elements of collaborative care.

Crawford et al.²⁵² reported their results of a review on providing continuity of care for patients with severe mental illness (Table 15). They included 60 articles identifying factors that either promoted or impeded the continuity of care among these patients; assertive community treatment and community mental health teams were among two of the care coordination strategies evaluated in some of the included articles. The authors categorized continuity of care as either longitudinal (continuity of care over a period of time, most likely characterized by the provision by a single provider) or cross-sectional (continuity of care between different services, characterized mostly by different providers or settings). Care coordination was an important component in the provision of care between primary and secondary services and between medical, social and other services. Unfortunately, most of the included articles did not define continuity of care and the articles addressing care coordination were limited to epidemiologic studies, nonrandomized trials and qualitative research. However, the review identified three meta-analyses of care coordination interventions, such as case management, assertive community treatment and community mental health teams (already included in our reviews that focused entirely on care coordination^{212, 213, 232}), which suggested that the use of such interventions can decrease the likelihood that patients will lose contact with services.

Heart Failure. McAlister et al.²¹⁷ and Holland et al.²¹⁶ both examined the effect of multidisciplinary teams on the management of heart failure patients (Table 14b). The review by Holland et al.²¹⁶ was an update of the McAlister review, with nearly double the included studies; therefore, there was considerable overlap of the included studies between the two reviews.

McAlister et al.²¹⁷ did not provide a definition of multidisciplinary teams; however, Holland et al.²¹⁶ provided a clear definition. Both studies reported improvements in outcomes when interventions included multidisciplinary teams. McAlister et al.²¹⁷ reported that follow-up by a specialized multidisciplinary team reduced mortality [risk ratio (RR) 0.75, (95% confidence interval (CI) 0.59-0.96)], and hospitalizations (heart failure hospitalizations: [0.74 (0.63-0.87)]; all-cause hospitalizations: [0.81 (0.71-0.92)]) (Table 14b). Holland et al.²¹⁶ reported similar results: multidisciplinary team interventions reduced all cause admission [RR: 0.87 (95% CI: 0.79-0.95), $p=0.002$], all cause mortality [0.79 (0.69-0.92), $p=0.002$] and heart failure admission [0.7 (0.61-0.81), $p<0.001$]. Holland et al.²¹⁶ also conducted subgroup analysis to determine the effect of setting and intensity. Interventions with a home-based component or those with telephone follow-up were more effective than those based in the hospital or clinic; home-based interventions showed reductions in both all cause [0.8 (0.71-0.89), $p<0.0001$] and heart failure [0.62 (0.51-0.74), $p<0.001$] admissions. Intensity of the intervention [high or low] and risk of the patient (high or low) did not appear to have an impact on effectiveness. It was not possible to evaluate the effect of specific intervention components; however, almost all the included interventions had two elements in common: symptom monitoring and self-management advice; and one-to-one patient education.

Pain Management. Higginson et al.²²⁰ conducted a meta-regression and meta-analysis that included 44 articles to determine if palliative care teams improve patient outcomes and found significant improvements on patients' pain [OR 0.38 (95% confidence interval 0.23-0.64)] and other symptoms [0.51 (0.30-0.88)] (Table 14h).

Stroke. Langhorne et al.²¹⁹ studied the effect of early supported discharge interventions among elderly stroke patients (Table 14j). They assessed whether team coordination and delivery (seven studies) or team coordination alone (two studies) had any effect on death or dependency in activities of daily living. They specifically examined the amount of effort that would be required by teams (staffing levels, case load) as well as how teams worked together (effect of weekly team meetings, an example of a coordinating process in one conceptual model on organizational theory described in Chapter 5). They found that coordination of teams through weekly team meetings were more effective in reducing the risk of death or dependency (OR: 0.70, 95% CI: 0.56-0.88, $p=0.02$) compared to no team coordination (Table 14j).

No Specific Clinical Focus. Lemieux-Charles and McGuire²²¹ conducted a systematic review to study the overall effectiveness of health care teams for a general patient population (Table 14k). They reported information on 12 studies evaluating the effectiveness of team versus no team interventions; nine studies evaluating team redesign interventions; and 12 multi-site field studies. The authors presented descriptions of the included studies and provided a narrative analysis. They suggested that the diversity and type of clinical expertise involved in team decisionmaking may account for improved patient care and organizational effectiveness. Some factors likely to influence staff satisfaction and perceived team effectiveness are: collaboration, conflict resolution, participation and cohesion. They also stated, however, that the existing evidence does not provide clear direction on how to design or maintain high-functioning teams. The lack of quantitative synthesis makes it difficult to evaluate their findings.

Summary. Multidisciplinary teams have been shown to improve select patient outcomes in stroke, heart failure, severe mental illness, and terminal conditions. Specifically, the evidence suggests that among patients with mental illness, multidisciplinary teams can reduce hospitalizations and improve the rates with which clients remain in contact with services. Furthermore, in the clinical areas of heart failure and stroke, multidisciplinary teams can improve

mortality and dependency. Hospital admissions are also reduced by this intervention for heart failure patients. For patients needing palliative care, a team approach can reduce symptoms. The evidence also suggests that multidisciplinary teams are more effective when team members deliberately coordinate their activities (e.g., schedule regular team meetings to facilitate exchange of information).²¹⁹

Systematic Reviews Evaluating Disease Management as a Care Coordination Strategy

Background. In the reviews we identified, disease management has been defined in numerous ways and there does not appear to be a consensus from systematic reviewers about specific components that should be included in a disease management program. Disease management programs include the involvement of both patients and clinicians. The intent of all the disease management programs, however, is to improve the coordination of patient care, provide support to patients, and improve patient outcomes.

Results. Among the reviews that focused entirely on care coordination, we found ten reviews^{152, 218, 223-230} (Tables 16a-k) that evaluated the effects of disease management; we found eight reviews^{148, 260-266} among those that focused partially on care coordination using a disease management approach (Table 15).

Mental Health. Neumeyer-Gromen et al.²²³ conducted a meta-analysis of disease management programs for depression (10 included articles). Disease management programs when compared with usual primary care, significantly improved depression severity [RR 0.75 (95% CI: 0.70-0.81)], adherence to treatment regimen [0.59 (0.46-0.75)] and patient [0.57 (0.37-0.87)] and provider satisfaction. They also reported on the cost-effectiveness of disease management programs which were reported in six articles that were deemed high quality by the authors. The cost utility ratios (not defined by the review) per quality adjusted life years ranged from \$9,051 to \$49,500 (Table 14a).

Heart Failure. We included four reviews²²⁴⁻²²⁷ that studied the effectiveness of disease management programs on improving outcomes for patients with heart failure (Table 14b). Three of the four reviews conducted meta-analyses of the included studies; there was considerable overlap of the included studies across all four reviews. Disease management was not well-defined by any of the reviews, though two reviews^{225, 227} provided extensive descriptions of the disease management programs reported in each included study. The meta-analysis by Roccoforte et al.²²⁵ found that disease management programs significantly reduced mortality [OR: 0.8 (95% CI: 0.69-0.93), p=0.003], all-cause re-admission rates [0.76 (0.69-0.94), p<0.00001] and HF-related admission rates [0.58 (0.5-0.67), p<0.00001] compared to usual care. They also conducted sensitivity analysis looking at type of care provider and duration of intervention. Type of care provider had an effect on outcomes: mortality was reduced in multidisciplinary interventions [0.58 (0.44-0.75)] but not in nurse-based only interventions [0.93 (0.77-1.11)]. Length of intervention had mixed results; long term interventions (> 6 months) appeared to reduce all outcomes; however, short-term (0-3 months) and medium term (3-6 months) also reduced admission rates. Yu et al.²²⁷ categorized the disease management programs for heart failure patients into effective or ineffective on the basis of the characteristics for disease management programs recommended by the European Society of Cardiology (ESC). Effective programs (n=11) significantly decreased hospital readmissions by 29%-85% (mean 44.15 +/- SD: 14.36%); four programs significantly reduced mortality rates by 28%-78% (57.6

+/- 21.9%). They also reported that effective disease management programs improved quality of life and were cost saving. When comparing specific components of the intervention, effective disease management programs had the following: multidisciplinary teams, or care that involved both a cardiac nurse and cardiologist; provided a wider range of in-hospital care; were more likely to include home visits; and ongoing surveillance and management.

Diabetes. Knight et al.²²⁸ also studied the effectiveness of diabetes disease management programs and found a mean reduction in glycated hemoglobin of 0.5 (95% CI: 0.3-0.6) percentage points among disease management programs (Table 14c). They also reported that programs associated with the greatest decrease in glycated hemoglobin involved pharmacists counseling patients and combined physician and patient interventions. The specific components of the interventions were not reported by the review.

Norris et al.¹⁵² studied the effectiveness of both disease management (27 articles) and case management (15 articles) on outcomes for patients with diabetes. They reported improvements in glycemic control [median net change: -0.5% (interquartile range: -1.35% to -0.1%)] and on screening for and monitoring of lipid concentrations [15.6% (4% to 39%)], dilated eye exams [9% (3% to 20%)] and foot exams [26.5% (10.9% to 54%)] among patients who received the disease management program. These improvements were applicable to adults with diabetes in both community clinics and managed care organizations in the U.S. and Europe (Table 14c).

Multiple Clinical Focus. Krause²²⁹ examined economic outcomes of disease management programs (Table 14f). His meta-analysis included 67 studies on disease management programs for asthma, diabetes or heart failure. Overall, there was a positive effect on economic outcomes for disease management programs [effect size 0.311 (95% CI: 0.272-0.35)]. Program interventions were significantly different, with team-based interventions being the most effective: team-based [0.395 (0.32-0.47)], self-managed [0.916 (0.148-0.243)], and nurse-based [0.306 (0.253-0.359)]. Disease severity significantly affected economic outcomes of programs; interventions aimed at more severely and moderately ill patients were more effective than those aimed at patients with mixed severity [0.35 (0.306-0.396) versus 0.175 (0.142-0.208), respectively]. The effect on economic outcomes did not differ by disease type (asthma, diabetes or heart failure).

Rheumatoid Arthritis. Badamgarav et al.²³⁰ evaluated the effects of disease management programs on the functional status of patients with rheumatoid arthritis (11 included articles). Overall, disease management did not improve functional status in patients with rheumatoid arthritis [Effect size: 0.27; 95% CI: -0.01-+0.54]. The authors performed a sensitivity analysis to determine the effect of intervention intensity and duration. Interventions lasting longer than 5 weeks showed significant improvements in patient functional status [0.49 (0.12-0.86)] compared with those lasting ≤ 5 weeks [0.13 (-0.25-0.52)]; the intensity of the intervention did not have a similar effect (Table 14i).

Among the reviews that only partially focused on care coordination, eight included disease management programs (Table 15).^{148, 260-266} Even though the definition of disease management as provided by the authors did not indicate a clear care coordination component, we included these reviews because the intent of all the programs was to improve the coordination of care through a disease management program. Furthermore, the descriptions provided for the interventions of the included articles within the reviews suggested a care coordination element. The reviews included heterogeneous interventions. Five of the reviews^{148, 260, 261, 263, 264} reported an overall positive effect of disease management programs on outcomes. One review²⁶² reported promising results in its study of disease management programs for congestive heart failure,

hypertension and hyperlipidemia-coronary artery disease. However, all of the reviews lacked a focused analysis on coordination-related activities and functions (e.g., clear definition, intensity, and structure).

Summary. Disease management programs appear to be effective in improving depression severity and adherence to treatment in patients with mental illness, glycemic control in patient with diabetes and mortality and re-admission rates in patients with heart failure. However, the heterogeneity of the definitions of disease management and the limited analysis on the specific components that may contribute to the effectiveness of disease management programs makes it difficult to interpret the findings with respect to the overall effectiveness of care coordination. Some of the reviews suggest improved outcomes based on patient targeting, multi-disciplinary teams, home visits, ongoing monitoring, pharmacist counseling on medications, and other less-well specified factors.

Systematic Reviews Evaluating Case Management as a Care Coordination Strategy

Background. Case management (also referred to as care management in some instances – particularly in the United Kingdom -- without any distinction in meaning) typically involves the assignment of a single person (case manager or “key worker”, so named in one study²³⁴) who coordinates all aspects of a patient’s care (e.g., providing information to multiple providers, seeing that the patient receives services in a timely manner etc.). The assumption behind case management is that having one person perform all the coordinating functions for a patient’s care is likely to lead to improved coordination and possibly better outcomes.

Results. Among the reviews that focused entirely on care coordination, we found nine reviews^{152, 214, 215, 222, 231-235} (Tables 16a-k) that evaluated the effects of case management on patient outcomes; among those reviews that only partially focused on care coordination, 12^{249, 250, 252, 254, 256, 257, 259, 267-271} (Table 15) included case management as part of their included interventions.

Mental Health. Gorey et al.²³¹ evaluated the effectiveness of case management in improving outcomes for mentally ill patients (24 articles). They found that case management was effective in reducing re-hospitalization (mean effect size r-index: 0.277, standard deviation: 0.235). They also analyzed characteristics of case management (e.g., case load) and found that patients receiving more intense case management (case load of less than 15 per case manager) were 30% less likely to be re-hospitalized (Table 14a).

Wadhwa and Lavizzo-Mourey²¹⁴ studied whether multidisciplinary teams and case management models improve care for patients with either mental or terminal illness. Their results suggested that aggressive case management may be beneficial to patients with mental illness; however, they only included one study of case management among patients with terminal cancer which did not report any significant differences between the intervention and control group with respect to functional, clinical, or psychological outcomes (Table 14a).

Gilbody et al.²⁶⁹ conducted a systematic review to evaluate whether organizational and educational interventions improve management of depression in primary care (Table 15). Since they were unsuccessful in their attempt to identify active components of successful interventions, they provided examples of successful and unsuccessful strategies that improved outcomes such as treatment adherence, depression outcomes and improved uptake of therapy. Most of the effective strategies presented in the review included some elements of care coordination. These

were: collaborative care, defined as programs that included shared care among different care providers; stepped collaborative care, which included enhanced collaborative management by a psychiatrist in the primary care setting; quality improvement programs that included nurse case management and integration with specialist care; and case management, which was usually done by nurses and involved some element of follow up.

Heart Failure. Windham et al.²³³ studied the effect of care management interventions for congestive heart failure among older patients (32 articles). The purpose of their review was to identify components of successful care management programs. They found that the key elements of an effective care management program (defined as a program in which most of the outcomes measured were significantly positive) included employing a physician and either a nurse or case manager to coordinate care; close monitoring and follow up of patients by nurses or case managers; and patient education combined with regular contact with a nurse or a physician (Table 14b).

Diabetes. Norris et al.¹⁵² studied the effectiveness of both disease management (27 articles) and case management (15 articles) on outcomes for patients with diabetes. They reported improvements in glycemic control [median net change: -0.4% (interquartile range: -0.6% to -0.16%)] and provider monitoring in patients receiving case management.

No Specific Clinical Focus. Payne et al.²³⁴ assessed the effectiveness of different methods of transferring information from the hospital to the community at the time of discharge in 31 articles (Table 14k). Presumably, good and effective information transfer forms the basis for improved care coordination. They found that using a key worker to facilitate information transfer improved the quality of the information provided, improved patient and caregiver satisfaction and increased “patient concordance” with services; however, they were unable to report sufficient evidence as to the professional background of such a worker or where this person should be located (community or hospital).

Summary. Case management as a care coordination strategy appears to improve patient outcomes for patients who have mental health problems, heart failure or diabetes. Among the included reviews, there was insufficient evidence to make a summary determination as to the training required for effective case managers (e.g., nurse, social worker, other provider), the ideal qualifications of effective case managers, and the specific duties that should be performed for case management to be effective. Close patient monitoring was identified as an important component in two reviews.

Systematic Reviews Evaluating Integrated Care as a Care Coordination Strategy

Background. Integration of patient services either across diseases or between providers may improve care coordination. In both situations, health personnel work closely together and have the opportunity to share information, which should lead to improved coordination. The reviews included here focused on integrating care programs as an approach to improving care coordination.

Results. Among reviews that focused entirely on care coordination, we identified three²³⁵⁻²³⁷ that evaluated the effectiveness of integrated care programs (Tables 16a, 16k). Jeffery et al.²³⁵ studied the effect of integrating services for patients with mental illness and substance misuse (offering treatment to address both problems in a single location) (Table 14a). Briggs et al.²³⁶ studied integration of primary care services (bring together different types of services, for

example, packaging together services around a particular set of needs such as sexually transmitted disease services integrated with provision of contraceptives and/or family planning) (Table 14k). Both reviews found a lack of evidence regarding any clear benefit or harm from integrating services.

Johri et al.²³⁷ reported a narrative synthesis of seven successful integrated care programs that provided care to the elderly (Table 14k). They did not summarize their findings but instead reported the key elements that were common across the seven programs. However, since they only reported on the successful programs and did not provide information on unsuccessful programs, it is difficult to analyze the effectiveness of integrated care programs from their review.

Summary. There is insufficient evidence to either support or refute the effectiveness of integrated care programs.

Systematic Reviews Evaluating Interprofessional Education as a Care Coordination Strategy

Background: Interprofessional education is defined as the provision of training and education to professionals from different health and social areas, who learn together interactively. The aim of interprofessional education is to improve the coordination of patient care by improving the way professionals collaborate with each other. We considered this a care coordination strategy since it is an approach to improving patient care through improved coordination among multiple providers.

Results. Among the reviews that focused entirely on care coordination, we identified three reviews²³⁸⁻²⁴⁰ that evaluated the usefulness of interprofessional education. Zwarenstein et al.²⁴⁰ were unable to find any articles of methodological rigor that met their inclusion criteria (Table 14k). Reeves²³⁸ extended the work by Zwarenstein et al.²⁴⁰ by broadening the inclusion criteria to articles of all study designs. His review concluded that the evidence relating to the effectiveness of interprofessional education was “patchy” (Table 14a). Irajpour et al.²³⁹ found that the evidence was “broadly supportive” of interprofessional education, but was insufficient to determine the best way to improve pain management (Table 14g).

Summary. There is insufficient evidence to determine the effectiveness of interprofessional education in improving collaboration among professionals.

Narrative Syntheses of Systematic Reviews by Selected Clinical Topic, Population, and Setting

Systematic Reviews of Care Coordination Strategies Among Patients With Mental Health Problems

Among our included reviews that focused entirely on care coordination, we found that care coordination interventions were most often studied among patients with mental health problems (mental illness, severe mental illness, depression). These patients are more likely to require complex care and services across different areas, thereby putting them at higher risk for poorly coordinated care. Among reviews that focused entirely on care coordination, we identified 13 reviews that focused on patients with mental health problems (Table 14a); among reviews that

focused only partially on care coordination, we identified 15 reviews^{251, 252, 254-256, 258, 261, 263-266, 269, 270, 272, 273} that included patients with mental health problems (Table 15). A variety of different care coordination strategies were evaluated among this population: multidisciplinary teams, assertive community treatment, case management, collaborative care, disease management, integrated care programs and interprofessional education. Most of the reviews reported improved outcomes within each strategy studied. Several reviews compared different types of intervention, and no single strategy appeared to be more effective than other strategies. Since the interventions were not always described in enough detail, we are unable to draw any firm conclusions, but it appeared that strategies that included a more intense approach and involved community outreach (e.g., assertive community treatment, community mental health teams) were associated with positive outcomes, including better contact with services, fewer suicides, and reduced hospitalizations (or days hospitalized). Given the heterogeneity of the strategies studied and the lack of evidence pointing toward the success of one strategy over another, we were limited in our ability to interpret the findings with respect to the comparative effectiveness of any particular strategy for improving outcomes among patients with mental health problems.

Systematic Reviews of Care Coordination Strategies Among Patients With Heart Failure

Among our included reviews that focused entirely on care coordination, we found nine reviews that focused on patients with heart failure or heart disease (Table 14b); among reviews that focused partially on care coordination, we identified five reviews^{250, 260, 262, 268, 270} that included patients with heart failure (Table 15). Multidisciplinary teams and disease management were the two main care coordination interventions evaluated in these reviews. Four reviews²²⁴⁻²²⁷ reported reductions in either readmission rates or mortality associated with disease management programs; four reviews^{216-218, 241} also reported the effectiveness of multidisciplinary teams in reducing readmission rates or mortality. However, there was considerable overlap of the included studies across these reviews. Holland et al.²¹⁶ reported significant reductions in all-cause admission, all-cause mortality and heart failure admission in interventions with multidisciplinary teams. They also reported that interventions with a home-based component or telephone follow-up were more effective than those based in the hospital or a clinic. Intervention intensity and patient risk did not have an impact on effectiveness. Roccoforte et al.²²⁵ reported that disease management programs were also associated with reductions in mortality, and all-cause and heart failure readmission rates; additionally, mortality was significantly reduced in interventions provided by multidisciplinary teams but not in nurse-based only interventions. Length of intervention did not appear to have an impact on effectiveness. Our findings suggest that multidisciplinary teams and disease management programs are associated with improved outcomes for patients with heart failure. However, it is unclear what components of the interventions contribute toward this improvement since the findings regarding intensity of intervention were mixed and there was insufficient analysis on specific intervention components. Furthermore, most of the reviews did not provide a clear definition of the care coordination intervention. Although some specific components of multidisciplinary teams and disease management programs that were associated with positive outcomes were described in some of the reviews, further research is needed to assess relative contributions of these components for improving outcomes among patients with heart failure or heart disease.

Systematic Reviews of Care Coordination Strategies Among Patients With Diabetes

Among our included reviews that focused entirely on care coordination, we found only three reviews that included patients with diabetes (Table 14c); among our reviews that focused partially on care coordination, we identified four reviews^{148, 254, 271, 274} that included patients with diabetes (Table 15). One review evaluated the effectiveness of disease management and case management on diabetes outcomes and care.¹⁵² Norris et al.¹⁵² found that both disease management and case management improved glycemic control (Table 14c); disease management also improved screening and monitoring of selected outcomes associated with diabetes; one review evaluated the effectiveness of diabetes disease management programs;²²⁸ and the third review focused on identifying factors that contributed to the success or failure of shared care where care of the patient was shared by a general practitioner and a specialist.²⁴² Given the heterogeneity of the care coordination strategies evaluated and the few studies evaluating care coordination strategies for diabetes care, we are limited in our ability to synthesize the evidence and draw any definitive conclusions about the comparative effectiveness of different coordination strategies in improving outcomes among patients with diabetes. However, disease management and case management both showed improved outcomes, including reductions in glycated hemoglobin.

The remaining clinical areas (stroke, rheumatoid arthritis, asthma, pain management, and palliative care) were each studied in a single systematic review and so were not further synthesized.

Systematic Reviews of Care Coordination Strategies Among Elderly Patients

Elderly patients are likely to have co-morbid conditions with poorly coordinated care and constitute a vulnerable population that we were interested in. Among the reviews that focused entirely on care coordination, we identified eight^{219, 222, 227, 233, 234, 237, 241, 246} that included articles on care coordination strategies to improve care for elderly patients (Tables 16a-k). Three studies focused on heart failure patients, and one on stroke patients. The remaining four did not have a specific clinical focus. An assortment of care coordination strategies were evaluated (e.g., multidisciplinary teams, case management, disease management, geriatric assessment and evaluation) in these reviews, and most reported improved outcomes associated with each individual strategy studied. Overall, the results indicate that the use of care coordination strategies may improve outcomes among elderly patients (particularly reduction in hospital admissions); however, the heterogeneity of the included strategies do not permit any further synthesis that would allow us to assess the effectiveness of one particular strategy over another.

Systematic Reviews of Care Coordination Strategies Across Settings

When patient care is provided across different settings (e.g., discharge from the hospital or emergency department, patients are referred by primary care physicians for specialist care), it is possible for the care to be poorly coordinated. The transition of patient care from one setting to another constitutes another area we were interested in. Among the reviews that focused entirely on care coordination, we identified 12 reviews that studied different interventions specifically

aimed to improve patient care across settings. Four reviews^{242, 244, 245, 247} evaluated the effectiveness of interventions that linked primary care with specialist care. Greenhalgh²⁴² evaluated the effect of shared care between general practitioners and specialists for patients with diabetes and reported the common elements of successful shared care programs (Table 14c). Mitchell et al.²⁴⁷ evaluated the effect of introducing a formalized arrangement to link general practitioners with specialists which they referred to as organized cooperation (Table 14k). They reported mixed success for physical and functional health outcomes and a modest benefit of this intervention for some chronic mental health conditions. Gruen et al.²⁴⁵ studied the effects of regular, planned visits by a specialist practitioner from a usual location to a primary care or rural setting, a multifaceted outreach that involved increased collaboration between primary care providers and specialists. They found that this type of specialist outreach can improve measures of access (decreased cost, distance and travel time for patients), attendance to clinics, quality of care (guideline-concordant care and adherence to treatment) and health outcomes (Table 14k). Grimshaw et al.²⁴⁴ studied interventions to improve referrals from primary care to specialists and reported that such improvements may occur if guidelines for referrals are distributed with standard forms and involve consultants in education, or if a second opinion or enhanced services are provided before a referral (Table 14k). There was insufficient evidence to determine which intervention is effective in linking primary care with specialist care.

Three reviews²³⁵⁻²³⁷ evaluated the effect of integrating services received by patients in different settings into one setting (Tables 16a, 16k). The evidence was insufficient to determine the effectiveness of this strategy in improving patient care.

Four reviews^{219, 222, 234, 246} studied different interventions aimed at improving discharge planning for patients from hospital or the emergency department to reduce future readmissions. Langhorne et al.²¹⁹ reported the effectiveness of multidisciplinary teams in reducing death or dependency, for patients who had a stroke, when coordinating discharge from the hospital and providing post-discharge care and rehabilitation at home (Table 14j). McCusker²⁴⁶ and Richards²²² both evaluated the use of comprehensive geriatric assessment and evaluation. Richards²²² found limited evidence that implementation of care plans after discharge was effective. McCusker²⁴⁶ reported that interventions with greater integration with primary medical care were effective (Table 14k). Payne et al.²³⁴ studied current methods for transfer of patient information at discharge and found them to be inadequate (Table 14k). They also reported insufficient evidence to determine where key workers, who can facilitate information transfer, should be located or what their professional qualifications should be. There was insufficient evidence to determine the effectiveness of a specific intervention in improving discharge planning to reduce future admissions.

One review¹⁹² aimed at reducing disparities in cancer care by addressing barriers to care. The authors evaluated whether navigation programs reduce barriers. The review reports descriptions of 11 navigation programs to reduce barriers to cancer care and distinguish between the types of personnel who serve as navigators. There is limited data evaluating whether these programs address barriers; the existing literature "suggests that navigation is associated with improved rates of screening and follow-up, lower clinical stage of presentation, and higher patient satisfaction." There is also some indication that "navigation services improve the clinic's ability to engage, track, and support patients and to develop communication and trust between clinics and disadvantaged populations." (Table 14k)

In summary, the reviews studying transition of patient care across different settings evaluated a wide variety of interventions. The included interventions were not clearly defined in most of

the reviews and only one review provided clear evidence of the effectiveness of its intervention (multidisciplinary teams for hospital discharge and post-discharge of stroke patients). The heterogeneity of the included interventions and the lack of quantitative analysis do not permit any further synthesis that would allow us to determine the effectiveness of any particular care coordination intervention to improve patient care across settings.

Table 14a. Summary of reviews with entire focus on care coordination interventions: mental health

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Bower 2000 ²⁰⁸	To assess the effect on primary care provider behavior of adding an onsite mental health worker	<i>On-site mental health worker:</i> services provided by an on-site MHW were a separate activity and not part of normal primary care consultations; the PCP and MHW work for at least part of the time as part of the same clinical team	38	The addition of a mental health worker to the primary care team did not have any significant effects on provider behavior. The evidence did not support the addition of a mental health worker to a primary care team with the intent of changing provider behavior.	None
Craven 2006 ²⁰⁹	To identify better practices in collaborative care for mental health	<i>Collaborative care:</i> "involves providers from different specialties, disciplines, or sectors working together to offer complementary services and mutual support, to ensure individuals receive the most appropriate service from the most appropriate provider in the most suitable location, as quickly as necessary, with a minimum of obstacles. Collaboration can involve better communication, closer personal contacts, sharing of clinical care, joint educational programs, and (or) joint program and system planning."	38	The authors reported the following results: collaborative relationships at either a system-level or provider level require time, supportive structures and preparation; the degree of collaboration does not appear to predict outcomes; for collaboration to be effective, it should be paired with treatment guidelines; collaboration works best when clinicians and specialists are located in the same place; systematic follow-up was a strong predictor of positive clinical outcomes; patient choice about treatment may be important; and collaborative care interventions established as part of a research study may be difficult to sustain once the study is complete.	Not possible to evaluate effectiveness of different elements of collaborative care
Gunn 2006 ²¹⁰	To assess effectiveness of "system level" interventions for depression	<i>System level interventions:</i> had to include ALL of the following: (1) multi-professional approach with a GP and at least one other health professional; (2) a structured management plan; (3) scheduled patient follow up; (4) enhanced inter-professional communication through team meetings, case-conferences, feedback between care-givers	11	Eight articles reported an increase in the proportion of patients recovering from depression in favor of the intervention group (range 10% to 33%); however the articles did not account for attrition rates ranging from 5% to 50%.	No information on which elements of the intervention contribute to improved outcomes.
Latimer 1999 ²¹¹	To determine the economic impacts of the assertive community treatment model	<i>Assertive community treatment:</i> "involvement of team medical personnel along with a case manager, team meetings to discuss treatment plans"	34	The most consistent effect of the assertive community treatment (ACT) model was the greater reduction in hospital use, particularly of programs that have higher fidelity to the ACT model. "Based on costs in Quebec, high-fidelity ACT can cut costs if patients averaged more than about 50 days hospitalization yearly".	Poorly described methods for article searches and inclusion/exclusion criteria.

Table 14a. Summary of reviews with entire focus on care coordination interventions: mental health (continued)

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Marshall 2000 ²¹²	To determine the effectiveness of assertive community treatment (ACT) for severe mental disorders when compared to standard care, hospital-based rehabilitation and case management	<i>Assertive community treatment</i> : a multidisciplinary team sharing responsibility for their patients who care exclusively for a group of patients; emphasizes team working and responsibility	26	Patients receiving ACT were more likely to remain in contact with services [OR: 0.51 (95% CI: 0.37-0.70)], were less likely to be admitted to a hospital [0.59 (0.41-0.85)], more likely to be living independently [0.46 (0.25-0.86)], less likely to become homeless [0.24 (0.08-0.65)], and less likely to be unemployed [0.31 (0.17-0.57)] when compared to standard community care. These findings were consistent when compared to hospital-based rehabilitation. There was insufficient data to allow for comparison to case management for patients remaining in contact with services and hospitalization. There was insufficient cost data; however, limited data suggests that ACT programs are expensive. Overall, the evidence suggested that ACT is effective in caring for mentally ill patients in the community.	None.
Simmonds 2001 ²¹³	To assess the benefits of community mental health team management in severe mental illness	<i>Community mental health team management</i> : generic care (care not supplemented by assertive community treatment, intensive case management or other specific model) from a community-based multi-disciplinary team that provides a full range of interventions	5	Community mental health team management compared to standard care was associated with fewer deaths by suicide or suspicious circumstances, lesser loss to follow-up, reduced hospital stay, and reduced costs. The intervention showed no impact on social functioning.	None
Wadhwa 1999 ²¹⁴	Do multidisciplinary teams, case management, and outreach or home care improve the quality of care for vulnerable populations	<i>Multidisciplinary teams</i> : “comprehensive care is delivered through the coordinated action of a diverse collection of health care populations” <i>Case management</i> : “a health care professional who works with the patient and families”	3 6	These interventions did not consistently demonstrate improvements in functional, clinical or psychological outcomes. Multidisciplinary outreach strategies were effective in reducing in-patient hospitalizations among mentally ill patients. Aggressive case management models also appeared to be beneficial to mentally ill patients. Satisfaction among patients and care givers was higher among these interventions. There was insufficient cost data provided in the articles.	None

Table 14a. Summary of reviews with entire focus on care coordination interventions: mental health (continued)

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Ziguras 2000 ²¹⁵	To evaluate the effectiveness of case management in mental health	<i>Assertive community treatment:</i> authors recorded the definition provided in each article	28	Both assertive community treatment and clinical case management had positive effects on family burden, family satisfaction and costs of care. While clinical case management increased total number of admissions, it also decreased the total length of stay in the hospital. However, with assertive community treatment the total number of admissions and the proportion of clients hospitalized were reduced. Overall, assertive community treatment was more effective in reducing hospitalization compared to clinical case management.	None
		<i>Clinical case management:</i> no specific definition; authors recorded the definition provided in each article.	16		
Neumeyer-Gromen 2004 ²²³	To assess the effectiveness and cost-effectiveness of disease management programs for depression	<i>Disease management:</i> the program had to include all the following components: patient self management education, provider education, collaborative care, routine reporting and regular feedback between different professions, interdisciplinary discussion of treatment options and supervision by specialists	10	Disease management programs (DMPs) when compared with usual primary care, significantly improved depression severity [RR 0.75 (95% CI: 0.70-0.81)], adherence to treatment regimen [0.59 (0.46-0.75)] and patient [0.57 (0.37-0.87)] and provider satisfaction. This finding was applicable across different degrees of depression, settings and US populations. DMPs can be considered cost-effective (costs per QUALY: \$9,051 to \$49,500). The effectiveness of single elements within the programs could not be assessed since the research question aimed at answering the effectiveness of DMPs which included all components in a comprehensive care strategy.	None
Gorey 1998 ²³¹	To assess the effectiveness of case management for mentally ill patients	<i>Case management:</i> "outreach, identification, assessment and service planning, service linkage and monitoring, advocacy"	24	Among articles assessing functional status, prevention of re-hospitalization and quality of life, approximately three-quarters of patients in a case management program had better outcomes than those not in such programs. Also, approximately three-quarters of case managed care plans cost less than the average comparison care plan. Case load accounted for half of the variability observed in case management's effectiveness.	No detail on inclusion/exclusion criteria provided.

Table 14a. Summary of reviews with entire focus on care coordination interventions: mental health (continued)

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Marshall 1998 ²³²	To assess the effectiveness of case management "as an approach to caring for severely mentally ill people in the community"	<i>Case management</i> : "means of coordinating services"; by a single case manager who is expected to assess that person's needs, develop a care plan, arrange for suitable care to be provided, monitor the quality of the care provided, and maintain contact with the person	11	Patients receiving case management were more likely to remain in contact with psychiatric services, though the effect size was small. Case management approximately doubled the rate of hospital admissions when compared to standard care. In one trial, case management found a significant increase in medication compliance, otherwise it appeared unlikely that case management showed substantial improvement in clinical or social outcomes. The effect of case management on costs must be interpreted with caution; while it appears that case management increases costs to health care providers, it may reduce cost to society. Overall, the authors believe that case management is a poor alternative to standard care "because a small advantage in numbers remaining in care is off-set by a large increase in admission rates, no obvious clinical gains and considerable uncertainty over costs."	None
Jeffery 2000 ²³⁵	To evaluate the effectiveness of different approaches to treating patients with problems of severe mental illness and substance misuse	<i>Integrated care programs</i> : programs where substance misuse treatment was integrated with psychiatric care and care was provided by the same personnel team <i>Case management</i> : not defined but included a specialized five-hour per week substance misuse treatment group	6 1	The review looked at complex patients: patients with severe mental illness who also had problems with substance misuse. There was no clear evidence that integrated programs have different outcomes compared to programs providing psychiatric treatment alone. There was also no evidence that any particular type of integrated program was better than the others studied. However, one article found that a residential integrated program was more likely to retain patients than a non-residential program. Overall, there was no clear evidence that integrated care for patients with substance misuse and severe mental illness can lead to better or worse outcomes.	No definition of case management intervention
Reeves 2001 ²³⁸	To assess the effect of interprofessional education on the care of adults with mental health problems	<i>Interprofessional education</i> : "when two or more professionals learn interactively together with the object of promoting collaborative practice"	19	All of the articles showed an improvement in the outcomes studied regarding provider education; however the author notes that the quality of the included articles was generally poor and so the evidence relating to the effectiveness of interprofessional education can be considered "patchy".	Outcomes related to provider education and not specifically patient care.

Table 14b. Summary of reviews with entire focus on care coordination interventions: heart failure

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Holland 2005 ²¹⁶	To determine the effectiveness of multidisciplinary interventions on improving outcomes for patients with heart failure	<i>Multidisciplinary interventions:</i> interventions "in which management was the responsibility of a multidisciplinary team that included medical input plus one or more of the following: a specialist nurse, a pharmacist, a health educator, a dietician, or a social worker"	30	Multidisciplinary interventions reduced all outcomes reported: all cause admission [RR: 0.87 (95% CI: 0.79-0.95), p=0.002], all cause mortality [0.79 (0.69-0.92), p=0.002] and heart failure admission [0.7 (0.61-0.81), p<0.001]. Interventions with a home-based component or those with telephone followup were more effective than those based in the hospital or clinic; home-based interventions showed reductions in both all cause [0.8 (0.71-0.89), p<0.0001] and heart failure [0.62 (0.51-0.74), p<0.001] admissions. Intensity of the intervention [high or low] and risk of the patient (high or low) did not appear to have an impact on effectiveness. Almost all included interventions had two elements in common: symptom monitoring and self-management advice; and one-to-one patient education.	None
McAlister 2004 ²¹⁷	Do multidisciplinary strategies improve outcomes for patients with heart failure?	<i>Multidisciplinary heart failure clinic:</i> not defined	7	Specialized follow-up by multidisciplinary teams (regardless of setting), was associated with significant reductions in all-cause mortality [RR: 0.75 (95% CI: 0.59-0.96)], all-cause hospitalization [0.81 (0.71-0.92)] and heart failure hospitalization rates [0.74 (0.63-0.87)]. The authors believe that the following 3 elements were crucial to the success of these programs: specially trained heart failure nurses, patient and caregiver education, ready access to providers trained in heart failure.	No definition of the studied interventions.
		<i>Multidisciplinary team providing specialized follow-up in a non-clinic setting:</i> not defined	8		
McAlister 2001 ²¹⁸	To determine the effects of multidisciplinary disease management programs on outcomes among patients with coronary heart disease	<i>Multidisciplinary disease management:</i> Programs using multidisciplinary teams and specialized clinics	12	Multidisciplinary disease management programs when compared to usual care showed reduced rate of admission to hospital [RR 0.84 (95% CI: 0.76-0.94)] and length of hospital stay. There was no effect on recurrent myocardial infarctions or all cause mortality. Intervention patients were more likely to be prescribed appropriate medications. 5 of 7 trials evaluating the impact of disease management on cardiovascular risk factors (reduction in cholesterol concentration, rates of smoking cessation, reduction in blood pressure) showed significantly greater improvements in the intervention group. 5 of 8 trials measuring quality of life showed better improvements in the intervention arm, but only 3 were statistically significant.	None

Table 14b. Summary of reviews with entire focus on care coordination interventions: heart failure (continued)

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Göhler 2006 ²²⁴	To determine the efficacy of disease management programs for heart failure	<i>Disease management programs</i> : No clear definition provided by review	36	Disease management programs (DMP) significantly decreased all-cause mortality [Risk Difference: 3% (95% CI: 1%-5%), $p<0.01$] and all-cause hospitalization [8% (5%-11%), $p<0.0001$]. Heterogeneity across the studies was explained by team composition (single person versus multiple persons), intervention mode (personal contact versus telephone), patient age and severity of disease and length of followup.	No clear definition of intervention term
Roccoforte 2005 ²²⁵	To evaluate the effectiveness of disease management programs for heart failure	<i>Comprehensive disease management programs</i> : not defined by review	33	Disease management programs showed significant reductions in mortality [OR: 0.8 (95% CI: 0.69-0.93), $p=0.003$], all-cause re-admission rates [0.76 (0.69-0.94), $p<0.00001$] and HF-related admission rates [0.58 (0.5-0.67), $p<0.00001$] compared to usual care. Mortality was reduced in multidisciplinary interventions [0.58 (0.44-0.75)] but not in nurse-based only interventions [0.93 (0.77-1.11)]; however, there was no difference in admission rates based on provider type. Length of intervention had mixed results; long term interventions (> 6 months) appeared to reduce all outcomes; however, short-term (0-3 months) and medium term (3-6 months) also reduced admission rates.	No definition of the intervention that was the focus of the review
Whellan 2005 ²²⁶	To evaluate the effectiveness of disease management programs for heart failure	<i>Disease management programs</i> : not defined by review	19	Disease management programs showed a significant decrease in all-cause hospitalization; there was significant heterogeneity in the results.	No definition of the intervention that was the focus of the review; the meta-analysis did not provide actual numbers for the pooled results

Table 14b. Summary of reviews with entire focus on care coordination interventions: heart failure (continued)

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Yu 2006 ²²⁷	To identify key components of effective disease management programs	<i>Disease management program (DMP):</i> program "used multiple interventions in a systematic manner to manage heart failure across health-care delivery systems"	21	Categorized disease management programs into effective versus ineffective using the characteristics recommended by the European Society of Cardiology (ESC). Effective programs (n=11) significantly decreased hospital readmissions by 29%-85% (mean 44.15 +/- SD: 14.36%); four programs significantly reduced mortality rates by 28%-78% (57.6 +/- 21.9%). Effective DMPs improved quality of life and were cost saving. When comparing specific components of the intervention, effective DMPs had the following: multidisciplinary teams, or care that involved both a cardiac nurse and cardiologist; provided a wider range of in-hospital care; were more likely to include home visits; and ongoing surveillance and management.	None
Windham 2003 ²³³	"To identify those interventions and outcome measures that should be included when designing and assessing the effectiveness of care management programs for older patients with congestive heart failure"	<i>Care management programs:</i> not defined by review	32	Characteristics of effective programs: close monitoring of patients by nurses or care managers; patient education combined with regular contact with nurse or physician. Characteristics of Ineffective programs: lack of structured patient monitoring; self management alone without follow up or monitoring; problems with patient selection; lack of a structured or standardized intervention; insufficient training of personnel.	No definition of the intervention that was the focus of the review.
Philbin 1999 ²⁴¹	to evaluate the impact of comprehensive, multidisciplinary management programs on outcomes and processes of care in patients with congestive heart failure	<i>Comprehensive, multidisciplinary program:</i> not defined	7	A decrease of 50% to 85% in the rate of hospital admissions was reported in 6 articles. Improved functional status, aerobic capacity or satisfaction was reported in five articles. The economic data was weak suggesting that multidisciplinary programs may be cost-saving.	None

Table 14c. Summary of reviews with entire focus on care coordination interventions: diabetes

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Knight 2005 ²²⁸	To determine the effectiveness of diabetes disease management programs	<i>Disease management</i> : "an approach to patient care that coordinates medical resources for patients across the entire health care delivery system"	24	There was a mean reduction in GHb of 0.5 (95% CI: 0.3-0.6) percentage points among disease management programs. Those programs associated with greatest decrease involved pharmacist counseling patients and combined physician and patient interventions.	Intervention components of included studies not reported; this limited the ability to determine which components played a key role.
Norris 2002 ¹⁵²	To examine the effectiveness of disease management and case management on diabetes outcomes and care	<i>Disease management</i> : "organized, proactive multicomponent approach to healthcare delivery...care is focused on and integrated across the entire spectrum of disease and its complications, the prevention of comorbid conditions, and the relevant aspects of the delivery system"	27	There was an improvement in GHb among both disease management [median net change: -0.5% (interquartile range: -1.35% to -0.1%)] and case management [-0.4% (-0.06% to -0.16%)] interventions. The case management interventions showed similar improvements in GHb when implemented with or without disease management interventions. Disease management showed improvement in provider screening and monitoring of selected outcomes (foot lesions, peripheral neuropathy, lipid concentrations, proteinuria, GHb and retinopathy). There was insufficient data to estimate the economic effects of the interventions. The findings for disease management are applicable to managed care and community settings in the US and Europe; findings for case management can only be applied to a US managed care setting.	None
		<i>Case management</i> : "a set of activities whereby the needs of populations of patients at risk for excessive resource utilization, poor outcomes or poor coordination of services are identified and addressed through improved planning, coordination and provision of care"	15		
Greenhalgh 1994 ²⁴²	To determine factors that contributed to the success or failure of shared care for diabetes	<i>Shared care</i> : care of patients is shared between a general practitioner and a specialist; care is characterized by enhanced information and exchange	24	Shared care that is structured and supported by a liaison team of general practitioners and specialists produced comparable levels of care to that provided in hospitals. Successful shared care programs appear to have the following common elements: tailoring of the shared care program to the needs and resources identified and a highly trained and experienced liaison nurse whose role it is to serve as a coordinator and facilitator in the program.	None

GHb: glycated hemoglobin

Table 14d. Summary of reviews with entire focus on care coordination interventions: asthma

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Ram 2005 ²⁴³	To assess the effectiveness of organized asthma care through primary care based asthma clinics	<i>Organized asthma clinics:</i> clinics are nurse-led and usually doctor supported	1	There was limited evidence from one article that organized asthma clinics can improve certain outcomes (provision of peak flow meters; reduction in waking at night with asthma attack).	Only one included article.

Table 14e. Summary of reviews with entire focus on care coordination interventions: cancer

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Dohan 2005 ¹⁹²	To assess if navigation programs reduce barriers to disparities in cancer care	<i>Navigation program:</i> Not clearly defined; program aimed at reducing disparities in cancer care by addressing barriers	62	The review reports descriptions of 11 navigation programs to reduce barriers to cancer care and distinguish between the types of personnel who serve as navigators. There is limited data evaluating whether these programs address barriers; the existing literature "suggests that navigation is associated with improved rates of screening and follow-up, lower clinical stage of presentation, and higher patient satisfaction." There is also some indication that "navigation services improve the clinic's ability to engage, track, and support patients and to develop communication and trust between clinics and disadvantaged populations."	No clear definition of intervention studied

Table 14f. Summary of reviews with entire focus on care coordination interventions: multiple clinical topics

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Krause 2005 ²²⁹	To determine the economic effectiveness of disease management programs	<i>Disease management</i> : "a system of coordinated health interventions and communications for populations with conditions in which patient self-care efforts are significant"	67	Overall, disease management programs had positive economic outcomes [effect size 0.311 (95% CI: 0.272-0.35)]. Program interventions were significantly different with team-based interventions being the most effective; self-managed [0.916 (0.148-0.243)], nurse-based [0.306 (0.253-0.359)] and team-based [0.395 (0.32-0.47)]. Disease severity significantly affected economic outcomes; interventions aimed at more severely and moderately ill patients were more effective than those aimed at patients with mixed severity [0.35 (0.306-0.396) vs 0.175 (0.142-0.208), respectively]. Effect on economic did not differ by disease type (asthma, diabetes or heart failure).	None

Table 14g. Summary of reviews with entire focus on care coordination interventions: pain management

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Irajpour 2006 ²³⁹	To determine if interprofessional education changes provider practice and patient outcomes	<i>Interprofessional education</i> : "Occurrences when two or more professions learn from and about each other to improve collaboration and the quality of care"	4	Only one study reported improvement in patient's pain ($p < 0.0001$) between the intervention and control groups; two studies reported no difference in pain scores. One study reported improvement in documentation of pain history between groups ($p < 0.001$).	Some of the included articles were conducted in an in-patient setting.

Table 14h. Summary of reviews with entire focus on care coordination interventions: palliative care

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Higginson 2003 ²²⁰	To determine the effectiveness of palliative care teams on patient outcomes	<i>Palliative care teams</i> : "two or more health care workers, at least one of whom had specialist training or worked principally in palliative or hospice care"	44	Palliative care teams showed a significant improvement in pain [OR 0.38 (95% CI: 0.23-0.64)] and other symptoms [0.51 (0.30-0.88)]. There was a trend toward improved satisfaction and therapeutic interventions but this was not significant. There was insufficient evidence on economic outcomes. Overall, the review supported the positive effect of palliative care teams, though their effect size was small.	None

Table 14i. Summary of reviews with entire focus on care coordination interventions: rheumatoid arthritis

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Badamgarav 2003s ²³⁰	To determine the effect of disease management programs on functional status of patients with rheumatoid arthritis	<i>Disease management</i> : "a multidisciplinary intervention delivered by a team of health care professionals, providing a systematic approach to care, and including a patient education component. A multidisciplinary team was defined as 2 or more disciplines cooperatively involved in patient care"	11	Overall, disease management did not improve functional status in patients with rheumatoid arthritis [Effect size: 0.27; 95% CI: -0.01-+0.54)]. However, when interventions were examined by duration and intensity, interventions lasting longer than 5 weeks showed significant improvements in patient functional status [0.49 (0.12-0.86)] compared with those lasting ≤ 5 weeks [0.13 (-0.25-0.52)]. There was no effect on functional status based on the intensity of the intervention.	Some of the included articles were conducted in an in-patient setting.

Table 14j. Summary of reviews with entire focus on care coordination interventions: stroke

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Langhorne 2005 ²¹⁹	To assess the effectiveness of early supported discharge (ESD) services	<i>ESD team coordination and delivery:</i> multidisciplinary team coordinated discharge from hospital and postdischarge care and rehabilitation at home	7	There was a significant reduction in death or dependency in activities of daily living among patients assigned to an ESD team [OR 0.79 (95% CI 0.64-0.97), p=0.02] compared to conventional services. There finding was also seen specifically in articles with a coordinated multidisciplinary team versus those without a team [0.70 (0.56-0.88), p=0.02, vs. 1.23 (0.79-1.91), p=0.4, respectively]. Estimated costs were lower in the articles that described an ESD team (median cost reduction 20%, range 4-30).	None
		<i>ESD team coordination:</i> discharge and post discharge care planned and supervised by coordinated team; however, subsequent care provided by community-based agencies	2		

Table 14k. Summary of reviews with entire focus on care coordination interventions: no specific clinical topic

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Lemieux-Charles 2006 ²²¹	To provide an overview of health care team effectiveness, including conceptualization of terms and a model on how to approach evaluating team effectiveness	<i>Health care team</i> : "a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems (for example, business unit or corporation), and who manage their relationships across organizational boundaries"	33	Reported information on 12 studies evaluating effectiveness of team versus no team interventions; 9 studies evaluating team redesign interventions; and 12 multi-site field studies. The authors present descriptions of the included studies and provide a narrative analysis. They suggest that the diversity and type of clinical expertise involved in team decisionmaking may account for improved patient care and organizational effectiveness. Some factors likely to influence staff satisfaction and perceived team effectiveness are: collaboration, conflict resolution, participation and cohesion. They also state, however, that the existing evidence does not provide clear direction on how to design or maintain high-functioning teams.	The lack of quantitative results makes it difficult to assess the effectiveness of health care teams.
Richards 2003 ²²²	To evaluate the effectiveness and costs of interventions that influence access to post-discharge services	- <i>Geriatric consultation teams (GCTs)</i> : Provision of needs assessment by a multidisciplinary team followed by recommendations for subsequent patient care	3	The review evaluated different methods of providing needs assessment and then linking the care plan with the provision of services after discharge from the hospital to determine the effectiveness of each method. There was some evidence that interventions that emphasized implementation of care plans after discharge were more effective than those that focused solely on needs assessment and discharge planning.	It is difficult to separate the effects of the post-discharge intervention and inpatient care received on outcomes since the two are inextricably combined.
		- <i>In-patient geriatric evaluation and management (GEM)</i> : Provision of needs assessment by a multidisciplinary team followed by implementation of treatment plans; concerned with patient management on the ward and recommendations for discharge planning.	7		
		- <i>Outpatient GEM</i> : Provision of needs assessment by a multidisciplinary team followed by implementation of treatment plans; patient management concerned with postdischarge care.	5		
		- <i>Coordinator role</i> : improve access to postdischarge services by combining the needs assessment and care plan with facilitating joint working with community agencies.	5		

Table 14k. Summary of reviews with entire focus on care coordination interventions: no specific clinical topic (continued)

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Payne 2002 ²³⁴	To assess the effectiveness of existing methods in the transfer of patient information between hospital and community	<i>Discharge coordination and key worker:</i> A key worker is one who can provide a point of contact for workers from hospital and community. Their presence is associated with improved discharge planning and coordination of services.	31	Current methods for transfer of patient information are inadequate. Information transfer can be facilitated by key workers; however, there was insufficient evidence to determine where the worker should be located (hospital or community) or their professional background. Community-based practitioners reported a lack of provision of appropriate and sufficient information. The barriers to effective information transfer identified were: lack of time and coordination, lack of discharge planning as a priority, fragmentation of information, and assumptions about the availability of family support post-discharge.	Most of the included articles were cross-sectional; US-based articles excluded.
Briggs 2006 ²³⁶	To assess the effects of integration of primary care services on health care delivery and health status	<i>Integration of services:</i> "a variety of managerial or operational changes to health systems to bring together inputs, delivery, management, and organisation of particular service functions. Integration aims to improve the service in relation to efficiency and quality"	5	The results did not indicate any clear pattern of benefit or harm from integration of primary care services. Based on this review, no conclusions can be drawn about the effects of integration on health services delivery or health status in middle or low income countries. There was neither a strong case for or against integration of primary care services compared to the existing provision of health care.	None
Johri 2003 ²³⁷	To analyze the impact of community-based long term care reforms and to common factors of an effective integrated care program for the elderly	<i>Integrated care program:</i> comprehensive integration of acute and long-term care services	7	Identified 7 successful integrated care programs. There was no synthesis of outcomes; results are presented in a narrative fashion describing each of the 7 included programs. The authors identified the following common elements in effective integrated care programs: a single entry point system, case management, geriatric assessment and multidisciplinary teams, and the use of financial incentives.	Only describes the successful integrated programs.

Table 14k. Summary of reviews with entire focus on care coordination interventions: no specific clinical topic (continued)

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
Zwarenstein 2001 ²⁴⁰	To assess the usefulness of interprofessional education interventions when compared to education in which the same professions learn separately from one another	<i>Interprofessional education:</i> when members of more than one health and/or social care profession learn interactively together, for the explicit purpose of improving interprofessional collaboration and/or the health/well being of patients/clients; requires active learner participation and active exchange between learners from different professions	0	Since no articles met the inclusion criteria, there was insufficient rigorous evidence to evaluate the effect of interprofessional education on professional practice and health outcomes.	No included articles.
Grimshaw 2006 ²⁴⁴	To evaluate the effectiveness of interventions to improve referrals from primary care to secondary care	<i>No specific care coordination intervention studied</i>	17	The authors included all interventions (education, organizational, financial) aimed specifically at influencing referral behavior. Improvements in the referral process may occur in the following instances: if guidelines for referrals are distributed with standard forms and involve consultants in education, or if a second opinion or enhanced services are provided before a referral. There was insufficient evidence to determine the effectiveness of financial interventions on referrals.	No specific care coordination intervention was studied
Gruen 2003 ²⁴⁵	To determine the effectiveness of specialist outreach clinics	<i>Specialist outreach clinics:</i> planned/regular visits by a specialist practitioner from a usual location to primary care or rural setting; multifaceted outreach involved increased collaboration between primary care providers and specialists	9	Specialist outreach can improve measures of access (decreased cost, distance and travel time for patients), attendance to clinics, quality of care (guideline-concordant care and adherence to treatment) and health outcomes. The included articles can be regarded more as collaborative care initiatives since they utilized outreach as a way of integrating specialist and community services.	Most of the studies were conducted in an urban setting where specialist outreach is least likely to be useful; need for more research in rural settings.

Table 14k. Summary of reviews with entire focus on care coordination interventions: no specific clinical topic (continued)

Reference	Purpose	Care coordination intervention and definition	No. of articles	Results	Limitations to usefulness of review
McCusker 2006 ²⁴⁶	To assess the effectiveness of comprehensive geriatric assessment interventions on reducing emergency department (ED) utilization	<i>Comprehensive geriatric assessment</i> : No clear definition of the intervention provided; appears to include all interventions that include geriatric assessment	26	The setting of the intervention and type of patient targeted may have affected rates of ED utilization. Interventions in primary care and/or outpatient settings or home care settings appeared to reduce ED utilization; whereas hospital-based interventions appeared to have little effect on ED utilization. Interventions with greater integration with primary medical care and those targeting high-risk patients also appear to reduce ED utilization.	No clear definition of the intervention term
Mitchell 2002 ²⁴⁷	To assess the effectiveness of formal cooperation and liaison between general practitioners and specialists on patient outcomes	<i>Organised cooperation</i> : a formal arrangement that links general practitioners with specialists in the care of patients	7	Organised cooperation had mixed success for physical and functional health outcomes. There was a modest benefit of this intervention for some chronic mental health conditions. The costs associated with establishing this formal relationship could not be established.	None
Zwarenstein 2000 ²⁴⁸	To evaluate the effect of interventions to improve nurse-doctor collaboration	<i>Nurse-doctor collaboration</i> : "collaboration was taken to mean sharing of information, coordination of work, and joint decisionmaking on aspects of patient care"	2	There was limited evidence that structured nurse-doctor collaborations can improve length of stay without adversely affecting mortality. Neither of the two included articles provided evidence on improved collaboration.	Both reviews were conducted in an in-patient setting; no outpatient reviews were included.

Summary of Reviews With Partial Focus on Care Coordination

We included 32 reviews that had a partial focus on care coordination (Table 15). All of these reviews aimed at evaluating the effectiveness of a broad set of interventions across a variety of clinical conditions (e.g., nonpharmacological approaches to improving heart failure outcomes, strategies to improve medication use). As a result of these broad inclusion criteria, some of the articles included in these reviews involved interventions with a care coordination component. The care coordination strategies included in these reviews were highly heterogeneous and included the following: multidisciplinary teams, case management, disease management, integrated care, collaborative care and shared care, among others. The effect of these different strategies on outcomes was difficult to assess since most of the reviews failed to present analysis related to individual strategies but instead presented overall results for the broad set of included interventions.

Table 15. Summary of reviews with partial focus on care coordination interventions

Reference	Purpose	Results
Adli 2006 ²⁷³	To discuss algorithm-guided treatment for depression	This review evaluated the effectiveness of algorithm-guided care; it included four studies on collaborative care that used algorithms to guide treatment. All studies showed improvement in different outcomes measured (e.g., symptoms, greater satisfaction with care and higher attrition rates).
Aminzaadeh 2002 ²⁷⁵	To assess use of emergency department by older adults, risk factors associated with adverse health outcomes, and the effectiveness of intervention strategies	This review was primarily an epidemiologic review looking at the use of emergency departments (ED) by older adults; it also included the risk factors to determine ED use. One section of the review focused on interventions such as comprehensive geriatric evaluation (5 articles) and coordinated discharge planning to improve ED use; however, the data were inconclusive about the effectiveness of these strategies.
Andrews 2004 ²⁶⁷	To explore the roles of community health workers and their effectiveness in conducting research with ethnic minority women	The review investigated using community health workers in research with ethnic minority women. In reviewing their roles, there were 4 articles that considered community health workers as case managers but this was integrated with their other roles as educators or outreach workers. The authors reported that "using community health workers as case managers was more successful in retaining subjects than using them for outreach only"
Ara 2004 ²⁶²	To evaluate the effectiveness of cardiovascular disease management programs in managed care populations	The different interventions included in the different disease management programs suggest some effectiveness in improving outcomes for cardiovascular diseases. The specific interventions that demonstrated effectiveness included case management, physician reminders and feedback, patient education and self-management. Specifically for CHF disease management programs, case management and intensive patient monitoring were effective strategies.
Badamgarav 2003 ²⁶³	To evaluate the effectiveness of disease management programs for depression	This review searched for disease management programs for depression; however, it included several different interventions, of which multidisciplinary teams were one component. The review, however, did not specifically provide results for the effectiveness of multidisciplinary teams on outcomes but provided results for disease management programs as a whole. Overall, the pooled results indicated statistically significant outcomes for patients with depression who received disease management programs. The results also indicated that these programs can increase treatment costs.
Bijl 2004 ²⁶⁶	To evaluate the effectiveness of disease management programs in recognizing, diagnosing and treating major depression	The review did not define disease management. Only one of the 6 included studies met our definition for care coordination. That study showed improvements in the intervention group for the outcomes reported: reductions of depressive symptoms [OR 3.45 (95% CI: 2.71-4.38)]; higher rates of treatment [2.98 (2.34-3.79)]; more satisfaction with care; lower depression severity; less functional impairment and greater quality of life.

Table 15. Summary of reviews with partial focus on care coordination interventions (continued)

Reference	Purpose	Results
Campbell 1999 ²⁷⁶	To review the effectiveness and problems of programs providing cancer care in rural and remote areas	This review searched for all programs providing rural cancer care services. Programs with shared care of patients in rural areas between primary care physicians and specialists in cancer care were included in the review. The review was unable to make any recommendations about the provision of shared care services for cancer in remote and rural areas due to the limitations of article designs and the variability of outcomes reported.
Crawford 2004 ²⁵²	To identify factors that promote or impede continuity of care for patients with severe mental illness	Most of the evidence in this review came from qualitative articles that identified factors that are important for continuity of care. Meta-analyses of care coordination interventions such as case management, assertive community treatment and community mental health teams suggest that use of such interventions can decrease the likelihood that patients will lose contact with services.
Dennis 2004 ²⁵¹	To assess the effectiveness of interventions to prevent postpartum depression	Only one article in the review reported on an element of care coordination: team midwifery. There were no significant differences between the two groups (team midwifery versus standard care) with respect to depression scores. There was insufficient evidence to recommend any of the interventions studied.
Draper 2000 ²⁵⁵	To evaluate the outcomes of acute service delivery to older people with mental disorders	This review provided an overview of the provision of old age psychiatry services in the hospital and the community. One section reported results from 5 randomized controlled trials that provided these services in a community setting. These results indicate that community old age psychiatry services are effective.
Druss 2006 ²⁵⁶	To evaluate interventions to improve general medical care in patients with mental and addictive disorders	The review provided an overview of all interventions designed to improve medical care. One study included a case manager and one included a multidisciplinary team with a facilitated referral to the community. The first study reported an improvement in the physical score of the SF-36 in the intervention group; the second study reported no difference between groups.
Duffy 2004 ²⁵⁰	To assess the evidence on nonpharmacological strategies for heart failure management	This review assessed all nonpharmacological approaches to heart failure management, including those that were not specifically related to care coordination. Eight of the 15 included articles appeared to have some element of care coordination: multidisciplinary or case management. Overall, there appeared to be improvement in quality of life and hospital admissions in those articles with a care coordination component.
Eastwood 1996 ²⁷⁷	To assess the effectiveness of different methods of organization of asthma care	The review evaluated different methods of organizing asthma care, one of which was shared care between general practitioners and specialists. Only 1 of the 27 included articles reported this intervention and suggested that the effectiveness of shared care is comparable to conventional outpatient care. Overall, the review reported a lack of conclusive evidence favoring any particular way of organizing asthma care.

Table 15. Summary of reviews with partial focus on care coordination interventions (continued)

Reference	Purpose	Results
Gilbody 2003 ²⁶⁹	To evaluate the effectiveness of educational and organizational interventions to improve the management of depression	Improved treatment adherence and/or improved depression outcomes were seen with the more complex interventions: collaborative care, quality improvement (both organizational and educational interventions included), case management, pharmacist-provided information and education, guideline implementation strategies that were accompanied by complex organizational interventions.
Gonseth 2004 ²⁶⁰	To assess the effectiveness of disease management programs in reducing hospital re-admission among elderly patients with heart failure	This review included all disease management programs; however, only 8 of the 54 included articles reported some element of care coordination. The effectiveness of these specific articles was not analyzed. Overall, meta-analysis of 27 RCTs showed significant decrease in re-admission for heart failure or cardiovascular cause [RR 0.70, (95% CI: 0.62-0.79), all-cause readmission [0.88 (0.79-0.97)] and readmission or death [0.82 (0.72-0.94)] for participants in disease management programs compared to usual care. 10 of these articles estimated costs and results indicated that the implementation of a disease management program was cost-effective. Similar results were observed in the non-randomized trials. These results were observed among a heterogeneous group of patients and in diverse health care systems.
Griffin 1998 ²⁷⁴	To assess the effectiveness of general practice versus hospital care for diabetes	This review included “shared care” as an intervention strategy; however, this was not defined. Two of the 5 included articles reported some element of care coordination; however, the review did not analyze the effect of this on outcomes. Overall, the review reported the effectiveness of computerized recall with prompting in improving outpatient care in the short term.
Halcomb 2004 ²⁶⁸	To describe the role of practice nurses in heart failure management	The authors identified two articles in which nurses played a role in coordinating care as part of a multifaceted intervention. Care coordination promoted follow up and decreased hospitalization but did not affect health outcomes.
Handford 2006 ²⁵⁷	To assess the effectiveness of the setting and organization of care on outcomes among patients living with HIV/AIDS	The authors identified three studies evaluating case management and six studies evaluating either multidisciplinary or multi-faceted care. Case management was defined differently for each study but always included a distinct case manager; multidisciplinary care involved use of two or more providers other than standard clinician; multi-faceted care was the use of two or more treatment programs other than standard clinician care. All three case management studies showed improvements in selected outcomes (mortality, medication use, continuity of care); one study showed no difference in health care utilization use. Multidisciplinary or multi-faceted care studies showed mixed results for use of medications and health care utilization with some studies associated with increased used of medications and others not.

Table 15. Summary of reviews with partial focus on care coordination interventions (continued)

Reference	Purpose	Results
Harding 2005 ²⁴⁹	To assess the effectiveness of different models of providing palliative care on outcomes for patients with HIV/AIDS	The review included all models of palliative care and did not search specifically for care coordination interventions. 15 of the included 34 articles had some element of care coordination: multidisciplinary teams, case management, integrated care. However, because the analysis did not focus specifically on the coordination elements, it is not possible to draw any conclusions about the effect of care coordination on patient outcomes. Overall, the evidence indicated that palliative care at home and inpatient hospice significantly improved pain and symptom control, insight, spiritual well-being and anxiety.
Harvey 2001 ²⁷⁸	To determine the effectiveness of existing interventions in improving health professionals' management of obesity or patient outcomes	The review searched for interventions aimed at professionals (e.g., education, reminders) as well as organizational interventions (e.g., multidisciplinary teams). Only one article that primarily addressed organizational interventions was included. This article aimed at improving collaboration between general practitioners and a hospital based obesity clinic through shared care and integration of services. This article "indicated some positive effects in the short term....but these were not sustained over the long term"
Hastings 2005 ²⁷⁹	To assess the effectiveness of interventions aimed at improving outcomes for elderly patients discharged from the emergency department (ED)	The review included five observational, descriptive studies and six RCTs that met our definition for care coordination. Of these, three RCTs reported improvements in functional status of intervention patients. All three studies included use of a specially trained nurse to perform geriatric assessment and home-based care. The review also reports that the targeting of high risk patients may result in interventions being more effective.
Heideman 2005 ²⁵⁸	To assess effectiveness of interventions aimed at improving diagnosis and management of patients with anxiety disorders by general practitioners (GP)	The review assessed the effectiveness of professional and organizational interventions to improve care for patients with anxiety disorders. It included two studies on collaborative care; one of which appeared to have a positive effect on anxiety outcomes. The intervention for this study included a psychologist working collaboratively with the GP to provide care.
Hwang 2005 ²⁵⁹	"To summarize the existing evidence on interventions to improve health-related outcomes in homeless people"	The review studied all interventions assessing health-related outcomes among homeless people. It included 13 studies that had some component of case management and 6 studies that included the use of assertive community treatment teams. Overall, the review reported improved outcomes among interventions providing coordinated treatment and support.

Table 15. Summary of reviews with partial focus on care coordination interventions (continued)

Reference	Purpose	Results
Ingersoll 2005 ²⁷¹	To summarize the literature on the role of nurses as care coordinators or case managers for patients with diabetes	Overall, there were 9 included studies; however, only 4 studies involved care coordination with multiple providers. The remaining 5 studies were substitution studies with nurses providing care instead of physicians. The care coordination studies showed improvements in the respective outcomes studied (HbA1c, hospital admissions). One study intervention involved the referral of patients by primary care physicians to specialist care and showed significant decreases in mean HbA1c levels of 1.75 (95%CI: 1.4%-1.9%).
Mitchell 2002 ²⁵³	To examine factors related to the delivery of palliative care by general practitioners	The review provided an overview of general practitioner (GP) provision of palliative care, including their self-assessment and training. There was only one paragraph of the review that briefly addressed the importance of having GPs be a part of a palliative care team and suggested that when GPs and specialists work together there is an improvement in "diagnostic accuracy, application of evidence-based treatments, identification of systematic problems in the delivery of care, and improved ability to facilitate deaths at home."
Ofman 2004 ²⁶¹	To assess the effects of disease management programs in patients with chronic disease	58 of 102 (56% of the included articles) used multidisciplinary teams as a strategy for care; however, the specific effect of this strategy was not reported. Disease management programs incorporating different strategies such as patient education, provider education, reminders and provider feedback, appeared to be beneficial for diabetes, depression, hypertension, coronary artery disease, and hyperlipidemia. Less benefit was shown for COPD and chronic pain.
Pearson 2003 ²⁶⁴	To assess the effectiveness of interventions to improve medication use in managed care settings	The review included articles with several interventions (including education, disease management, feedback) with most articles having multiple components. 25 of the 48 included articles reported disease management as the primary strategy. Disease management programs that focused primarily on depression and diabetes were effective in changing processes of care and improving short-term outcomes. These results did not extend to those articles that examined outcomes beyond 12 months.
Phillips 2004 ²⁷⁰	To evaluate the efficacy of comprehensive discharge planning and postdischarge support on outcomes among older patients with CHF	12 of the 18 included articles reported some element of care coordination: increased communication between providers, coordination of home care and case management. Interventions involving home visits or extended care services were associated with significantly lower readmission rates. The results should be interpreted with caution due to quantitative heterogeneity among articles within intervention effects.

Table 15. Summary of reviews with partial focus on care coordination interventions (continued)

Reference	Purpose	Results
Renders 2001 ²⁵⁴	To assess interventions targeting health care professionals or the health care system on the management of diabetes	This review examined a variety of interventions to improve diabetes management that target providers and the organization. Included in the interventions were some articles that had some element of care coordination: multidisciplinary teams or case management. However, these components were combined with other strategies such as education or follow-up, making it difficult to assess the effect of the care coordination component on outcomes. Most articles that included these care coordination components as part of the intervention showed improved outcomes.
Sin 2003 ²⁶⁵	To evaluate the effects of anti-COPD therapies (pharmacological and nonpharmacological) on patient outcomes	The review evaluated several commonly used anti-COPD therapies, including disease management programs. 8 of the included articles addressed disease management and the interventions mostly focused on education, self-management and follow-up. The intent of the disease management programs was to integrate and coordinate care. Overall, there was insufficient evidence to support the efficacy of disease management programs for patients with COPD.
Vergouwen 2003 ²⁷²	To assess the effectiveness of interventions to improve adherence to antidepressant medications	9 of the 11 collaborative care articles showed significantly improved adherence and depression outcomes in the intervention group vs. the control group. Most of the collaborative care interventions included components (such as increased patient education, treatment training, longer and more frequent visits) targeting the patient, physician and the health care system so it was not possible to know which components accounted for improved adherence.
Weingarten 2002 ¹⁴⁸	To evaluate the effectiveness of disease management programs for chronic diseases	The authors searched for articles evaluating disease management programs and then classified the different components of the intervention (e.g., patient education, provider education, reminders). None of the intervention components had a clear care coordination focus. Overall, the review reported that all of the interventions showed improvements in disease control and provider adherence to guidelines.

Narrative Synthesis of Recent Systematic Reviews by Coordination Component

Decisionmakers are interested in a more granular analysis of the effect of components of care coordination interventions. As described in Chapter 3, we developed a components list of essential tasks of care for a patient, associated care coordination activities, and features to support the activities. We reviewed 15 recent systematic reviews to assess if the reviews provided any information on specific components of the care coordination intervention. We mapped the information provided to the components deemed important when evaluating care coordination interventions (Table 16). Of the 15 reviews, 13 provided some detail on either the care coordination intervention or details on the individual studies included in the review; six reviews performed some analysis by selected components; four provided quantitative analysis.

When we apply this type of components list, we see that some interventions are aimed at (or incorporate delivery of) a subset of tasks and may have a few specific features to accomplish those tasks. Our ability to determine the presence or absence of each component reflects some assumptions, given the modest level of detail typically supplied for the intervention reviewed. Fairly uniformly, the systematic reviews provide little to no meaningful analysis at the component level. However, the application of a component list allows us to observe potentially important nuances. For example, one of the systematic reviews compared multidisciplinary teams to nurse-led teams, and found the former to appear more effective. We note that the tasks specified in the review were fairly limited – care planning and communication. The authors did not describe details about assessment, execution of care plan, monitoring and evaluation tasks, even though these activities may have been present. They noted that the nurse-led interventions tended to be more focused on patient education and follow-up visits or calls. Therefore the differences between the two types of interventions are more complex than simply “nurse-led” or “multidisciplinary”, and application of the list reminds us to examine each component that could affect the outcomes.

Summary. The current evidence base does not support a granular, component-level analysis from systematic reviews. Our impression from the literature reviews presenting detailed intervention descriptions of the primary studies is that they also will fall short of being able to address the question of what components of interventions are most critical for a given coordination challenge. Therefore, we anticipate that new primary research with appropriate (and likely novel) designs is necessary as a basis for later syntheses to provide definitive answers on what to do for each coordination challenge.

Table 16. Components described or evaluated by the systematic reviews

Review	Intervention	Care Tasks/ Coordination Activities*	Features*	Quantitative Patient Outcomes	Evaluation by Component(s)?	Comments
Craven ²⁰⁹	Collaborative care	I, C	TOOL, REDESIGN	NO	NO	Provided detailed descriptions of each included study.
Gunn ²¹⁰	System level interventions	I, C, M	TOOL	YES (+)	NO	
Holland ²¹⁶	Multidisciplinary interventions	A, I	IT, TOOL	YES (+)	YES	
Lemieux- Charles ²²¹	Team	I, C, M	TOOL	NO	NO	Analyzed subgroups: One on one patient education [TOOL] mattered. Patient targeting at high risk patients [ASSESSMENT] did not matter. Provided detailed descriptions of each included study.
Gohler ²²⁴	Disease management	D, I, M	TOOL, TECHNIQUE	NO	PARTIALLY	Analyzed intervention characteristics (team composition, intervention mode, country and duration of followup) in order to explain heterogeneity across studies regarding mortality. Sensitivity analysis found that multidisciplinary programs better than nurse-led interventions. [PARTICIPANT ROLE]
Roccoforte ²²⁵	Comprehensive disease management	D, I	TOOL	YES (+)	YES	
Whellan ²²⁶	Disease management	I	-	NO	NO	
Yu ²²⁷	Disease management	D, I, M	IT, TOOL	YES (+)	YES	Categorized studies into effective and ineffective based on key characteristics recommended by the European Society of Cardiology. Effective DMPs were more likely to involve both cardiac nurse and cardiologist; having the PCP [PARTICIPANT ROLE] as a member of the care team also appeared to result in more promising discharge outcomes.
Knight ²²⁸	Disease management	M	-	YES (+)	YES	A program involving pharmacist counseling patients and adjusting medications [MONITOR] and 2 programs involving combined physician and patient interventions were associated with greatest estimated changes in GHb. No further detail provided.
Krause ²²⁹	Disease management	C	-	NO	NO	No description of intervention components.

Table 16. Components described or evaluated by the systematic reviews (continued)

Review	Intervention	Care Tasks/ Coordination Activities*	Features*	Quantitative Patient Outcomes	Evaluation by Component(s)?	Comments
Briggs ²³⁶	Integration of primary care services	A	-	NO	NO	
Dohan ¹⁹²	Navigation programs	I, C		NO	NO	
McCusker ²⁴⁶ Individual studies	Comprehensive geriatric assessment	A, D, I, C	TOOL, TECHNIQUE, REDESIGN	NO	PARTIALLY	Narrative synthesis examined intervention characteristics to see which studies showed improvements in ED utilization. For e.g., “two RCTs evaluated multidisciplinary assessment and/or liaison intervention, a case conference and liaison with primary care; neither significantly reduced ED utilization”. “Other characteristic of interventions that may reduce ED utilization include greater integration with primary medical care and targeting of the intervention to higher risk patients. There was...insufficient number of studies to allow us to assess the effects of these factors.”

* A component is listed if it is obvious from the description that it was part of the intervention. Other components may well be present, but not described well enough to categorize with confidence.

Care tasks/Coordination Activities: A=Assess Patient, I=Identify Participants and Role, D=Develop care plan, C=Communication, E=Execute care plan, M=Monitor and adjust

Features: IT=Information technology, TOOL, TECHNIQUE to mitigate interface issues, REDESIGN of system to support care coordination

4D. Discussion

Our review of systematic reviews evaluating care coordination interventions suggests that many care coordination strategies have demonstrated effectiveness for selected outcomes within a particular clinical area, though the cumulative evidence across systematic reviews is less clear. Our review had the following key findings: First, care coordination interventions that have been evaluated are highly heterogeneous and tend to focus on several discrete clinical areas. Second, coordination strategies are defined differently across reviews, with no single definition for very similar strategies. Third, the evidence suggests that care coordination interventions can improve outcomes in different diseases (mortality and hospital re-admission in patients with heart failure, glycemic control in patients with diabetes, depression severity and treatment adherence in patients with mental illness, death or dependency in patients with stroke); however, there is a lack of evidence about the superiority of one particular strategy over another. Finally, there is insufficient evidence regarding the costs and cost-effectiveness of care coordination interventions. In summary, the diversity of the care coordination interventions evaluated, the heterogeneity of the definitions of the interventions, and the diversity across clinical conditions and populations limit our ability to synthesize the reviews; however, the evidence does suggest that multidisciplinary teams, case management and disease management programs are associated with improved outcomes.

4E. Limitations

This review has several limitations. First, we attempted to find all reviews that addressed some element of care coordination; however, we may have missed certain reviews that were not clearly focused on care coordination but which may have included articles that addressed care coordination as a result of a part of a broader search. Second, the included reviews were highly heterogeneous with respect to the care coordination interventions included. Many reviews failed to provide a clear definition of the care coordination intervention being studied. Additionally, a single care coordination term (e.g., disease management, assertive community treatment) was defined in different ways across different reviews, making it impossible to draw firm conclusions across reviews. Third, care coordination interventions were studied across several different clinical topics (heart failure, mental illness, diabetes, asthma, stroke, rheumatoid arthritis, pain management, palliative care) and it was unclear if interventions that were effective in one area would be effective in another area. Fourth, because reviews did not always have a clear focus on the analysis of the care coordination process or structure, it was difficult to interpret the effectiveness of care coordination in improving outcomes. Finally, we were limited by the methodology used for this chapter; our strategy of reviewing systematic reviews left us unable to review the primary findings of the articles included in the reviews. Therefore, it is possible that key pieces of information were missed since they were not provided in our included reviews.

4F. Summary Answers to Key Questions

Research Question 5: Which Care Coordination Interventions Have Been Evaluated by Systematic Reviewers and How Were They Defined?

Among our included reviews, we identified various care coordination interventions that have been evaluated. The terms used to define the care coordination strategies were highly heterogeneous. The 43 individual reviews that focused entirely on care coordination referred to 20 different care coordination interventions. The most common strategy evaluated the use of multidisciplinary teams involving two or more providers from different specialties providing care to a group of patients (15 reviews); the terms applied to this strategy included multidisciplinary teams, team coordination, assertive community treatment, collaborative care, integrated programs, and shared care. The next most common strategy evaluated was disease management (ten reviews). It was defined variably or not at all in the included reviews and there did not appear to be a consensus about the components that should be included in a disease management program; however, the intent of all the disease management programs reviewed was to improve the coordination of patient care, provide support to patients, and improve patient outcomes. Finally, nine reviews assessed the role of case management (also referred to as care management) which typically involves the assignment of a single person (case manager or “key worker”, so named in one study) who coordinates all aspects of a patient’s care (e.g., providing information to multiple providers, seeing that the patient receives services in a timely manner etc.). The qualifications and exact duties of case managers were poorly described in most reviews. Other strategies evaluated were integration of care (three reviews), and interprofessional education, defined as the provision of training and education to professionals from different health and social areas, who learn together interactively (three reviews).

Research Question 6: What is the Evidence Regarding the Health Benefits of These Care Coordination Interventions as Summarized in the Systematic Review(s)? In Particular, is the Effectiveness of Care Coordination Interventions Related to the Setting in Which Care is Being Coordinated, the Component of Care Being Coordinated, or the Type of Disease or Patients for Whom Care is Being Coordinated?

Numerous care coordination interventions were evaluated across several diseases among the included systematic reviews, with different outcomes being reported within each review. Only three care coordination strategies-multidisciplinary teams, case management, and disease management-were evaluated across different clinical topics (e.g., heart failure, diabetes). Overall, the reviews reported a positive effect of these strategies on the outcomes studied (improved mortality and hospital readmission rates in patients with heart failure, improved glycemic control in patients with diabetes, improved service continuity in patients with mental illness). The remaining reviews evaluated other care coordination strategies (comprehensive, multidisciplinary program, integrated care, shared care, organized clinic) within a single clinical

topic thereby limiting our ability to synthesize the evidence on the effectiveness of those care coordination strategies across clinical topics.

Interventions were conducted across different settings (home, community, outpatient clinic), with half of the reviews conducting interventions across multiple settings. One review²¹⁶ reported that interventions with a home-based component or telephone follow-up were more effective than those based in the hospital or clinic; however, due to a lack of analysis of the effectiveness of the care coordination intervention by setting, there is insufficient evidence to allow for any definitive conclusions regarding the effect of setting on the effectiveness of care coordination interventions. Furthermore, there was also insufficient evidence to determine the effectiveness of any particular care coordination intervention in improving patient outcomes across care boundaries.

In our included systematic reviews, care coordination interventions were frequently evaluated among patients with mental health problems. Several different strategies were studied among this population. Most of the reviews reported improved outcomes for each strategy; however, there was insufficient evidence that one particular strategy was more effective than others in improving outcomes. Care coordination interventions among patients with heart failure were also studied extensively, with multidisciplinary teams and disease management being the main interventions. While the reviews reported improved outcomes (mortality, hospital re-admission) associated with both these interventions, there was considerable overlap of the included studies across the reviews. The remaining reviews evaluated care coordination interventions among a diverse group of clinical conditions (diabetes, asthma, heart condition, stroke, rheumatoid arthritis) thereby limiting our ability to synthesize the findings for a given intervention.

Most of the included systematic reviews evaluated care coordination interventions in adults in the general population. Eight of the reviews evaluated interventions among the elderly, a vulnerable group more likely to have poorly coordinated care. The findings from these reviews suggest that care coordination strategies may improve outcomes among elderly patients (specifically by decreasing hospital admissions); however, the heterogeneity of the included strategies do not permit any further synthesis that would allow us to assess the effectiveness of one particular strategy over another.

The intervention descriptions provided by the most recent systematic reviews were generally not adequate enough for a complete categorization of the intervention components. The current evidence does not support a granular, component-level analysis from systematic reviews.

The overall quality of the included systematic reviews was very good, with most reviews providing detailed search terms, inclusion/exclusion criteria and appropriate synthesis of their included articles.

Research Question 7: Have the Costs of Care Coordination Interventions Been Evaluated in any of These Systematic Reviews, and if so What is Known?

Costs were evaluated in approximately half of the included reviews that focused solely on care coordination; however, only one of the reviews reported findings on the cost-effectiveness/cost-benefit of the care coordination intervention. The evidence from this review suggests that comprehensive disease management programs are cost-effective for improving outcomes in patients with depression. One other review reported a summary effect size of the

economic effectiveness of disease management programs indicating that disease management programs were economically effective. The remaining reviews provided some cost estimates of the interventions evaluated; however, the evidence was insufficient to allow for any definitive conclusions regarding the costs and benefits of the care coordination interventions evaluated.

Chapter 5. Conceptual Frameworks and Their Application to Evaluating Care Coordination Interventions

5A. Background

As noted in the previous chapters, a diverse set of large scale care coordination projects are being planned or are underway with the support of the Center for Medicare & Medicaid Services,^{32, 280, 281} the Department of Veterans Affairs,¹⁴⁷ professional organizations, and foundations.¹⁸⁸ The vast majority of healthcare systems and managed care organizations reported have disease management programs,⁶⁴ though these programs vary significantly in their design.^{187, 282} In addition, the research literature includes numerous studies reporting evaluations of care coordination interventions. Efforts to identify optimal strategies for coordinating care have been impeded in part by the lack of conceptual frameworks to guide the evaluation of care coordination interventions, as well as by uncertainty regarding how best to measure coordination itself.^{50, 93, 119, 283} To evaluate the effectiveness of interventions for improving care coordination and the validity of instruments used to measure care coordination, the concepts related to care coordination need clarification.

This chapter discusses some of the literature on conceptual frameworks and related metrics either directly or potentially applicable to care coordination. The purpose of this discussion is two-fold: to provide brief descriptions of selected potentially useful frameworks and to demonstrate how these frameworks might be used to guide development, implementation, and evaluation of care coordination interventions. Thus, the purpose of this chapter is to show that theoretical thinking from different fields has the potential to enrich the study of care coordination interventions. The goal is not to develop one integrated theory, as that is a major step beyond the scope of the current work. However, the frameworks presented in this chapter show that there are multiple alternatives to hypothesizing how an intervention might cause (or not cause) a desired effect.

5B. Methodological Approach

Similar to the methods described in detail in Chapter 3, we used iterative searches to identify literature describing conceptual frameworks and associated empirical evidence related to care coordination. We reviewed theoretical work developed in the behavioral, organizational, and health services research fields, and adapted selected frameworks to care coordination. While there are many potential frameworks from these and other fields, we chose well-established frameworks that had previously been used in or adapted to the health care setting, offered relevant concepts based on our discussions with experts in the field, and/or provided complementary ideas for understanding care coordination. Finally, we also searched for measures related to care coordination and summarized key information about some example measures and describe their relationship to the frameworks. We focused on providing information of relevance to potential decisionmakers and others involved in care coordination.

Focusing the Conceptual Frameworks on Key Decisionmakers

After our review of the types of care coordination programs underway (Chapter 2) and care coordination interventions evaluated in systematic reviews (Chapter 4), we decided to focus our conceptual framework on two levels of decisionmaking related to care coordination: system-level policymakers and service-level decisionmakers. By system-level policymakers (e.g., State Medicaid directors, Medicare officials, health plan managers), we mean individuals who have responsibility for paying for health care services for large numbers of individuals (i.e., health plan enrollees, Medicare beneficiaries) and make decisions about how to coordinate care at a *system level* in ways that minimize their financial risks and maximize the health care outcomes of their population of patients. By service-level decisionmakers (e.g., a primary care doctor, managers of a multi-specialty clinic), we mean individuals who are involved in providing health care services to individual patients or a panel of patients, and therefore tackle care coordination at the *service delivery level*. Depending upon the particular local environment, they make decisions related to care coordination to maximize health care outcomes and profit. To varying degrees, both the systems and delivery decisionmakers have shared responsibility for making care safe, effective, patient centered, timely, efficient, and equitable (the six IOM goals for quality healthcare). As we discuss specific conceptual frameworks, we will explore how each framework could help inform decisions related to care coordination for both of these types of decisionmakers.

The patient, of course, offers another key perspective to consider as we explore and apply specific frameworks. A focus group of hospitalized patients found that patients perceived that clear communication reflected good care coordination, and had varying opinions about who has responsibility for coordination (e.g., doctor, nursing supervisor, nurse, patient, etc.).²⁸⁴ With mounting interest in consumer-driven health plans and patient- (and family-) centered care, it is likely that the patient will have an increasingly active role in health care decisionmaking.^{285, 286} The patient is often the decisionmaker who experiences issues of coordination failures, so all frameworks apply to this key participant in care.

5C. Results

Malone and Crowston have argued for the utility of interdisciplinary study of coordination that draws from the fields of computer science, organizational theory, economics, psychology, management science, linguistics and biology, and have even provided a first synthesis of some common themes in relationship to information technologies.¹¹⁷ While we see the value of integrating across fields to develop a common conceptual framework of care coordination, we recognize that such a goal goes beyond the scope of this report. As a result, we have limited our scope to four frameworks from the fields of behavioral science, organizational design, management sciences, and health care that seem particularly relevant to the questions posed by care coordination decisionmakers (Chapter 2). We required that frameworks selected from these different fields include potential cause and effect relationships among the concepts included in the frameworks.* In the following sections, we describe each framework and the concepts that

* We have focused our review on frameworks that might help intervention designers analyze their situation and tailor solutions based on an understanding of the cause and effect relationship of various concepts. As a result, we have not included many current models that bundle interventions together into holistic approaches to improve

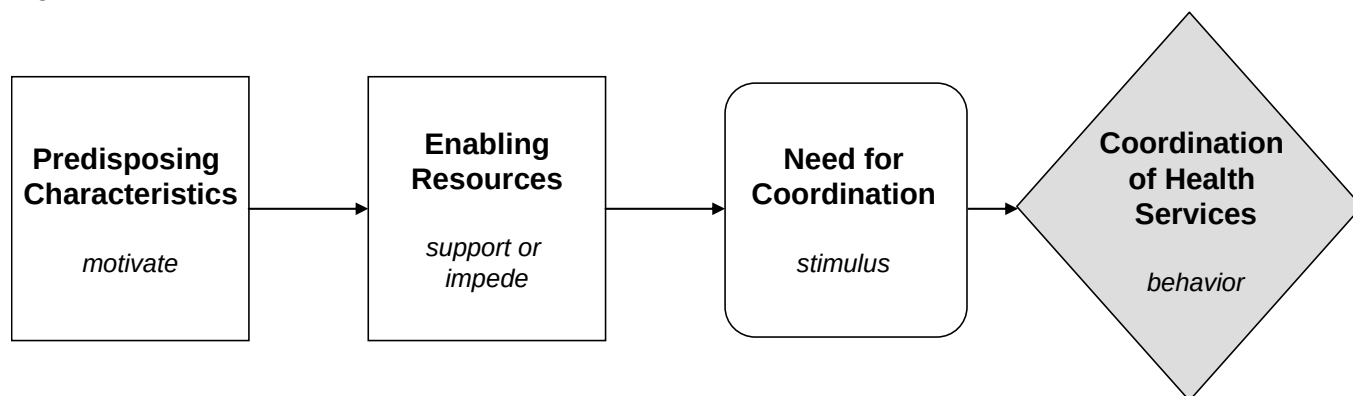
are likely to be particularly useful to decisionmakers. We then present some examples of metrics related to care coordination, and how they relate to the frameworks and evaluations of care coordination. Finally, we apply the concepts from these frameworks and metrics to our findings from the previous sections of this report to show how such an approach might be useful to those designing and evaluating care coordination interventions and programs. The intent of the rest of this chapter is to understand what factors might enable well-coordinated care in a variety of scenarios.

Model 1: The Andersen Behavior Framework

Since health care delivery relies greatly on individuals, we searched the sociology and psychology literatures for relevant frameworks and found a useful one originally developed by medical sociologist Ronald Andersen and adapted over the past 35 years by many others.²⁸⁷ The original framework from the 1960's lays out the some of the most salient concepts for care coordination. Originally intended to predict and explain use of health care services by individuals, the Andersen behavior model has recently been applied to model clinician response to quality-based payment incentives.²⁸⁸ We adapt the purpose here to focus on the coordination behaviors of health care delivery participants (including patients and clinicians, as defined in Chapter 3). We also refer the interested reader to the first report of this Closing the Quality Gap series for a descriptions of behavioral change theories.²⁸⁹

Figure 3 shows the initial framework with our substitution of the word “coordination” for “use.”^{**} Deceptively simple, the framework suggests that coordination of health services relates to three concepts: the participants’ predisposition to coordinate care, the resources that enable or impede coordination, and the participants’ need for coordination.

Figure 3. Andersen Behavior Framework



coordination. For example, the Wagner Chronic Care model has been applied widely as a package of approaches to activating patients and developing effective health care teams with adequate support from the community and the health care system. In the section on the third framework from organizational sciences, we describe how the Wagner model is consistent with organizational design concepts.

^{**} In each of the figures describing the conceptual frameworks relevant to care coordination, we adopt the following graphical convention: We use a box with square corners to depict the concepts related to the baseline assessment of the care coordination setting, patient population, and other existing factors in the health care environment. We use a box with rounded corners to depict the coordinating mechanisms, and we use a shaded diamond to depict the outcomes of care coordination.

First, some participants might be more or less predisposed to coordinate care based on their own attitudes toward or knowledge about their role in coordinating care. The idea behind *predisposing characteristics* is that they are not easily altered. Another predisposing characteristic in the context of care coordination might be the structure of medical professions, which set certain expectations about who has responsibility for specific care activities. Shifting major responsibility to the patient for example, for coordination of their own care, would go against the norms of some care professionals. Numerous other predisposing characteristics have been shown or hypothesized to relate to improvements in care, potentially through effects on care coordination behaviors: incentives, climate and culture, staff expertise, leadership/commitment to quality improvement,^{109, 290-293} pre-existing team/group or inter-clinician factors (e.g., team structure, collaborative practice),^{136, 164, 294-298} and individual clinician characteristics (e.g., knowledge, attitudes, and skills).^{96, 99, 140, 299-301} Since predisposing characteristics are difficult to change, more resources or creativity would likely be necessary if a clinician, patient or systems-level decisionmaker wanted to reduce a barrier related to these characteristics.

Second, *enabling resources* reflect the availability and access to the requisite information systems, organizational structures, or productive relationships with others providing care to the same patient. Enabling resources affect the ability of a participant to respond to the need for coordination. A key distinguishing feature of enabling resources (compared to predisposing characteristics) is that they may be changed by systems- or service-level decisionmakers. Interventions to improve care coordination typically involve changes to enabling resources (e.g., introduction of a protocol for handoffs or designating a nurse as a patient navigator at the service delivery level; and implementation of contracts with disease management organizations or changing payment policies at the systems level). More details about potential enabling resources will be covered in a subsequent section on organizational theory and design.

Classification of predisposing characteristics and enabling resources is a function of point of view. For example, a doctor working within a particular healthcare system would see a lack of an information system as a predisposing characteristic since he or she alone could not change the situation. However, the leader of the same system may make a choice about whether to invest in information systems, making the same factor an enabling resource. Thus, the service-level decisionmaker and the systems-level decisionmaker will have different views of predisposing characteristics versus enabling resources.

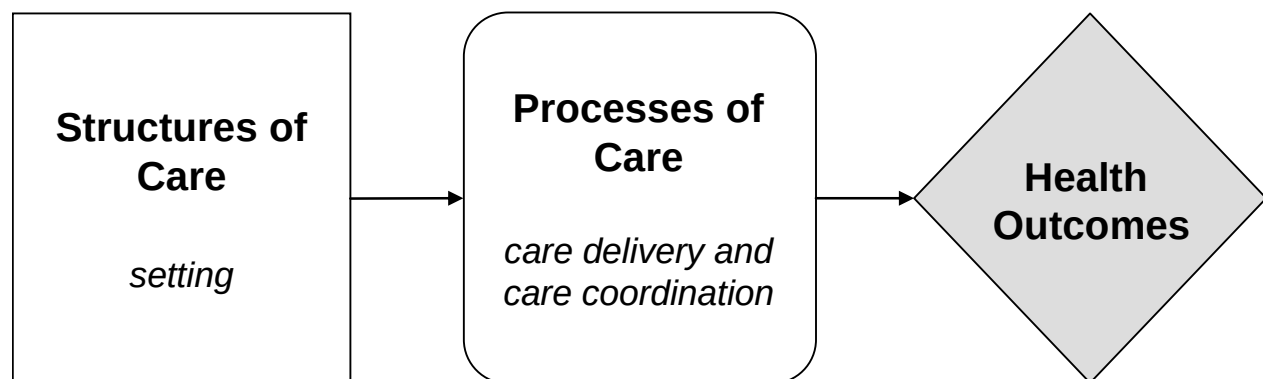
Third is the notion of the *need for coordination*. In Andersen's original model the need to utilize health care is based on the patient's health and functional state, and his/her perception of need for health care. Illness is therefore typically the trigger for using health care services. In the adapted care coordination framework, we assume that one or more of the participants must perceive a need for coordinating care in order to trigger actual coordination behaviors by the participants (e.g., exchanging information between two clinicians at the delivery level; setting up a registry to flag more complicated patients for intensive case management at the delivery or systems level). The need for coordination is likely a function of the patient when we consider the health care delivery level, and of the patient population when thinking about the system level (e.g., Medicare). Patients whose health requires the participation of multiple participants (e.g., several doctors for multiple chronic conditions, a rehabilitation therapist for post-stroke care, a social worker for connecting the patient to community resources, a pharmacist to help sort out Medicare Part D benefits, etc.) need more coordination of their care.

While this model is described using a general concept of coordination, it applies to any behavior related to coordination. In viewing coordination through a behavioral model, designers and evaluators of care coordination interventions might be motivated to ask, for example, “What behaviors need to change to improve coordination between medical and non-medical services? The focus is then on a specific element of coordination – coordination across services—presumably because patient complaints perhaps stimulated a desire to change the behavior related to this element of coordination. The situational analysis then would review predisposing and enabling factors that create barriers and opportunities for achieving the specific behavior change – coordinating more effectively among participants from medical and non-medical services – in order to design and test an appropriate intervention. Thus, application of this model involves potentially focusing on discrete elements of care coordination (e.g., smooth exchange of information, efficient planning and delivery of disparate services, education of patients about the care plan, adherence to treatment) and mapping out what behaviors need to change (e.g., the physician needs to describe to patient and support staff the non-medical service needs envisioned, and the support staff person needs to take responsibility for effectively linking the patient to the appropriate non-medical resources). The choices of appropriate interventions to improve coordination are likely to be more self-evident by breaking the analysis up into discrete coordination problems.

Model 2: Donabedian’s Quality Framework

Well known to those involved in health care quality research, Avedis Donabedian described a framework for assessing the quality of care that is flexible enough to apply to many situations.³⁰² Figure 4 illustrates the intuitive relationship between three related concepts. First, *structures* of health care are defined as the physical and organizational aspects of care settings (e.g., facilities, equipment, personnel, operational and financial processes supporting medical care, etc). Second, the *processes* of patient care sit in the middle of the diagram because they rely on the structures to provide resources and mechanisms for participants to carry out patient care activities. In addition, *processes* are performed in order to improve patient health in terms of promoting recovery, functional restoration, survival and even patient satisfaction. This latter concept is well-known as the *outcomes* of medical care.

Figure 4. Donabedian’s Quality Framework



In the context of care coordination, we note that health outcomes result from the medical care delivered to the patient and the patient's underlying characteristics. In focusing on the linkage between what is under the control of the medical profession and effects patient outcomes, Donabedian's framework purposely does not account for patient, economic or social factors outside of the care delivery system. In his seminal 1966 paper, republished recently, Donabedian states: "This is justified by the assumption that one is interested...in whether what is now known to be "good" medical care has been applied. Judgments are based on considerations such as the appropriateness, completeness and redundancy of information obtained through clinical history, physical examination and diagnostic tests; justification of diagnosis and therapy; technical competence in the performance of diagnostic and therapeutic procedures, including surgery; evidence of preventive management in health and illness; coordination and continuity of care; acceptability of care to the recipient and so on."³⁰³ Thus, the framework has coordination of care listed in the process box, meaning that care coordination is expected to be influenced by the setting and other structure variables and to exercise causal effects on patient outcomes. Another take-home point from this framework is that the positioning of care coordination implies that it is one of many important care processes, and therefore does not act in a vacuum even at the level of service delivery. In focusing on care coordination, it is easy to lose sight of this important, though relatively obvious point. Coordinating care better is only beneficial if other aspects of care delivery are optimized as well.

For a given care delivery setting—for example a small office-based physician practice—the coordination process of information exchange (e.g., test results conveyed from laboratory to physician) depends on the structures in place (e.g., information system linked with lab, fax machine). To coordinate care better, the physician may consider a structural change – purchasing an information technology solution to receive and flag results that need action, or adding staff time to perform the same function. The process could also be modified through a standard protocol to guide how the information flows, and to designate who has responsibility for each step under specific circumstances. Outcomes relevant to the information exchange process could include patient satisfaction with communication, timeliness of care, and clinical outcomes dependent on the information conveyed (e.g., better control of clotting times based on changing anticoagulant drug dosing). At the systems level—for example, an integrated health care system, the structural change might be to create an anticoagulation clinic to co-locate testing, results reporting, and clinician visits. The coordinating process would be teamwork, and the outcomes would be the same as in the first case.

Model 3: The Organizational Design Framework

The organizational theory literature offers numerous relevant concepts for thinking about care coordination, and for simplifying the complexities of the effects of the actions of multiple participants on multiple coordination parameters. Many studies outside of and within health care have focused on the effects of factors associated with organizational decisions on coordination and organizational effectiveness. However, there is not a single established framework that seems fully applicable to the questions posed by care coordination decisionmakers. Instead, several key concepts offer important lessons to consider in designing and evaluating new approaches to care coordination. To present these concepts as accessibly as possible, we anchor our discussion using a framework of formal coordinating mechanisms from organizational design research. For those decisionmakers who have a span of control within one organization

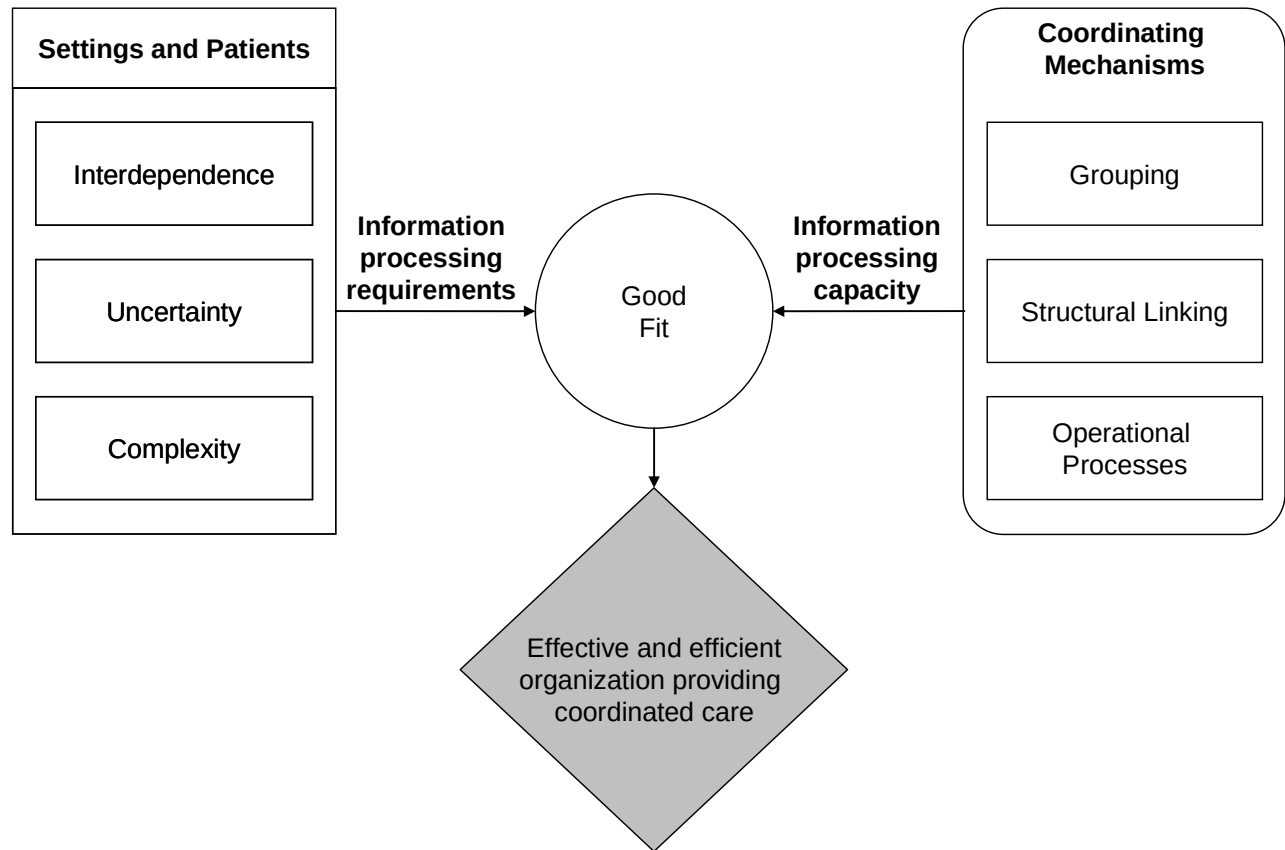
that provides integrated care to patients, the organizational design framework could readily apply, and offer a way to generate potential solutions appropriate to the particular demands of a care coordination problem. In contrast, for systems-level decisionmakers whose policies affect multiple organizations, the framework we present is largely illustrative of the types of failures that could occur among or within organizations participating in patient care. The organizational theory literature describes the relationships among organizations that together produce a good or a service; however, a detailed review of this information is outside the scope of this report. We direct the interested reader to Gittell and Weiss¹⁰⁵ for a cogent detailed description of a “multi-level framework for coordination” applied to health care.

The general organizational design framework shown in Figure 5 characterizes organizations as information-processing systems, where the flow of information among participants is a function of the demands of the situation and the capabilities of the organization to move information to where it is needed. The framework presents three concepts that underpin choices about organizational design: information requirements, information-processing capacity, and the match or fit between these.³⁰⁴

First, different situations produce variable *information requirements*, as shown on the left side of Figure 5. Studies within and outside of healthcare suggest that several basic characteristics of the organization’s task or in the case of health care, the specific patient care activities, have important implications for designing coordination mechanisms to facilitate information flow effectively: interdependence, uncertainty and complexity of patient care activities.^{130, 164, 304-307}

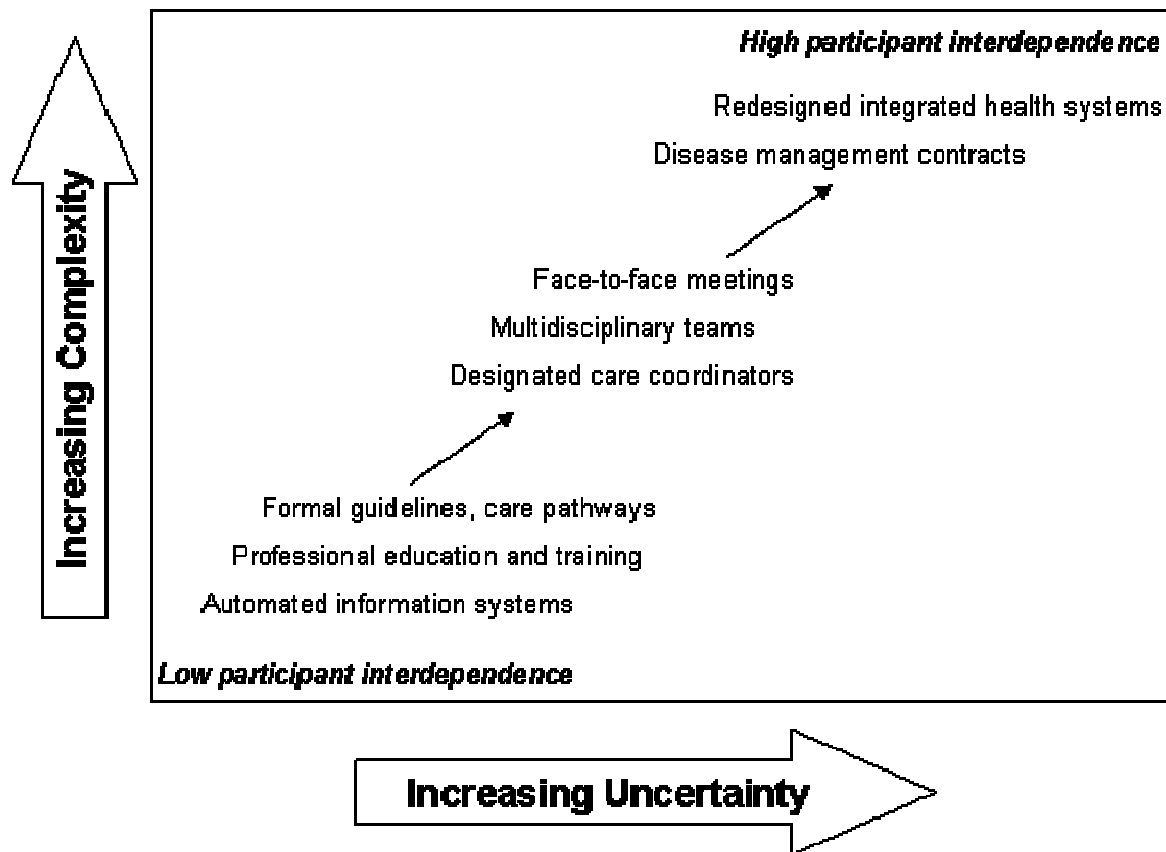
- In order to successfully perform their respective care activities, participants often rely on one another for information or other resources. As the level of *interdependence* among participants increases, so do the demands for information among participants.^{130, 138} A higher level of information flow is required in situations of reciprocal interdependence, such as for complex patients and referrals between physicians. Information flow between physicians is bi-directional, thereby increasing the demands for timely exchange of information.
- *Uncertainty* is ubiquitous in health care and results from a lack of information about what will happen in the future. The course of disease or treatment for a particular patient may be unpredictable. Participants working in situations of greater unpredictability tend to need to exchange information quickly and make numerous adjustments to meet changing patient care needs.
- *Complexity* relates to the amount of information required to manage a patient or group of patients. For patients with multiple chronic conditions, there are increasing needs to collect and respond to more symptom, diagnostic and monitoring information. Complexity also increases with the number of participants from different organizations, professions, or geographical location that must be engaged in care activities.³⁰⁸

Figure 5. Organizational Design Framework



The second key concept shown in the middle of Figure 5 is that the capacity of the organization to provide information must match, or *fit* the demands for information by the participants carrying out the patient care activities. In other words, the designs of structures for information-processing affect the ability of the participants to get the information they need to carry out their respective patient care activities. A care coordination intervention, therefore, needs to be appropriate for the coordination problem. While there may be multiple approaches to designing a good fit between information requirements and organizational capacity, some approaches may be more cost-effective than others.³⁰⁴ Designing in more expensive forms of coordination may be necessary for the most interdependent, complex and uncertain situations as shown in Figure 6. But simpler interventions such as standardization (e.g., implementation of care pathways) may be effective enough for lower interdependence situations.

Figure 6. Schematic of relationships between situational characteristics and appropriate care coordination approaches



Thus, just as the characteristics that drive the amount, timing and types of information flow required for care activities vary by patient need and other situation characteristics, organizations can be designed with differing types of *information-processing capacity*, the third main concept shown on the right side of Figure 5. The movement of information is a function of decisions about the structure of the organization, with three main areas that designers can change: grouping of participants, structural linking between participants and operational processes, as shown in the right rounded rectangle in Figure 5.³⁰⁴ It is worth noting that these areas could easily be subsumed within the Donabedian framework's structure concept, but we have additional insight from organizational design that these particular areas relate directly to facilitating information exchanges, and therefore act as coordinating mechanisms, which in turn can be described by three areas of leverage.

- *Grouping* involves putting participants together (or separating them into units). A multidisciplinary clinic aggregates various specialties into one setting making it possible for information and patients to move more easily between physicians. For example, a patient diagnosed with prostate cancer might be rapidly seen by his primary care physician, a urologist, and a radiation oncologist to determine the best course of treatment. If physicians are practicing more independently, such coordination of visits might take longer and information flow might be less reliable. For example, consider an elderly patient diagnosed with breast cancer in a small community requiring oncology care in a distant tertiary care

hospital. She may have to coordinate the transfer of medical records and other critical health information across geographic and institutional barriers to facilitate her care. The information requirements in both situations are similar, but the organization of participants either facilitates or impedes information flow.

- Various formal mechanisms can be used to coordinate care across organizational boundaries, and are referred to as *structural linking*. Examples of these mechanisms that operate mostly at the service delivery level include designating participants as liaisons (e.g., primary care physicians often fulfill this role based on their training and professional sense of responsibility to the patient), creating a coordinating committee comprised of participants from different groups (e.g., a guidelines committee), and hiring someone into an integrator role (e.g., a case manager to facilitate efficient care for particularly complex patients). At the system level, other higher powered mechanisms might be applicable, such as addition of an organization playing an integrator role (e.g., disease management vendors), or development of management structures where participants are accountable to more than one group (e.g., employer purchasing groups exercise some authority over health care providers through voluntary quality reporting requirements, while these same providers are accountable directly to their patients).
- *Operational processes* include standardization, adjustment, monitoring and organizational support, which are defined in Table 17. For example, standardization uses formalized mechanisms that pre-specify the roles, responsibilities and activities of individuals, or specify intermediate outputs, or skill sets needed for specific activities. Practice guidelines, care maps and protocols are examples of standardization (Table 17).

Table 17. Operational processes

Operational Process	Definition	Healthcare Examples
Standardization	Formalized mechanisms that pre-specify the roles, responsibilities, and activities; the specifications of intermediate outputs; and/or the skill sets needed to perform specific activities. ^{309, 310}	- Practice guidelines - Care maps - Protocols - Clinical pathways - Checklists - CME (continuing medical education) that aims to standardize skills or knowledge
Adjustment	Mechanisms that facilitate ongoing assessment and adjustment of roles, responsibilities, and decisions among multiple participants, either between individual participants or among a designated group of participants. ^{91, 130, 141, 305, 309, 310}	- Individual performance feedback - Team meetings - Consultations - Multidisciplinary patient rounds
Monitoring	Mechanisms to facilitate timely assembly of information regarding delivery of services and changing patient care needs ⁹¹	- Planned visits - Group visits - Automated relay of clinical information from home-based monitoring devices
Organizational Supports	Resources that influence the ability of an organizations to implement coordinating mechanisms. ^{91, 310}	- Co-location of care sites - Information systems (e.g., computerized decision support systems) - Staffing decisions - Incentives

Empirical evidence from outside of health care has shown that information requirement characteristics (interdependence, uncertainty, and complexity) correlate in predictable ways to organizational capacity (coordinating mechanisms such as grouping, linking, and operational processes).¹³⁰ Applying these concepts to the health care setting is largely limited to observational studies that have yielded somewhat mixed results.^{89-91, 109, 135, 297, 309, 311, 312} Figure 6 depicts the hypothesized relationships between the underlying situation or coordination problem (square box on left side of Figure 5) and some of the coordinating mechanisms (rounded corner box on the right side of Figure 5).

Wagner’s Chronic Care Model as an Example of Organizational Design. To make some of these concepts more concrete, we describe how a commonly known model for effective chronic illness care reflects concepts of the organizational design framework. Wagner and colleagues have proposed and applied a model for that relies on “productive interactions” between an “informed, activated patient” and a “prepared, proactive practice team” to produce improved functional and clinical outcomes.¹⁸⁷ The *information processing requirements* of the patient relate to the goal of making him or her well-informed and able to process information appropriately. Similarly, the practice team must be prepared through receiving adequate information. The *information processing capacity* can be titrated to *fit* each patient-practice team dyad’s *information processing requirements*, based on a range of coordinating mechanisms all pitched under the umbrella of organization of health care in Wagner’s model.¹⁴⁹

1. Community linkages are an example of *structural linking* in the organizational design terminology, and consisted of use of a designated case manager and creating interactive web sites.
2. Self-management support takes the form of an *operational process of standardization* in the case of a tool kit with tracking forms and action plans.
3. Delivery system re-design could reflect *structural linking* when telemedicine for rural patients is implemented, or *grouping* when nurse educator is included in a planned diabetes visit, or the *operational process of monitoring* with group visits.
4. Decision support occurs as an *operational process of adjustment* in the case of a system that generates regular feedback for clinical teams on guideline compliance from registry data, or simply an *organizational support* to help facilitate other coordination mechanisms.
5. Clinical information systems also reflect an *organizational support*.

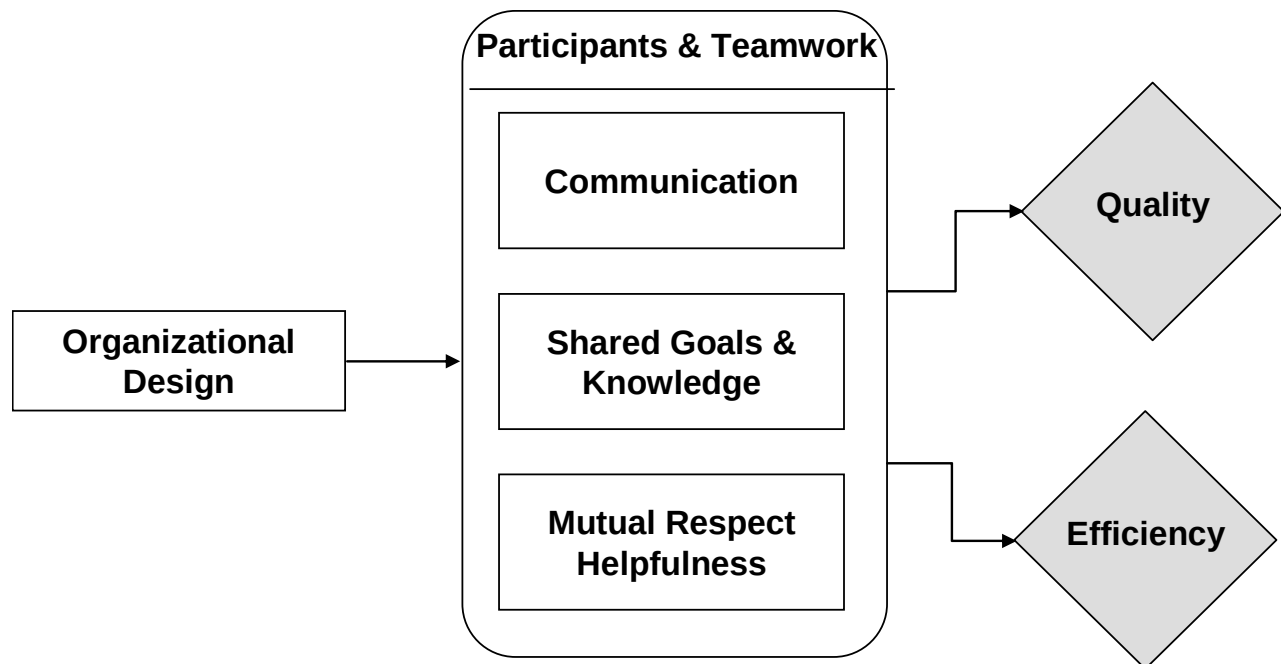
The examples provided for each of these five mechanisms come from a collaborative “Breakthrough Series” effort to innovate across 23 diverse health care organizations – including academic medical centers, community clinics, hospital-based programs, managed care, and safety net organizations.¹⁴⁹ Other examples given could also be easily mapped to the organizational design concepts.

Model 4: The Relational Coordination Framework

From the management sciences field, Jody Gittel has introduced a framework of relational coordination to understand the dynamics present in teamwork or collaboration.^{103, 104} Relational coordination aims to focus attention on relationships between participants whose awareness of the relationship of their work to the overall goals and to others involved in patient care is crucial, particularly for service organizations like health care with highly uncertain, time-sensitive, and

interdependent activities. Relational coordination is characterized (and measured) by the following: frequency, timeliness, and problem-solving aspects of communication among participants in care; helpfulness; shared goals and knowledge; and mutual respect. Gittel has conducted several studies to explore the links between relational coordination, organizational design, and performance (quality and efficiency)^{103-105, 313} Figure 7 shows Gittel's Framework of Relational Coordination, and illustrates some of the hypothesized linkages. In particular, variability in outcomes from different interventions to improve care coordination may be due in part to differences in the effectiveness of these interventions in improving relationships among interdependent clinicians.^{294, 313}

Figure 7. Relational Coordination Framework



Several studies have investigated the relational aspects of coordination. Relational coordination has been linked to higher patient-perceived quality of care and reductions in length of stay for joint arthroplasty in hospital orthopedic departments.^{104, 313} In the hospital setting, Shortell et al. found that higher reported quality of caregiver interactions in intensive care units was strongly associated with lower risk-adjusted LOS, lower nurse turnover, perceived technical quality of care, and perceived ability to meet family member needs, but was not associated with risk-adjusted mortality.¹²⁶ Studies of nurse-physician collaboration by Baggs et al, also in the intensive care setting, suggest that better interprofessional collaboration as reported by nurses may be associated with better patient outcomes³¹⁴ and provider satisfaction.³¹⁵ Finally, in a study of nurse, respiratory therapist, and physician collaboration in neonatal intensive care units, lower rates of certain morbidities were associated with higher collaboration but varied by clinician group, while lower mortality rates were associated with better respiratory therapist-reported collaboration only. When the collaborative scores of all clinician groups were evaluated simultaneously, however, the relationship between collaboration and mortality failed to reach statistical significance.¹²⁴

Summary of Concepts From Frameworks

Table 18 summarizes the concepts from the four frameworks, organizing concepts into three general areas: baseline assessment of the setting, patient population, and other factors that might influence the amount of coordination needed; coordinating mechanisms related to each framework; and outcomes aimed for in each framework. Grouping the concepts into three main analytic areas may oversimplify the potential relationships between concepts. However, for those who are designing or evaluating a new intervention to improve care coordination, we recognize the need to have an analytic framework that provides a starting point (baseline assessment of current situation—depicted in each of the included figures of the conceptual frameworks by the boxes with square corners), options for interventions (coordinating mechanisms—depicted in each of the figures by boxes with rounded corners), and outcomes to monitor (depicted by shaded diamonds). Each of the concepts from the four frameworks applies to developing or studying a given approach to care coordination.

Table 18. Summary of relationship of concepts across frameworks

Concept (Framework)	Example Corresponding Evaluation Question
<i>Baseline Assessment of Setting, Patient Population, and Other Factors</i>	
Need for Coordination (Andersen Behavioral Framework)	Is there a need for coordination perceived by one or more of the participants (service-level decisionmakers: patient, nurse, physician, social worker, case manager, etc.; system-level decisionmakers: State Medicaid director, quality improvement manager in an integrated health care organization, etc.)? Are perceptions of fragmented care similar among participants?
Predisposing Characteristics (as above Behavioral)	What characteristics are not easily amenable to change <i>and</i> might affect either perception about the need to coordinate care or coordination behaviors? Is it feasible to measure these and find out if they are indeed effecting perceptions or behaviors? Who would have the ability to make changes to these characteristics?
Enabling Resources (Behavioral)	What resources are available to make coordination easier? What resources are missing, resulting in barriers to coordination? Is it feasible to change these by an intervention or investment?
Structures of Care (Donabedian)	What care settings are relevant to coordinating care for a particular patient or panel of patients? Or group of beneficiaries or health plan enrollees?
Information Requirements (Organizational)	How are participants dependent upon each other for information? How complex are patient care activities, and what are the informational consequences? How rapidly is information needed for patient care activities? How much uncertainty is involved in patient care for the particular population of patients?
<i>Coordinating Mechanisms</i>	
Relational Coordination	How productive is communication among participants in care? Are there shared goals and knowledge? If measures of relationship coordination are low, what interventions are available to increase awareness of roles and mutual respect (e.g., enhance relational coordination)?
Organizational Design Options (Organizational)	What options are feasible for providing information processing capacity to match the requirements identified in the preceding step (e.g., enhance informational exchanges)? Is it feasible to change how the participants are grouped? What structural linking options are feasible and most likely to match the information processing requirements? What operational processes and supports would be most appropriate to change given the needs?
Coordination Processes (Donabedian)	Same as preceding two coordinating mechanism concepts, plus: What care delivery processes need to be coordinated?

Table 18. Summary of relationship of concepts across frameworks (continued)

Concept (Framework)	Example Corresponding Evaluation Question
Outcomes of Care Coordination	
Coordination of Health Services (Behavioral)	What is the evidence that participants' behaviors have coordinated care?
Patient Outcomes (Donabedian)	What improvements in patient outcomes are potentially related to coordinating mechanisms implemented or other changes in structure or enabling resources?
Coordinated Care (Organizational)	To what extent are the coordinating mechanisms congruent with the needs of the participants to achieve desired patient outcomes at a reasonable cost?

Thus, a general approach to applying concepts from theoretical frameworks involves: 1) assessment of the needs for coordination by reviewing baseline characteristics for a given practice setting and patient population, 2) identification of the options for improving coordination by reviewing potential coordination mechanisms and considering their fit with the demands of the particular circumstances, 3) selection and implementation of one of the alternatives, 4) evaluation to determine effects on coordination and outcomes of care, and 5) iteration if needed to test alternative solutions. Such application of the frameworks presented in this chapter may provide a useful way for *systems level* decisionmakers to characterize and assess specific approaches embedded in demonstration projects and used within health care delivery organizations. Likewise, the components list (described in Chapter 3) offers an approach for decomposing interventions at the *clinician-patient service delivery level*.

Measures Related to Care Coordination

Assessments of care coordination interventions report five types of measures: patient outcomes, cost outcomes, care delivery process measures, coordination mechanism measures, and patient/family perception of coordination. Both *patient and cost outcomes measures* (mortality, morbidity, functional status, costs, etc) are the end goals for improvements in care coordination. Assessing these outcomes is important in all evaluations of care coordination interventions. *Care delivery processes* generally capture the occurrence of recommended care activities that are expected to arise from appropriately coordinated work. Measures of care delivery processes are often intended to identify whether care practices (e.g., patient follow-up visits, intensification of medication) occurred in accordance with recommended guidelines.^{4, 132, 316} At the same time, they provide limited insight into the processes that facilitated the appropriate performance of these activities. In addition, guidelines upon which these measures are based are often disease-specific, and provide little information about how care is negotiated to manage multiple conditions.³¹⁷

The last two categories of measures (coordination mechanisms and patient perception of coordination) relate more specifically to care coordination.

Table 19 illustrates examples of some of these measurement tools found in the literature and how they map to concepts from the frameworks. The measures in the table are subsidiary to outcomes measures, but are important for intervention design to determine what features of a design contribute to improvements in coordination. These measures need to be used along with outcomes measures to provide a full picture of the effectiveness of a care coordination intervention. The subsequent sections highlight some of the important methodological challenges in measuring concepts specifically related to care coordination.

Coordination mechanism measures reported in the literature focus on either measurement of information exchanges, relational coordination among participants, or enabling resources present in the care setting. Information exchange and relational coordination measures ideally assess both the occurrence of information transfer among participants and recognition or awareness of relevant information by the decisionmaker. Such measures would help test whether a particular coordinating mechanism used in organizational design matched the information-processing requirements of the patient care situation. Similarly, measures of relational processes would be able to assess both the occurrence of interaction among participants, and common understanding of care activities and individual roles in delivering care to help identify issues related to relational coordination.

Direct observation of these processes poses significant methodological and data collection challenges, and indirect (but more easily gathered) measures have therefore typically been used. Measures of clinical information exchange include use of medical record audits to identify written or reported evidence of information transfer (e.g., note in medical record of physician knowledge of other physician's involvement in patient care^{96, 143}). Measures of relational processes have often relied on self-report by team members, which may or may not reflect actual collaborative practices. Further research is needed to understand how differences in perceptions of collaboration^{150, 160, 162, 314} and specific components of collaborative interactions¹³⁶ may affect delivery of care.

Development of measures for interprofessional collaboration has also generally been conducted within the acute care settings where either teams or organizational units are well-defined. More recent efforts have attempted to measure collaboration in other settings, such as integrated long-term care settings.¹²⁹ Given existing methodological and data collection challenges in measuring collaboration in well-defined units or teams, it is as yet unclear how clinician report-based measurement efforts may be extended to settings where interdependent clinicians are more loosely affiliated, not aware of one another, or not easily identified.

Patient-reported perceptions of coordination provide a proxy measure for the overall coordination performance of providers. In the setting of care transitions and often fragmented chronic illness care, patients are recognized as potentially the only "common thread" linking interdependent clinicians and settings³¹⁸ and may represent the only perspective (and data source) from which coordination of care may be measured. These measures are also more aligned with a patient-centered focus in health care quality. They can be meaningful, for example, in identifying that patients are getting conflicting advice that is not resolved (e.g., poly pharmacy). However, patients are unlikely to be aware of many of the specific activities coordinated in their care.^{94, 162} As a result, these measures may provide limited value in identifying and monitoring the specific processes that interventions to improve coordination might seek to change.

Given the relative strengths and limitations of these approaches to measurement, it seems likely that use of a combination of these measurement approaches within studies (e.g, clinician and patient report of coordination, direct and indirect measures) are needed to achieve a more comprehensive understanding of care coordination.

For example, an intervention designer testing a collaborative care model might want to use two instruments to assess the perspectives of different participants—one for the patient and another instrument for the providers of care—in order assess whether the intervention functioned as expected. Without such an assessment, it is impossible to tease apart a lack of effectiveness in achieving collaboration versus a lack of impact on patient outcomes from effective collaboration.

Thus, during the evaluation phase for a new intervention, the implementer could survey patients with Glasgow et al's "Patient Assessment of Chronic Illness Care" instrument, which includes items such as "Over the past 6 months, I was asked how my visits with other doctors were going" and "I was satisfied that my care was well organized". For members of the collaborative care team, the implementer could use or adapt the survey instrument developed by Temkin-Greener and colleagues to assess interdisciplinary team processes and performance, which includes items related to relational coordination such as "When team members talk, we understand each other," and "Others in my team have a good understanding of patient care plans and goals." If the decisionmaking between two types of team members (e.g., nurse and physician) is considered particularly important, Baggs' "Collaboration and Satisfaction About Care Decisions (CSACD)" would be another choice for an instrument. The findings from these surveys could help the intervention designer determine weaknesses in the intervention, that once ameliorated would increase the chances that the intervention would improve patient outcomes.

Table 19. Instruments and measures related to care coordination mechanisms or patient/family perception of coordination

Reference	Instruments and Measures	Objective*	Domains or Scales	Framework Concept**	Perspective
Baggs & Ryan 1990, ³¹⁹ Baggs 1992 ³¹⁴	Decisions About Transfer	To measure the collaboration and satisfaction involved with making a specific decision about a specific patient	Collaboration; Satisfaction	Relational coordination	Nurse; Physician
Baggs 1994 ³¹⁵	Collaboration and Satisfaction About Care Decisions	"To measure nurse-physician collaboration and satisfaction about care decisions in intensive care units"	Collaboration attributes (planned together; open communication; decisionmaking responsibilities shared; cooperated; nursing and medical concerns about patient's needs actively represented; decisionmaking was coordinated) Satisfaction attributes (decisionmaking process; decision)	Relational coordination	Nurse; Physician
Bonomi 2002 ¹⁸⁹	Assessment of Chronic Illness Care	"To help organizations evaluate the strengths and weaknesses of their delivery of care for chronic illness in six areas: community linkages, self-management support, decision support, delivery system design, information systems, and organization of care"; "assist teams in identifying areas for improvement for chronic illness care"	Health Care Organization; Community Linkages; Self-Management Support; Delivery System Design; Decision Support; Clinical Information Systems	Structure/Enabling Resources	Organizational Teams

Table 19. Instruments and measures related to care coordination mechanisms or patient/family perception of coordination (continued)

Reference	Instruments and Measures	Objective*	Domains or Scales	Framework Concept**	Perspective
Cassady 2000 ⁹⁴	Primary Care Assessment Tool - Child Edition	To "[assess] the adequacy of key characteristics of primary care services for children and youth"	Longitudinality - relationship; First contact - accessibility; Comprehensiveness - services available; Comprehensiveness - services provided; Coordination	Patient perception	Parent
Coleman 2005 ³¹⁸	Care Transitions Measure	To "[measure] the quality of preparation for care transitions" from the patient's perspective	Critical understanding, Preferences, Important, management preparation, Care plan	Patient perception	Patient
Cooley 2003 ⁹⁵	Medical Home Index	To "[provide] a point-in-time determination of 'medical homeness'" in pediatric primary care practices	Organizational Capacity; Chronic Condition Management; Care Coordination; Community Outreach; Data Management; Quality Improvement	Structure/Enabling Resource	Lead physician; Staff member; Site visit; interview
Fletcher 1984 ⁹⁶	No name (chart review measure)	"To develop a measure of [the process of integrating various episodes of care]"	Continuity; Coordination	Information exchange	Medical record
Flocke 1997 ⁹⁸	Components of Primary Care Index	"To measure seven key aspects of the delivery of primary care from the perspective of patients visiting their family physician"	Interpersonal communication; Physician's accumulated knowledge of the patient; Coordination of care; Patient's preference for their regular physician	Patient perception	Patient
Glasgow 2005 ¹⁰⁶	Patient Assessment of Chronic Illness Care	"To assess the extent to which patients with chronic illness receive care that aligns with the Chronic Care Model"	Patient Activation; Delivery System Design / Decision Support; Goal Setting; Problem-solving / Contextual Counseling; Follow-up / Coordination	Patient perception	Patient

Table 19. Instruments and measures related to care coordination mechanisms or patient/family perception of coordination (continued)

Reference	Instruments and Measures	Objective*	Domains or Scales	Framework Concept**	Perspective
Grimmer 2001 ³²⁰	“PREPARED” (Prescriptions, Ready to re-enter community, Education, Placement, Assurance of safety, Realistic expectations, Empowerment, Directed to appropriate services)	"To gather information on community stakeholder perceptions of the quality of the process and outcome of discharge planning activities undertaken in the acute hospital setting."	Process domains: information exchange; receipt of medication information; preparation for coping post-discharge; control of discharge circumstances	Patient perception	Consumers
Hojat 1999 ¹⁶¹	Attitude scale measuring physician-nurse collaboration (revised Jefferson Survey of Attitudes Toward Physician-Nurse Collaboration)	To "[measure] attitudes toward physician-nurse collaboration"	Shared educational and collaborative relationships; Caring as opposed to curing; Nurse's autonomy; Physician's authority;	Relational coordination	Nurse; Physician
McGuiness & Sibthorpe 2003 ¹¹⁹	Client Perceptions of Coordination Questionnaire	To measure patient perceptions of coordination of care, involving multiple services delivered by different agencies over time	Identification of need; Access to care; Patient participation; Patient-provider communication; Inter-provider communication; Global assessment of care coordination	Patient perception	Patient
Morita 2004 ³²¹	Care Evaluation Scale	"To [directly measure] the bereaved family's perception of the necessity for improvement in structural/procedural aspects of palliative care"	Subscales: Physical care (by physician, by nurse); psycho-existential care; help with decisionmaking (for patient, for family); environment; family burden; cost; availability; coordination and consistency	Patient perception	Family

Table 19. Instruments and measures related to care coordination mechanisms or patient/family perception of coordination (continued)

Reference	Instruments and Measures	Objective*	Domains or Scales	Framework Concept**	Perspective
Radwin 2003 ³²²	Oncology Patients' Perceptions of the Quality of Nursing Care Scale	To "[measure] the quality of cancer nursing care from the patient's perspective"	Responsiveness, Individualization, Coordination, Proficiency	Patient perception	Patient
Safran 1998 ³²³	Primary Care Assessment Survey	To operationalize and measure primary care performance	Accessibility, Continuity; Comprehensiveness; Integration; Clinical Interaction; Interpersonal Treatment; Trust	Patient perception	Patient
Shortell 1991 ³²⁴	ICU Nurse-Physician Collaboration Questionnaire	To examine perceptions of nurses and physicians on collaborative interactions in an intensive care unit	Coordination	Relational coordination	Nurse; Physician
Starfield 1979 ¹²⁸	No name	"To determine the extent to which the medical record contained evidence of coordination of care"	Leadership; Organizational culture; Communication; Coordination; Problem solving/conflict management; Team cohesiveness	Information exchange	Medical record; Direct observation
Temkin-Greener 2004 ¹²⁹	Interdisciplinary team performance in LTC and PACE settings	To "[assess] interdisciplinary team performance in long-term care settings"	Leadership; Communication; Coordination; Conflict Management; Team cohesion; Perceived Team Effectiveness	Relational coordination	Care Team Members
Weiss 1985 ¹⁵⁶	Collaborative Practice Scales	"To assess the degree to which the interactions of nurses and physicians enable synergistic influence of patient care"	Nurse scale factors: direct assertion of professional expertise/opinion; active clarification of mutual responsibilities in patient care; Physician scale factors: acknowledgement of nurse's contribution to patient care, consensus development with nurses regarding mutual responsibilities and patient care goals	Relational coordination	Nurse; Physician

Table 19. Instruments and measures related to care coordination mechanisms or patient/family perception of coordination (continued)

Reference	Instruments and Measures	Objective*	Domains or Scales	Framework Concept**	Perspective
Zillich 2005 ¹⁵⁴	Physician-Pharmacist Collaboration Instrument	"To measure physicians' views of physician-pharmacist collaborative relationships"	Initial instrument: Collaborative Care; Commitment; Dependence Symmetry; Bidirectional communication; Trust; Initiating behavior; Conflict resolution. Refined instrument: Trustworthiness; Role Specification; Relationship Initiation	Relational coordination	Physician

*Some objectives do not explicitly describe a care coordination element, but the assessment instrument includes questions about care coordination.

**The developers of the instruments do not describe their measures in terms of concepts from the frameworks evaluated in this Chapter. We have reviewed their questions or instrument response items, and provide a rough categorization that reflects the majority of the questions pertinent to coordination. If instrument items focus on understanding of participants' roles and teamwork, we use the category "Relational coordination" based on Gittell's model. If the instrument items relate to the flow of information, then we use the category "Information exchange" based on the organizational theory framework. Two instruments assesses structures of care and resources available, and is categorized accordingly. The remaining measures focus on patient perceptions of coordination (as well as other areas of care in many cases).

5D. Summary Answers to Key Questions

Research Question 8: What Concepts Are Important To Understand and Relate to Each Other for Evaluations of Care Coordination? What Conceptual Frameworks Could be Applied To Support Development and Evaluation of Strategies To Improve Care Coordination?

We identified four well-established frameworks that complement each other in terms of developing and studying care coordination interventions and programs. Taken together, the frameworks include a dozen concepts generally fitting into one of three domains: baseline assessment of the specific patient care situation, coordination mechanisms, and outcomes of care. The exact relationships between concepts (e.g., how much of the variation in use of health services is explained by enabling resources like availability of a clinic) is fairly well-developed for the original specification of the frameworks; however extensions of these frameworks to care coordination (e.g., how much of the variation in care coordination behaviors by the participants is related to predisposing characteristics like attitude toward collaboration) will need to be studied carefully.

These frameworks for care coordination provide evaluators of new interventions with a guide to understanding the relationships and connections between an intervention and patient outcomes. Developers and evaluators of interventions to improve coordination need to ask:

- What are the coordination needs related to patient care? At the service level, this might entail an initial assessment of an individual patient that determine what needs to be coordinated based on the level of complexity and uncertainty related to the patient's clinical condition, insurance coverage, preferences, family support and other situation-specific factors. At the system level, this question could be posed for a population with an assessment of the range of coordination needs anticipated.
- Who are the participants in care, and how are they dependent on each other for a given care situation? At the service level, the participants might be a primary care physician, office staff, and an adult patient who has several chronic illnesses and is also seeing two specialists. At the system level, care of a targeted group of high cost Medicare beneficiaries may include numerous participants, with varying levels of dependence on each other for information and services.
- What are the enabling factors already in place (e.g., personnel resources, information systems)? Does the intervention or a part of it aim to add a new enabler (e.g., quality improvement strategy such as provider reminders) expected to improve coordination?
- What are the predisposing factors that influence the motivation of those involved in coordination (e.g., attitudes, incentives)?
- How is the intervention expected to change the coordination process of informational exchange? In other words, how does the intervention movement of necessary information across interfaces, such as different settings of care?
- How is the intervention expected to change the coordination process of relational awareness? In other words, what does the intervention do to improve participant's understanding of the relationship of one individual's work to the overall goals and to that of others involved in patient care?
- How are the interactions of these factors and coordination processes expected to affect clinical processes and patient outcomes (e.g., what is the hypothesis about why the intervention will work)?

Research Question 9: What Measures Have Been Used To Assess Care Coordination?

Studies of care coordination have evaluated patient outcomes, including changes in mortality, symptoms, unemployment, staying connected to services, and adherence to medication. Cost and utilization outcomes, including hospitalizations, emergency department visits, and clinic visits were included in a number of studies. Also, patient and family satisfaction were reported in some instances.

We also separately searched the literature for instrument development related to care coordination, and found 20 instruments and approaches. About half of the instruments are targeted at patient and family members, and ask about perceptions of care, including items about coordination (e.g., "treatment was planned with appropriated considerations of previous course

of the disease”³²¹ “told me which nurse was primarily responsible for coordinating my care”).³²² Two of the instruments derive their data from chart reviews to assess the information exchanged between physicians. Seven instruments survey physicians or members of a defined care team to assess collaboration and teamwork processes and performance. Two instruments evaluate resources and structures (e.g., community linkages) that support care coordination. One of these instruments is for systems that care for adults with chronic illness, and the other is for primary care practices that have adopted a “medical home” approach to pediatric care.

The measurement field related to care coordination is in the early phases of its development. It is as yet unclear what approach or combination of approaches to measurement will adequately capture the processes driving an intervention’s effect, particularly outside well-defined care settings, where the challenges for coordination are most salient to the patient and families.

Research Question 10: How do These Frameworks Relate to Quality Improvement Strategies Evaluated in the Previous Closing the Quality Gap Series Reports?

The IOM Priorities Report⁶ highlighted care coordination as a cross-cutting topic, meaning that it related to the other areas prioritized for national action. As a result, the relationship between the conceptual frameworks for care coordination and our previous work on quality improvement strategies for some of the IOM priority conditions (e.g., hypertension, diabetes, asthma, etc.) merits some exploration. The quality improvement strategies evaluated in the previous reports from our Closing the Quality Gap series include patient education, self management, provider education, provider reminders, audit and feedback, relay of clinical data, organizational change (including disease management and case management), financial and regulatory incentives and are relevant to care coordination.³²⁵ Most of these strategies have been shown to improve health outcomes in randomized controlled trials or other fairly rigorous comparative study designs. They are often used in packages of several strategies together, so assessing the essential component or components is often not feasible.

These strategies share the objective of improving care through changing patient, provider or organizational behavior. To the extent that they influence behavior, they are most easily mapped into the Andersen behavior framework as changes to predisposing or enabling factors (e.g., financial incentives to alter a predisposing characteristic—one’s underlying motivation, or provider education to enhance skills as an enabling resource for improving quality of care). In addition, many of the strategies relate to the organizational design and relational coordination frameworks (e.g., provider reminders as an operational process that improves information transfer; patient education and self-management aimed at enhancing communication between patient and physician). Finally, the organizational change quality improvement strategies are synonymous with care coordination interventions (e.g., case management, disease management, creation of multidisciplinary teams), based on our working definition.

Chapter 6. Conclusions

This Report describes definitions, ongoing programs, systematic reviews of interventions, and conceptual frameworks related to care coordination. The field of care coordination may be thought of narrowly or broadly. Based on discussions with decisionmakers with diverse views of the field, we decided that an important first step in building an evidence base related to care coordination required an overview approach instead of a targeted literature review of primary studies representing only a slice of the full picture. For example, some decisionmakers are particularly interested in the role of self-management in coordinating and improving health care, while others are interested in specific approaches such as disease management. All agree, however, that care coordination needs to be defined in order to assemble pertinent evidence, that a critical analysis of evidence from systematic reviews related to care coordination would reflect the IOM's categorization of care coordination as a cross-cutting priority applicable to many health conditions and situations, and that more conceptual thinking could help guide the design and evaluation of care coordination programs and interventions. Our goal was to address these common interests, summarize findings of relevance now to both service level and system level decisionmakers, and recommend future research resulting from our work.

Improving Care Coordination

Our findings highlight the need for reaching consensus on definitions, conceptual models, and outcome measures related to care coordination and the necessity of continued research to evaluate the value of different coordination efforts. While the research community responds to these needs, patients and providers recognize that improved coordination is an immediate and urgent problem. The 2006 Commonwealth Fund survey reported that 92% of patients felt that it was “somewhat” or “very important” to have one doctor, or one place, responsible for primary care and coordinating care and 96% percent of patients said it was “somewhat” or “very important” that care from different doctors be well coordinated.³²⁶ Physicians surveyed by the Commonwealth Fund in 2003, indicated that patient medical records, tests, or other relevant clinical information were not available at the time of scheduled patient visits 72% of the time and only 34% of physicians reported receiving timely information about referrals.³²⁷ How does this report inform the patients, providers, and system level decisionmakers in today's healthcare system?

We found that care coordination interventions improved important patient outcomes in different diseases across a broad spectrum of clinical settings. Systematic reviews provided evidence of benefit with multidisciplinary teams (including those involved in assertive community treatment, collaborative care, shared primary-specialty care and other arrangements), case management, and disease management. Multidisciplinary team interventions have been shown to reduce mortality and dependency in stroke patients; reduce mortality and hospital admissions in heart failure patients; improve service continuity for severely mentally ill patient; and reduce symptoms for terminally ill patients. Some evidence suggests that a deliberate effort to coordinate among team members (e.g., regular meetings) is a determinant of improved outcomes.²¹⁹ Case management as a care coordination strategy appears to improve patient outcomes for patients who have mental health problems, heart failure or diabetes. Close patient monitoring was identified as an important component in two reviews.^{233, 269} Disease

management programs with coordination elements also appear to be effective in improving patient outcomes, especially for patients with depression or diabetes. While these and other care coordination interventions have been reported in systematic reviews covering other coordination challenges (e.g., transitions of care, other diseases, and specific patient populations such as the elderly or homeless people), there is insufficient evidence to draw any conclusions in these other instances.

Reviewing the literature from the perspective of the patient, the provider (or service delivery level) and the system level decisionmaker provides some guidance for the immediate future. From the perspective of system level decisionmakers, probably the most important lesson from the literature reviewed is that the current evidence does not support one single model of coordination. The lack of consensus regarding definitions and measures, and the paucity of data on the cost effectiveness of different interventions, limits the ability to compare the value of different care coordination efforts. Policymakers and decisionmakers at the system level must exercise caution before investing significant resources to support interventions without evidence demonstrating their value, despite the fact that these interventions may seem to “just make sense.” In the absence of strong evidence supporting specific coordination interventions, system level decisionmakers should consider supporting pilot programs while awaiting the results of larger, national studies such as the Medicare Coordinated Care and the Physician Group Practice Demonstration projects.

From the perspective of the patient, the literature reviewed provides some information for specific patient populations. For patients with congestive heart failure, the evidence supports enrollment in some type of coordinated care program (disease management, multidisciplinary team care, or case management). The majority of the reviews support formal coordinated care programs for patients with diabetes mellitus, depression, and other mental health illnesses. Patients hospitalized with acute stroke benefit from teams which coordinate discharge planning and postdischarge treatment plans. Patients in these clinically defined populations should consider care coordination programs as one element of evidence based therapy in their treatment regimens.

The evidence is not as clear for other patient populations that have obvious coordination needs, such as patients with multiple complex medical problems, the frail elderly living independently, patients transferring between care settings, or physically disabled persons. There are many models of care for these populations but few systematic reviews demonstrating the benefit of one coordination intervention over an alternative. However, these patients’ needs are real and immediate and they must navigate today’s health care system, while awaiting overall improvements in care coordination at the system level. For these patients identifying the components of coordinated care and adopting features of care coordination which can be initiated by the patient and caregivers may offer some assistance to their immediate needs.

Providers and decisionmakers at the health service delivery level are caring for patients with increasing needs for coordination services in a system that is progressively becoming more fragmented. Physicians perceive that time constraints are a major barrier to patient care.³²⁸ Coordinating care for patients takes time; time that is typically not reimbursed. As the population ages, as the number of people with multiple chronic medical problems increases, and as patients see more doctors and receive care at a greater number of healthcare settings, the need to coordinate care will continue to increase. This increase in need is occurring in an environment in which cost containment efforts result in decreased access to social support

services. While the need for coordination increases, healthcare providers frequently lack the infrastructure and resources to respond to their patient's needs.

Some components of care coordination can be adopted by providers at minimum cost. Routinely assessing coordination needs for patients at high risk may offer an opportunity to proactively address a need and avert a potential problem, e.g., notifying a family member to anticipate that the patient will need extra help at home following a scheduled hospital admission may prevent a delay in hospital discharge. Communication between providers and between care settings is a major problem and providers can assume the responsibility that referral letters and discharge summaries are sent in a timely manner. The current lack of interoperable electronic medical records greatly complicates this problem. Providers should also consider establishing communication links with community services and maintaining an inventory of these services. Providers should enroll willing patients in established care programs in which the evidence demonstrates improved outcomes, e.g., patients with CHF should be encouraged to enroll in coordinated care programs. As research in this field evolves, providers can work collaboratively with system level decisionmakers to adopt care coordination models that have demonstrated improved patient outcomes.

The table below lists suggestions to improve care coordination from the perspective of the patient, the provider, and the decisionmaker at the system level. Where the evidence exists based on systematic reviews, that information is presented and noted explicitly as evidence-based using bold-faced type. Many of the other approaches to improving care coordination are drawn from various intervention activities encountered in the research for this report, and should not be construed as having clear evidence of a benefit. They are selected as activities that can be done in a short time frame and possibly with minimal resources. This table is designed to help those who ask, "What can I do today to improve coordination for myself, my family or my patients?"

Table 20. Suggested approaches for improving care coordination

Coordination Component	Patient	Provider	System
Identification and assessment of need for coordination services	- Patients or caretakers should tell providers about their level of confidence related to coordinating various care services and when transferring care between settings - Some patients will benefit from care coordination interventions tailored to specific diseases (CHF, DM, depression, mental illness), and should ask their health plan or physician about these services	- Identify patients who are likely to have increased needs for coordination (complex medical or social problems, multiple healthcare providers involved in care, services received at multiple sites, and patients with specific diseases such as CHF, DM, and depression, mental illness) - Assess medical and social services required for care (consider geriatric assessment in high risk populations)	Alert providers to patients with patterns of high service utilization (ED visits, hospitalizations, pharmacy usage, outpatient visits)
Role identification in care coordination	- Patient identifies family, friends, caregivers and medical providers who are part of the patient's medical "home" and ensures that the principal source of care is aware of all members in the home. - If the patient is unable to participate with care coordination activities, an alternative caregiver should be identified and the patient must document his/her permission for the caregiver to receive medical information on behalf of the patient	- With the patient, identify which clinician is the principal source of care - Identify the healthcare team members who will be responsible for coordinating services and communicating with the patient and make sure everyone understands their distinct roles	Ensure providers have knowledge of available resources for specific patient populations (case managers, social workers, disease management programs) and how to access these resources
Care planning	Patient and family communicate with principal source of care to identify healthcare priorities (these may differ from provider identified priorities)	- Coordinate care plans and ensure that plans do not conflict, e.g., patients with CHF and severe COPD who receive beta blocker prescriptions for treatment of CHF by one physician but are instructed by another physician to avoid beta blockers because of their COPD - Develop clear follow-up plans	Partner with clinicians to provider care planning tools and infrastructure (decision support, standard templates, etc)

Table 20. Suggested approaches for improving care coordination (continued)

Coordination Component	Patient	Provider	System
Communication	Active participation in communication: know how to contact principal source of care, call prior to scheduled visits to ensure necessary information is available to clinicians (especially when being referred to another provider)	- Improve information exchange between providers and between settings. Provide patient education and communicate clearly regarding goals of referrals - Pre-appointment management: clinic staff ensure necessary medical records are available in advance of scheduled appointments - Consider increased use of telephone and electronic information transfer to communicate with patients	Support timely distribution of accurate information (decreased transcription turnaround time, increased use of fax/electronic transfer of information) Identify unreliable information transfer points (hospital discharge, communication between community services and medical providers, etc) and test approaches (potentially based on organizational design concepts in Chapter 5) to improve information exchange at those points
Implementation of coordination interventions	- Patients with CHF should strongly consider enrolling in established disease management/care coordination programs if these programs are available - Patients with DM or depression should consider enrolling in these programs - Patients with mental illness may wish to consider enrollment in a care management program although the design of the program appears to be of greater importance than in the other disease specific programs reviewed in Chapter 4	- Consider linking patients with care coordination programs or participating in team/collaborative approaches that show improved outcomes from systematic review evidence (see tables in Chapter 4 for CHF, DM, mental illness, including depression) - Patients hospitalized with CVA should receive consultation with coordinated care programs if available	Offer care coordination programs (including ongoing evaluations if possible) for clinical areas with more evidence (see tables in Chapter 4 for CHF, DM, mental illness, including depression, patients hospitalized with CVA)
Monitoring coordinating activities	Patient and family/caretaker communicate satisfaction or problems with coordinating efforts	Care coordinator (case manager, MD, advanced practice RN) identify strengths or barriers to coordination efforts	

Boldface type indicates evidence-based interventions, and regular type indicates that the suggestion is based on current efforts, but has not been evaluated in systematic reviews.

Recommendations for Future Research

From our literature review, it is clear that future studies evaluating the effectiveness of care coordination interventions should explicitly define the care coordination intervention being evaluated. Much related terminology lacks standard definitions, leading to confusion about whether various approaches work. Furthermore, details of the specific interventions should be provided to enable comparisons and synthesis across studies. Further research should include analyses of the effects of specific care coordination components (e.g., mechanisms of coordination, task-specific characteristics) to determine if any particular component affects the effectiveness of the intervention.

Similarly, more research is needed to develop an understanding of conceptual frameworks to guide reporting of key variables. At this point, systematic reviewers have not been able to adopt a standard approach to evaluating care coordination interventions. Often this information is missing from the primary studies as well. Ideally, investigators would want to know what to describe and assess, and further theoretical work in this area may be helpful. Organizational theory suggests that this detail is vital to properly design interventions and programs that match the information-processing demands of the specific situation. The purpose of our review of several theories (Chapter 5) was to show the relevance of models from different fields to care coordination interventions. For example, there is no doubt interplay between patient need for coordination, level of fragmentation present in a particular setting, and any coordination intervention, but what is the best approach to conceptualize and study such interactions? More research is needed to determine theories that will be potentially useful to care coordination intervention design.³²⁹

Concurrently with theoretical work, since some argue that the need for it in this area is unproven,³³⁰ other research methods might be used to reach consensus about a common set of components that should be described any time an evaluation of a care coordination intervention is reported. We developed both a working definition and a list of components of care coordination to facilitate our review and analysis. The working definition allowed us to capture a broad range of interventions. We found application of the components list difficult due to the limited level of detail available in the systematic reviews. Future research might map the components from our list or that of others to interventions described in primary studies in order to define a common list, and to determine inter-rater reliability.

Determining the effectiveness of care coordination also requires more research on measures of care coordination. Assessing whether an intervention improves patient outcomes or lowers costs is the main goal of effectiveness studies. However, other coordination-oriented measures such as those that assess relational coordination, information exchange, enabling resources, and patient perceptions of coordination are important for refining interventions when they do not work. More research is needed on the validity of these measures, and about the relationship of these coordination-centric measures to outcomes of care. In addition, new measures need to be developed for areas that are not yet covered adequately (e.g., patient utilities/preferences for coordination, intensity of intervention).

Much of the work related to care coordination occurs outside of the research paradigm. Further research on observational study designs appropriate for this area is needed, and could build upon work in quasi-experimental methods, including those applied in this field.⁵⁹ The evaluations of the Medicare demonstration projects look promising and include rigorous experimental and observational designs. Smaller-scale quality improvement efforts may lack

appropriate control groups for meaningful evaluations, and yet, development of methods to learn more from practical implementations seems particularly important for the area of care coordination.

Another promising area for additional research is to test whether interventions that work in one setting are applicable to another setting. Some of the lessons learned in one clinical domain (e.g., geriatric evaluation and management approach, comprehensive community-based treatment programs for the mentally ill) may be relevant to other areas (e.g., stroke patients, children with special needs). Our review of systematic reviews offers a list of possible interventions, many of which are currently used more intensively in specific clinical domains.

Finally, there is limited information at the systematic review level for some clinical domains and some types of interventions. It is likely that primary studies have been conducted on coordination of care for children with special needs, but the systematic review literature has not addressed this area yet.* Other areas may be lacking primary studies, though ripe for future research and even new approaches. For example, a recent study applied complexity science to identify coordination issues (e.g., difficulties encountered by a complex pediatric patient and family when a CT scan appointment was cancelled) and develop potential solutions (e.g., foster relationships between families and schedulers to support contingency planning when emergency scans displace scheduled appointments).³³¹

The study of care coordination is challenging. Nonetheless, the impressive improvements in outcomes that were documented in the systematic reviews included in our report indicate that care coordination can work, and that appropriately designed studies can identify these improvements.

* Paul Wise and colleagues from the Stanford-UCSF Evidence-based Practice Center have prepared a White Paper for AHRQ on Care Coordination in Children with Special Health Care Needs, which will be published soon and will help fill this gap.

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List of Acronyms/Abbreviations

Acronyms/Abbreviations	Definition
AAFP	American Academy of Family Physicians
ACP	American College of Physicians
ACT	Assertive Community Treatment
AGS	American Geriatric Society
BIPA	Medicare Benefits Improvement and Protection Act
CBA	Controlled Before-After
CCHT	Coordination/Home Telehealth
CI	Confidence interval
CINAHL®	Cumulative Index to Nursing and Allied Health®
CMS	Centers for Medicare and Medicaid Services
CMSA	Case Management Society of America
DMAA	Disease Management Association of America
EPC	Evidence-based Practice Center
GHb	Glycated hemoglobin
GRACE	Geriatric Resources for Assessment and Care of Elder
HAPI	Health and Psychological Index
IOM	Institute of Medicine
ICU	Intensive care unit
ITS	Interrupted Time Series
JCAHO	Joint Commission on Accreditation of Healthcare Organizations
LOS	Length of Stay
LTC	Long-term care
MHSO	Medicare Health Support Organizations
MMA	Medicare Prescription Drug, Improvement, and Modernization Act
NCQA	National Committee for Quality Assurance
NQF	National Quality Forum
OR	Odds ratio

PACE	Program of All-Inclusive Care for the Elderly
RCT	Randomized Controlled Trial
ROI	Return on Investment
RR	Risk ratio
SGIM	Society of General Internal Medicine
S/HMO	Social Health Maintenance Organization
URAC	Utilization Review Accreditation Commission
VA	Department of Veterans Affairs

APPENDIXES:

to

“Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies, Volume 7—Care Coordination”

**Prepared by the Stanford University-UCSF
Evidence-based Practice Center
(Contract #290-02-0017)**

Appendix A: Exact Search Strings

Medline® Database Search

#1: Targets articles addressing care coordination

"Coordinated care" OR "care coordination" OR "collaborative care" OR "integrated care" OR "shared care" OR "transitional care" OR "comanagement" OR "case management" OR "synchronized care" OR "interdisciplinary care" OR "disease management" OR "Progressive Patient Care"[MeSH] OR "Continuity of Patient Care"[MeSH] OR "Patient-Centered Care"[MeSH] OR "Patient Care Planning"[MeSH] OR "Disease Management"[MeSH] OR "Delivery of Health Care, Integrated"[MeSH] OR (care AND (integrat* OR collaborat* OR coordinat* OR transition* OR interdisciplin* OR shared OR comanagement OR cooperat* OR aftercare OR interinstitution* OR synchron* OR harmon* OR manage*))

#2: Targets systematic reviews

((meta-analysis [pt] OR meta-analysis [tw] OR metanalysis [tw]) OR ((review [pt] OR guideline [pt] OR consensus [ti] OR guideline* [ti] OR literature [ti] OR overview [ti] OR review [ti] OR Decision Support Techniques [mh]) AND ((Cochrane [tw] OR Medline [tw] OR CINAHL [tw] OR (National [tw] AND Library [tw]))) OR (handsearch* [tw] OR search* [tw] OR searching [tw]) AND (hand [tw] OR manual [tw] OR electronic [tw] OR bibliographi* [tw] OR database* OR (Cochrane [tw] OR Medline [tw] OR CINAHL [tw] OR (National [tw] AND Library [tw])))) OR ((synthesis [ti] OR overview [ti] OR review [ti] OR survey [ti]) AND (systematic [ti] OR critical [ti] OR methodologic [ti] OR quantitative [ti] OR qualitative [ti] OR literature [ti] OR evidence [ti] OR evidence-based [ti])) BUTNOT (case report [mh] OR case* [ti] OR report [ti] OR editorial [pt] OR comment [pt] OR letter [pt])

#3: Targets systematic reviews addressing care coordination

#1 and #2

#4: Limits articles found through search #3 to humans and English Language

#3 limited to English, Human

Cumulative Index to Nursing and Allied Health (CINAHL®) Database Search

NOTE: Searching the CINAHL® database required searching for different time frames as shown below. This search was updated to November 15, 2006.

#1: Targets disease management specific articles (1982 to May Week 2, 2005)

-
- 1 "Continuity of Patient Care"/ or Case Management/ or care coordination.mp. (8222)
 - 2 *"Continuity of Patient Care"/ (999)
 - 3 exp *"Continuity of Patient Care"/ (1825)
 - 4 3 (1825)
 - 5 limit 4 to research (560)

6 exp research/ or study design/ (300305)
 7 5 and 6 (526)
 8 ("coordinated care" or "uncoordinated care").mp. [mp=title, subject heading word, abstract, instrumentation] (120)
 9 ("discontinuity of care" or "transfer of responsibility" or "documentation of follow-up" or "documentation of followup").mp. [mp=title, subject heading word, abstract, instrumentation] (44)
 10 ("handoff" or "consults" or referral or "information transfer" or "telephone care" or "care coordination" or "discharge planning").mp. [mp=title, subject heading word, abstract, instrumentation] (11922)
 11 ("collaborative care" or "integrated care" or "shared care" or "transitional care" or "comanagement" or "synchronized care").mp. [mp=title, subject heading word, abstract, instrumentation] (1991)
 12 ("interdisciplinary care" or "disease management" or "case management").mp. [mp=title, subject heading word, abstract, instrumentation] (9912)
 13 case management/ or progressive patient care/ (6366)
 14 continuity of patient care/ (2086)
 15 case management/ or patient centered care/ (8850)
 16 Nursing Care Plans/ or patient care planning.mp. (2033)
 17 Health Care Delivery, Integrated/ (952)
 18 (care and (integrat\$ or collaborat\$ or coordinat\$ or transition\$ or interdisciplin\$ or shared or comanagement or cooperat\$ or aftercare or interinstitution\$ or synchron\$ or harmon\$ or manage\$)).mp. [mp=title, subject heading word, abstract, instrumentation] (60301)
 19 1 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 (76912)
 20 limit 19 to research (22658)
 21 1 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (28054)
 22 limit 21 to research (8216)
 23 ("care coordination" or "coordinated care" or "uncoordinated care" or "discontinuity of care" or "transfer of responsibility" or "documentation of followup" or "documentation of follow-up").m_titl. (114)
 24 (handoff or referral or consults or "information transfer" or "telephone care" or "collaborative care" or "integrated care" or "shared care" or "transitional care" or "synchronized care" or comanagement or "interdisciplinary care").m_titl. (1203)
 25 ("discharge planning" or "case management" or "disease management").m_titl. (3528)
 26 *"Continuity of Patient Care"/ or *"Health Care Delivery, Integrated"/ or *"Case Management"/ or *"Progressive Patient Care"/ or *"Patient Centered Care"/ (7733)
 27 *"Nursing Care Plans"/ or *"Patient Care Planning"/ (560)
 28 23 or 24 or 26 (8901)
 29 limit 28 to research (1616)
 30 25 or 27 (4081)
 31 limit 30 to research (741)
 32 31 not 29 (383)
 33 from 32 keep 1-383 (383)

#2: Targets case management specific articles (1982 to May Week 2, 2005)

- 1 "Continuity of Patient Care"/ or Case Management/ or care coordination.mp. (8222)
- 2 *"Continuity of Patient Care"/ (999)
- 3 exp *"Continuity of Patient Care"/ (1825)
- 4 3 (1825)
- 5 limit 4 to research (560)
- 6 exp research/ or study design/ (300305)
- 7 5 and 6 (526)
- 8 ("coordinated care" or "uncoordinated care").mp. [mp=title, subject heading word, abstract, instrumentation] (120)
- 9 ("discontinuity of care" or "transfer of responsibility" or "documentation of follow-up" or "documentation of followup").mp. [mp=title, subject heading word, abstract, instrumentation] (44)
- 10 ("handoff" or "consults" or referral or "information transfer" or "telephone care" or "care coordination" or "discharge planning").mp. [mp=title, subject heading word, abstract, instrumentation] (11922)
- 11 ("collaborative care" or "integrated care" or "shared care" or "transitional care" or "comanagement" or "synchronized care").mp. [mp=title, subject heading word, abstract, instrumentation] (1991)
- 12 ("interdisciplinary care" or "disease management" or "case management").mp. [mp=title, subject heading word, abstract, instrumentation] (9912)
- 13 case management/ or progressive patient care/ (6366)
- 14 continuity of patient care/ (2086)
- 15 case management/ or patient centered care/ (8850)
- 16 Nursing Care Plans/ or patient care planning.mp. (2033)
- 17 Health Care Delivery, Integrated/ (952)
- 18 (care and (integrat\$ or collaborat\$ or coordinat\$ or transition\$ or interdisciplin\$ or shared or comanagement or cooperat\$ or aftercare or interinstitution\$ or synchron\$ or harmon\$ or manage\$)).mp. [mp=title, subject heading word, abstract, instrumentation] (60301)
- 19 1 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 (76912)
- 20 limit 19 to research (22658)
- 21 1 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (28054)
- 22 limit 21 to research (8216)
- 23 ("care coordination" or "coordinated care" or "uncoordinated care" or "discontinuity of care" or "transfer of responsibility" or "documentation of followup" or "documentation of follow-up").m_titl. (114)
- 24 (handoff or referral or consults or "information transfer" or "telephone care" or "collaborative care" or "integrated care" or "shared care" or "transitional care" or "synchronized care" or comanagement or "interdisciplinary care").m_titl. (1203)
- 25 ("discharge planning" or "case management" or "disease management").m_titl. (3528)
- 26 *"Continuity of Patient Care"/ or *"Health Care Delivery, Integrated"/ or *"Case Management"/ or *"Progressive Patient Care"/ or *"Patient Centered Care"/ (7733)
- 27 *"Nursing Care Plans"/ or *"Patient Care Planning"/ (560)
- 28 23 or 24 or 26 (8901)
- 29 limit 28 to research (1616)

- 30 25 or 27 (4081)
- 31 limit 30 to research (741)
- 32 31 not 29 (383)
- 33 from 32 keep 1-383 (383)
- 34 29 and 31 (358)
- 35 from 34 keep 1-358 (358)

#3: Targets articles that have the term “care coord” in title/abstract (2003 to 2005)

(NOTE: Searches 3, 4, 5 and 6 are the same except for the years searched)

-
- 1 "Continuity of Patient Care"/ or Case Management/ or care coordination.mp. (8222)
 - 2 *"Continuity of Patient Care"/ (999)
 - 3 exp *"Continuity of Patient Care"/ (1825)
 - 4 3 (1825)
 - 5 limit 4 to research (560)
 - 6 exp research/ or study design/ (300305)
 - 7 5 and 6 (526)
 - 8 ("coordinated care" or "uncoordinated care").mp. [mp=title, subject heading word, abstract, instrumentation] (120)
 - 9 ("discontinuity of care" or "transfer of responsibility" or "documentation of follow-up" or "documentation of followup").mp. [mp=title, subject heading word, abstract, instrumentation] (44)
 - 10 ("handoff" or "consults" or referral or "information transfer" or "telephone care" or "care coordination" or "discharge planning").mp. [mp=title, subject heading word, abstract, instrumentation] (11922)
 - 11 ("collaborative care" or "integrated care" or "shared care" or "transitional care" or "comanagement" or "synchronized care").mp. [mp=title, subject heading word, abstract, instrumentation] (1991)
 - 12 ("interdisciplinary care" or "disease management" or "case management").mp. [mp=title, subject heading word, abstract, instrumentation] (9912)
 - 13 case management/ or progressive patient care/ (6366)
 - 14 continuity of patient care/ (2086)
 - 15 case management/ or patient centered care/ (8850)
 - 16 Nursing Care Plans/ or patient care planning.mp. (2033)
 - 17 Health Care Delivery, Integrated/ (952)
 - 18 (care and (integrat\$ or collaborat\$ or coordinat\$ or transition\$ or interdisciplin\$ or shared or comanagement or cooperat\$ or aftercare or interinstitution\$ or synchron\$ or harmon\$ or manage\$)).mp. [mp=title, subject heading word, abstract, instrumentation] (60301)
 - 19 1 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 (76912)
 - 20 limit 19 to research (22658)
 - 21 1 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (28054)
 - 22 limit 21 to research (8216)
 - 23 ("care coordination" or "coordinated care" or "uncoordinated care" or "discontinuity of care" or "transfer of responsibility" or "documentation of followup" or "documentation of follow-up").m_titl. (114)

24 (handoff or referral or consults or "information transfer" or "telephone care" or "collaborative care" or "integrated care" or "shared care" or "transitional care" or "synchronized care" or comanagement or "interdisciplinary care").m_titl. (1203)
 25 ("discharge planning" or "case management" or "disease management").m_titl. (3528)
 26 *"Continuity of Patient Care"/ or *"Health Care Delivery, Integrated"/ or *"Case Management"/ or *"Progressive Patient Care"/ or *"Patient Centered Care"/ (7733)
 27 *"Nursing Care Plans"/ or *"Patient Care Planning"/ (560)
 28 23 or 24 or 26 (8901)
 29 limit 28 to research (1616)
 30 25 or 27 (4081)
 31 limit 30 to research (741)
 32 31 not 29 (383)
 33 from 32 keep 1-383 (383)
 34 29 and 31 (358)
 35 from 34 keep 1-358 (358)
 36 29 not (31 or 32) (1258)
 37 from 36 keep 1-1258 (1258)
 38 limit 37 to yr=2003 - 2005 (352)
 39 from 38 keep 1-352 (352)

#4: Targets articles that have the term “care coord” in title/abstract (2000 to 2002)

Search strategy used is same as #3.

#5: Targets articles that have the term “care coord” in title/abstract (1995 to 1999)

Search strategy used is same as #3.

#6: Targets articles that have the term “care coord” in title/abstract (1966 to 1994)

Search strategy used is same as #3.

Cochrane Database of Systematic Reviews, American College of Physicians Journal Club, Database of Abstracts of Reviews of Effects
 (through November 15, 2006)

1 "Continuity of Patient Care"/ or Case Management/ or care coordination.mp. (294)
 2 "Quality of Health Care"/ or Quality Improvement/ or improv\$.mp. (63628)
 3 1 and 2 (118)
 4 from 3 keep 2,5-8,10 (6)
 5 from 3 keep 3-4,11-12,14,19,22,25-26,28,46,50-51,53,70 (15)
 6 care coordination.m_titl. (5)
 7 [from 6 keep 2-4,6-15,17-20,22-24,26-27,29-30] (0)
 8 5 or 7 (15)
 9 [from 8 keep 1-39] (0)
 10 from 8 keep 5,7-10,13-15 (8)

PsychInfo Database Search

Search updated to November 15, 2006

1872 to May Week 5, 2005

- 1 "Continuity of Patient Care"/ or Case Management/ or care coordination.mp. (1573)
- 2 ("coordinated care" or "uncoordinated care").mp. [mp=title, abstract, subject headings, table of contents, key concepts] (47)
- 3 integrated care.mp. [mp=title, abstract, subject headings, table of contents, key concepts] (124)
- 4 "Quality of Health Care"/ or Quality Improvement/ or improv\$.mp. (113208)
- 5 1 or 2 or 3 (1730)
- 6 4 and 5 (282)
- 7 from 6 keep 1-22 (22)
- 8 from 6 keep 23-209 (187)
- 9 exp meta analysis/ (2588)
- 10 6 and 9 (0)
- 11 5 and 9 (0)
- 12 exp "literature review"/ (22105)
- 13 5 and 9 (0)
- 14 5 and review.mp. [mp=title, abstract, subject headings, table of contents, key concepts] (170)
- 15 14 and systematic.mp. [mp=title, abstract, subject headings, table of contents, key concepts] (9)
- 16 from 15 keep 2 (1)
- 17 "systematic review".m_titl. (536)
- 18 5 and 17 (1)
- 19 exp integrated services/ (1061)
- 20 case management/ or discharge planning/ (1622)
- 21 19 or 20 or 5 (2826)
- 22 21 and 17 (1)
- 23 21 and (metanalysis or "meta analysis" or "systematic review").mp. [mp=title, abstract, subject headings, table of contents, key concepts] (7)
- 24 from 23 keep 1-7 (7)

Sociological Abstracts Database and Social Services Abstracts Database Search

Through November 15, 2006

Systematic review and (coordinated care or continuous care or uncoordinated care or care planning)

Appendix B: Sample Data Abstraction Forms

Level One (Screening Title and Abstract) Form

PLEASE NOTE: If you feel an article should be excluded, please answer the question on the basis of which you are excluding it. You do not need to answer the remaining questions.

1. Does this article report a systematic review?

- ☐ Yes
- ☐ No
- ☐ Can't tell
- ☐ Did not check

2. Does this article report on some component of care coordination?

(Care coordination for the purposes of this triage can be defined as those activities in which two or more people are involved in coordination of care for a patient. Components to consider include disease management, case management, discharge planning, coordination between health care providers and/or organization units).

NOTE: Please document why you consider this care coordination. If you exclude as not being care coordination, please specify why.

- ☐ Yes, specify: _____
- ☐ No, specify: _____
- ☐ Exclude for review but keep as background, specify: _____
- ☐ Can't tell
- ☐ Did not check

3. Does this article report results from studies that are conducted exclusively in an in-patient setting?

- ☐ Yes
- ☐ No
- ☐ Can't tell
- ☐ Did not check

Level Two (Full Text) Abstraction Form

1. Does this article merit full text review? (check ANY that apply)

- ☐ Yes
- ☐ No - not a systematic review
- ☐ No - does not address care coordination: _____
(Coordination of care can be broadly defined as the deliberate assembly, exchange, and integration of information by two or more participants involved in a patient's care to facilitate appropriate delivery of health care services. For the purpose of the review, we restrict our definition of coordination of care to the deliberate assembly, exchange, and integration of information by two or more clinicians involved in a patient's care to facilitate appropriate delivery of health care services.)
- ☐ No - cost effectiveness study only
- ☐ No - study conducted in an in-patient setting only
- ☐ No - foreign language
- ☐ No - other (specify): _____
- ☐ Not sure - need to discuss: _____

2. Does this article meet inclusion criteria? (check ALL that apply)

- ☐ Yes - multiple providers
- ☐ Yes - complex patient
- ☐ Yes - multiple settings
- ☐ No - no intervention evaluated
- ☐ No - self management only
- ☐ No - other (not sure)

3. Does the entire review focus on care coordination or does only a part of the review focus on care coordination?

- ☐ Entire review is on care coordination
- ☐ Only a part of the review is on care coordination (please remember to only abstract results for the care coordination part of the article)

Quality Assessment of Review

4. Does the study report a review/research question? (This might be stated under the purpose of the review)

- ☐ Yes
- ☐ No

5. Are the inclusion/exclusion criteria used to select articles stated? (Determine if the criteria address study design, patient populations, interventions and outcomes of interest that determine inclusion/exclusion)

- ☐ Yes
- ☐ Not stated

6. Were the studies examined independently to determine inclusion/exclusion of the study for the review (i.e., dual level 1 review)?

- ☐ Yes
- ☐ No
- ☐ Not stated

7. Was the data abstraction done by at least 2 independent reviewers?

- ☐ Yes
- ☐ No
- ☐ Not stated

8. Does the review report on how disagreements between reviewers were handled?

- ☐ Yes
- ☐ No
- ☐ Not applicable - no multiple reviewers

9. Did the research team include the following team members? (check ALL that apply). [To answer this question, look at the author affiliations, acknowledgements section and methods section]

- ☐ Research librarian
- ☐ Statistician
- ☐ Methods expert
- ☐ Topic expert
- ☐ Not stated

10. What study designs does the review include? (check ALL that apply)

- ☐ Randomized controlled trials (RCT)
- ☐ Quasi-RCT
- ☐ Controlled before-after
- ☐ Interrupted time series
- ☐ Prospective studies
- ☐ Cross-sectional studies
- ☐ Other (specify): _____
- ☐ Not stated

11. Which databases were searched by the review? (check ALL that apply)

- ☐ Medline
- ☐ EMBASE
- ☐ Cochrane
- ☐ PsychInfo
- ☐ Social Sciences Register (or other social sciences database): _____
- ☐ Other (specify): _____
- ☐ Article does not specify the databases searched

12. Does the review provide details of the search strategy used?

- ☐ Yes
☐ No

13. Does the review indicate the time frame covered by the search?

- ☐ Yes (specify): _____
☐ No

14. Does the review provide sufficient detail on the search for articles to indicate that a substantial effort was made to obtain all relevant articles?

- ☐ Yes, substantial effort made
☐ No, substantial effort not made

15. Does the review adequately address the validity of the included studies? (e.g., provides an explanation of the criteria used to assess the studies)

- ☐ Yes
☐ No
☐ Not stated
☐ Not applicable - no included studies

16. Does the review provide sufficient details of the individual studies presented? (e.g., paper has a table listing the included studies, details on the study design, sample sizes, patient characteristics etc.)

- ☐ Yes
☐ No
☐ Not applicable - no included studies

17. Does the review summarize the primary studies included appropriately? (e.g., includes a narrative summary of results; may or may not include a quantitative analysis)

- ☐ Yes
☐ No
☐ Unclear: _____
☐ Not applicable - no included studies

Systematic Review Details

18. What topic does the review focus on?

- ☐ Asthma
☐ Cancer screening
☐ Children with special health care needs
☐ Congestive heart failure
☐ Diabetes
☐ Discharge planning
☐ End of life associated with advanced organ system failure
☐ Frailty associated with old age
☐ Hypertension
☐ Immunization

- ☐ Ischemic heart disease
- ☐ Major depression
- ☐ Medication management
- ☐ Other (specify): _____
- ☐ No specific clinical focus

19. How many studies were included in the final analysis? _____

20. What populations does the review include?

- ☐ General population
- ☐ Children
- ☐ Elderly
- ☐ Other (specify): _____
- ☐ Not stated
- ☐ Not applicable - no included studies

21. Does the review provide information on the setting of the included studies? (check ALL that apply)

- ☐ Outpatient clinic
- ☐ Specialist facility
- ☐ Managed care setting (specify): _____
- ☐ Home
- ☐ Community setting (specify): _____
- ☐ Other setting (specify): _____
- ☐ Not stated
- ☐ Not applicable - no included studies

22. Does the review provide a description of a conceptual framework used to inform the search strategy or data abstraction?

(May include: operational definition of coordination; theories used to inform framework - e.g., behavioral change theories, organizational design theories; hypothesized mechanisms through which specific QI strategies act; categorization of QI approaches) (check ALL that apply)

- ☐ Yes, operational definition of care coordination
- ☐ Yes, theories explicitly applied (e.g., organization theory, behavior change, structure-process outcomes)
- ☐ Yes, hypothesized mechanisms through which specific QI strategies act (e.g., improve information exchange patient-provider, improve information exchange provider-provider, improve information continuity)
- ☐ Yes, categorization of QI approaches
- ☐ No conceptual framework provided

23. How were the results of the review presented?

- ☐ Narrative results
- ☐ Quantitative analysis (meta-analysis)
- ☐ Combination of narrative results and quantitative analysis
- ☐ No results

Care Coordination Interventions

24. What care coordination interventions were the authors looking for? (this will probably be found in the search strategy or inclusion/exclusion criteria. e.g.: disease management, multidisciplinary teams etc)

- ☐ State intervention (s) (list all the interventions): _____
- ☐ Unclear
- ☐ Not stated

25. How did the authors classify the individual studies included in the review into the intervention groupings? For each intervention or term used to classify the studies, list the term used, its definition and the number of studies included for each intervention/term.

Term Used	Definition	# of included studies
Intervention/Term 1		
Intervention/Term 2		
Intervention/Term 3		
Intervention/Term 4		
Intervention/Term 5		
Intervention/Term 6		
Intervention/Term 7		
Intervention/Term 8		
Intervention/Term 9		
Intervention/Term 10		

26. What coordination-related measures are reported in the review (i.e., did systematic review report process measures regarding implementation, where coordination is an implied or explicit component of intervention)?

- ☐ None reported, no discussion of implementation
- ☐ No measures reported, implementation of coordination activities and barriers discussed qualitatively
- ☐ Yes, process measures (e.g., frequency of follow up visits/referrals, rate of contacts among providers, rate of provider-patient contacts)
- ☐ Yes, participant self-report re: potential predictors of behavioral change (e.g., motivational, action, and stage of change constructs) [NOTE: evaluation of behavior change constructs and development of questionnaires appear to be under development, so if present in studies, likely to be study-specific]
- ☐ Yes, participant self-report re: coordination-related concepts (e.g., interprofessional collaboration, continuity of care) [NOTE: the table below includes some of the survey instruments that we've come across so far. Because most measures listed below were

developed for the inpatient setting, it is unlikely that reviews will mention these unless modifications were made)

The table below lists some survey instruments that include an explicit "coordination" domain and have undergone at least initial psychometric assessment (i.e., separate study of validity/reliability):

Survey Instruments	Reference
Collaborative Practice Scales (CPS)	Weiss 1985
Collaboration and Satisfaction about Care Decisions (CSACD)	Baggs 1994
ICU Nurse-Physician Questionnaire	Shortell 1991
Jefferson Scale of Attitudes Toward Physician-Nurse Collaboration	Hojat 1999
Long-term-care interdisciplinary team performance questionnaire (adapted from ICU-Nurse Physician Questionnaire)	Temkin-Greener 2004
Physician - Pharmacist Collaboration Instrument (PPCI)	Zillich 2005
Care Transitions Measure (CTM)	Coleman

27. What were the barriers, if any, to the usefulness of the review? (To answer this question, you will need to assess the usefulness of the review as well as see what the limitations were)

Systematic Review Results

28. What outcomes were measured by the review that relate to care coordination interventions?

- ☐ Clinical outcomes (specify): _____
- ☐ Health services utilization (specify): _____
- ☐ Cost (specify): _____
- ☐ Cost-effectiveness analysis: _____
- ☐ Quality of life (specify): _____
- ☐ Other (specify): _____
- ☐ Not stated: _____

29. Please report the main findings of the review.

(the goal here is to highlight the results that readers are likely to find interesting. Feel free to use text as used in the article, but if using it verbatim, please indicate this when abstracting the information). Listed below are some other things to include in this section, if provided in the article.

Please provide 1-2 sentences of the overall findings of the review. Include here any information on negative or ineffective interventions as well.

If the authors provide any kind of synthesis on lessons learned or any specific elements/components that contributed to the success or failure of the intervention, include that information.

If any of the findings focus on more severe/complex patients, please note that as well.

30. Is there material in this article that could be abstracted using the evaluation framework?

☐ Yes

☐ No

(TO MAKE THIS DECISION, CONSIDER THE FOLLOWING: If the authors provide enough information and detail in the review on any of the following items, then this article should be included in the evaluation framework:

- o details on the original studies that offer insight about the mechanisms of coordination, e.g., how patient monitoring or population surveillance links with planning for care, which activities or processes were integrated better by the coordination intervention;*
- o synthesis of the lessons learned or which components of the intervention were effective vs. ineffective in terms of any outcomes;*
- o barriers to the success of the intervention(s); structural contexts that influenced care coordination, e.g., physical infrastructure (availability of decision support systems, proximity of those involved in coordinating care, etc), reinforcing characteristics (financial incentives, integration of funding);*
- o details about characteristics of tasks or activities that were coordinated, e.g., task complexity, task uncertainty, level of interdependence among tasks, number of participants involved in coordinating activities)*

31. Please specify any other comments or concerns.

Appendix C: List of Excluded Reviews

Citation	Reason for exclusion
Best care for the dying is listening to their needs: individual needs should dictate care decisions. Patient-Focused Care and Satisfaction. 1998;6(4):44-6.	Not a systematic review
Case management of patients with chronic renal insufficiency did not improve outcomes over usual care. Research Activities. 1999;225:9.	Not a systematic review
Continuity of caregivers during pregnancy and childbirth. Pract Midwife. 1999;2(1):10-1.	Not a systematic review
Delegation and referral in primary healthcare teams. Nursing Standard. 1997;11(49):32-3.	Not a systematic review
Hospital CM and managed care growth link questioned: 74% of acute care facilities have CM departments. Hospital Case Management. 1999; 7(8):138.	Not a systematic review
Medicare hospital discharge planning: report from the DHHS Office of the Inspector General. Continuum: An Interdisciplinary Journal on Continuity of Care. 1998;18(1):11-6.	Not a systematic review
Patient management benefits clients, agency, and hospital. Hospital Home Health. 1992;9(4):52-4.	Not a systematic review
Pilot project: proactive protocol for diabetes: can CM make a difference in diabetes outcomes? Hospital Case Management. 2001;9(10):147-9.	Not a systematic review
Transitional care from hospital to home improves health of seniors while saving money. Nursingmatters. 1999;10(12):13.	Not a systematic review
Treatment outlines for the management of schizophrenia. The Quality Assurance Project. Aust N Z J Psychiatry. 1984;18(1):19-38.	Not care coordination
Abbott J, Young A, Haxton R, Van Dyke P. Collaborative care: a professional model that influences job satisfaction. Nursing Economics. 1994;12(3):167-9.	Not a systematic review
Abercrombie PD. Improving adherence to abnormal Pap smear follow-up. J Obstet Gynecol Neonatal Nurs. 2001;30(1):80-8.	Not care coordination
Abir F, Bell R. Assessment and management of the obese patient. Crit Care Med. 2004;32(4 Suppl):S87-91.	Not a systematic review
Adair CE, McDougall GM, Beckie A, et al. History and measurement of continuity of care in mental health services and evidence of its role in outcomes. Psychiatric Services. 2003;54(10):1351-6.	Not care coordination
Adatia FA, Damji KF. Chronic open-angle glaucoma. Review for primary care physicians. Can Fam Physician. 2005 Sep;51:1229-37.	Not a systematic review
Alberts MJ, Hademenos G, Latchaw RE, et al. Recommendations for the establishment of primary stroke centers. Brain Attack Coalition. JAMA. 2000;283(23):3102-9.	Not care coordination
Alexander DA, Klein S. Biochemical terrorism: too awful to contemplate, too serious to ignore: subjective literature review. Br J Psychiatry. 2003;183:491-7.	Not a systematic review

Allen D, Lyne P, Griffiths L. Fraying seams... the divisions between health and social services should be invisible to those who use them... a version of this article appeared in Nursing Times. Therapy Weekly. 2001;28(22):4.	Not available
Allred CA, Arford PH, Michel Y, Veitch JS, Dring R, Carter V. Case management: the relationship between structure & environment. Nursing Economics. 1995;13(1):32-41.	Not a systematic review
Amruso NA, O'Neal ML. Pharmacist and physician collaboration in the patient's home. Ann Pharmacother. 2004;38(6):1048-52.	Not a systematic review
Anderson JL. Nursing management of the cancer patient in pain: a review of the literature. Cancer Nurs. 1982;5(1):33-41.	Not care coordination
Anderson MA, Helms LB. Quality improvement in discharge planning: an evaluation of factors in communication between health care providers. Journal of Nursing Care Quality. 1994;8(2):62-72.	Not a systematic review
Anderson MA, Tredway C. Focus on research. Care manager communication in home health care referrals. Chart. 1998;95(1):5.	Not a systematic review
Andlin-Sobocki P. Economic evidence in addiction: a review. Eur J Health Econ. 2004;5 Suppl 1:S5-12.	Not care coordination
Armitage SK, Kavanagh KM. The discharge liaison nurse at the interface of hospital and community nursing services. International Journal of Nursing Practice. 1996;2(4):215-21.	Not a systematic review
Aronson N, Lefevre F, Piper M, et al. Management of chronic asthma. Evid Rep Technol Assess (Summ). 2001;(44):1-10.	Not care coordination
Bachrach LL. Young adult chronic patients: an analytical review of the literature. Hosp Community Psychiatry. 1982;33(3):189-97.	Not a systematic review
Balas EA, Krishna S, Kretschmer RA, Cheek TR, Lobach DF, Boren SA. Computerized knowledge management in diabetes care. Med Care. 2004;42(6):610-21.	Not care coordination
Barlow JH, Ellard DR. Psycho-educational interventions for children with chronic disease, parents and siblings: an overview of the research evidence base. Child Care Health Dev. 2004;30(6):637-45.	Not care coordination
Barr H, Hammick M, Koppel I, Reeves S. Systematic review of the effectiveness of interprofessional education: towards transatlantic collaboration. J Allied Health. 1999;28(2):104-8.	Not a systematic review
Bauer M, Nay R. Family and staff partnerships in long-term care. A review of the literature. J Gerontol Nurs. 2003;29(10):46-53.	Not a systematic review
Baxter E. Patients, caregivers, and managing care. Geriatrics. 1997;52(2):S48-9.	Not a systematic review
Bayley EW, Carrougner GJ, Marvin JA, Knighton J, Rutan RL, Weber BF. Research priorities for burn nursing: rehabilitation, discharge planning, and follow-up care. Journal of Burn Care & Rehabilitation. 1992;13(4):471-6.	Not a systematic review
Bazzoli GJ, Dynan L, Burns LR, Yap C. Two decades of organizational change in health care: what have we learned? Med Care Res Rev. 2004;61(3):247-331.	Not care coordination

Beaudin CL, Lammers JC, Pedroja AT. Patient perceptions of coordinated care: the importance of organized communication in hospitals. <i>Journal for Healthcare Quality</i> . 1999;21(5):18-23.	Not a systematic review
Beavis D, Simpson S, Graham I. A literature review of dementia care mapping: methodological considerations and efficacy. <i>J Psychiatr Ment Health Nurs</i> . 2002;9(6):725-36.	Not care coordination
Bechel DL, Myers WA, Smith DG. Does patient-centered care pay off? <i>Joint Commission Journal on Quality Improvement</i> . 2000;26(7):400-9.	Not a systematic review
Bell R. Continuity of care: were we providing continuity of care for our clients? <i>Perspectives</i> . 1996;20(4):17-20.	Not a systematic review
Berk M, Berk L, Castle D. A collaborative approach to the treatment alliance in bipolar disorder. <i>Bipolar Disord</i> . 2004;6(6):504-18.	Not care coordination
Bernard-Bonnin AC, Stachenko S, Bonin D, Charette C, Rousseau E. Self-management teaching programs and morbidity of pediatric asthma: a meta-analysis. <i>J Allergy Clin Immunol</i> . 1995;95(1 Pt 1):34-41.	Not care coordination
Betz CL. Transition of adolescents with special health care needs: review and analysis of the literature. <i>Issues in Comprehensive Pediatric Nursing</i> . 2004;27(3):179-241.	Not care coordination
Bhui K, Stansfeld S, Hull S, Priebe S, Mole F, Feder G. Ethnic variations in pathways to and use of specialist mental health services in the UK. Systematic review. <i>Br J Psychiatry</i> . 2003;182:105-16.	Not care coordination
Bhutta ZA, Darmstadt GL, Hasan BS, Haws RA. Community-based interventions for improving perinatal and neonatal health outcomes in developing countries: a review of the evidence. <i>Pediatrics</i> . 2005 Feb;115(2 Suppl):519-617.	Not care coordination
Birthistle K, Carrington D. Fetal varicella syndrome--a reappraisal of the literature. A review prepared for the UK Advisory Group on Chickenpox on behalf of the British Society for the Study of Infection. <i>J Infect</i> . 1998;36 Suppl 1:25-9.	Not care coordination
Blaiss MS. Asthma disease management: a critical analysis. <i>Ann Allergy Asthma Immunol</i> . 2005 Nov;95(5 Suppl 1):S10-6	Not a systematic review
Blenkinsopp A, Anderson C, Armstrong M. Systematic review of the effectiveness of community pharmacy-based interventions to reduce risk behaviours and risk factors for coronary heart disease. <i>J Public Health Med</i> . 2003;25(2):144-53.	Not care coordination
Bloemen-Vrencken JH, de Witte LP, Post MW. Follow-up care for persons with spinal cord injury living in the community: a systematic review of interventions and their evaluation. <i>Spinal Cord</i> . 2005 Aug;43(8):462-75.	Not an evaluation of an intervention
Blondel B, Breart G. Home visits for pregnancy complications and management of antenatal care: an overview of three randomized controlled trials. <i>Br J Obstet Gynaecol</i> . 1992;99(4):283-6.	Not a systematic review
Boockvar K, Fishman E, Kyriacou CK, Monias A, Gavi S, Cortes T. Adverse events due to discontinuations in drug use and dose changes in patients transferred between acute and long-term care facilities. <i>Archives of Internal Medicine</i> . 2004;164(5):545-50.	Not a systematic review

Bower P, Sibbald B. Systematic review of the effect of on-site mental health professionals on the clinical behaviour of general practitioners. <i>BMJ</i> . 2000;320(7235):614-7.	Duplicate publication
Bower P. Primary care mental health workers: models of working and evidence of effectiveness. <i>Br J Gen Pract</i> . 2002;52(484):926-33.	Not a systematic review
Bowlyow JE. Acute and long-term care linkages: a literature review. <i>Med Care Rev</i> . 1990;47(1):75-103.	Not a systematic review
Bradley P, Lindsay B. Epilepsy clinics versus general neurology or medical clinics. <i>Cochrane Database Syst Rev</i> . 2001(1):CD001910.	Not care coordination
Bradley P, Lindsay B. Specialist epilepsy nurses for treating epilepsy. <i>Cochrane Database Syst Rev</i> . 2001(4):CD001907.	Not care coordination
Brickman R, Axelrod R, Roberson D, Flanagan C. Clinical process improvement as a means of facilitating health care system integration. <i>Joint Commission Journal on Quality Improvement</i> . 1998;24(3):143-53.	Not a systematic review
Brigden M, McKenzie M. Treating cancer patients. Practical monitoring and management of therapy-related complications. <i>Can Fam Physician</i> . 2000;46:2258-68.	Not care coordination
Briggs CJ, Capdegelle P, Garner P. Strategies for integrating primary health services in middle- and low-income countries: effects on performance, costs and patient outcomes. <i>Cochrane Database Syst Rev</i> . 2001(4): CD003318	Duplicate publication
Bryan YE, Hitchings KS, Fox MA, Kinneman MT, Young MJ. The evaluation of hospital restructuring efforts: satisfaction, quality, and costs. <i>Quality Management in Health Care</i> . 1998;6(3):22-34.	Not a systematic review
Bull MJ. Patients' and professionals' perceptions of quality in discharge planning. <i>Journal of Nursing Care Quality</i> . 1994;8(2):47-61.	Not a systematic review
Bunn F, Byrne G, Kendall S. Telephone consultation and triage: effects on health care use and patient satisfaction. <i>Cochrane Database Syst Rev</i> . 2004(4):CD004180.	Not care coordination
Burns T, Knapp M, Catty J, et al. Home treatment for mental health problems: a systematic review. <i>Health Technol Assess</i> . 2001;5(15):1-139.	Not care coordination
Cabana MD, Jee SH. Does continuity of care improve patient outcomes? <i>J Fam Pract</i> . 2004;53(12):974-80.	Not care coordination
Caley LM, Shipkey N, Winkelman T, Dunlap C, Rivera S. Evidence-based review of nursing interventions to prevent secondary disabilities in fetal alcohol spectrum disorder. <i>Pediatr Nurs</i> . 2006 Mar-Apr;32(2):155-62.	Not an evaluation of an intervention
Cameron ID. Coordinated multidisciplinary rehabilitation after hip fracture. <i>Disabil Rehabil</i> . 2005 Sep 30-Oct 15;27(18-19):1081-90.	Not a systematic review
Campbell MK, Daly C, Wallace SA, et al. Evidence-based medicine in nephrology: identifying and critically appraising the literature. <i>Nephrol Dial Transplant</i> . 2000;15(12):1950-5.	Not care coordination

Cannon CP, Hand MH, Bahr R, et al. Critical pathways for management of patients with acute coronary syndromes: an assessment by the National Heart Attack Alert Program. <i>Am Heart J</i> . 2002;143(5):777-89.	Study conducted in an in-patient setting only
Casalino L, Gillies RR, Shortell SM, et al. External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. <i>JAMA</i> . 2003;289(4):434-41.	Not a systematic review
Casciano R. A pharmacoeconomic evaluation of major depressive disorder. <i>Manag Care Interface</i> . 2003;Suppl B:16-21.	Not care coordination
Castrucci BC, Kamb ML, Hunt K. Assessing the Center for Disease Control and Prevention's 1994 HIV Counseling, Testing, and Referral: Standards and Guidelines: how closely does practice conform to existing recommendations? <i>Sexually Transmitted Diseases</i> . 2002;29(7):417-21.	Not a systematic review
Caton CLM, Goldstein JM, Serrano O, Bender R. The impact of discharge planning on chronic schizophrenic patients. <i>H&CP: Hospital & Community Psychiatry</i> . 1984;35(3):255-62.	Not a systematic review
Challis D, Darton R, Hughes J, Huxley P, Stewart K. Emerging models of care management for older people and those with mental health problems in the United Kingdom. <i>Journal of Case Management</i> . 1998;7(4):153-60.	Not a systematic review
Chan KH, Winslow CP, Levin MJ, et al. Clinical practice guidelines for the management of chronic sinusitis in children. <i>Otolaryngology Head and Neck Surgery</i> . 1999;120(3):328-34.	Not a systematic review
Chang JT, Morton SC, Rubenstein LZ, et al. Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomised clinical trials. <i>BMJ</i> . 2004;328(7441):680.	Not care coordination
Chapman JL, Zechel A, Carter YH, Abbott S. Systematic review of recent innovations in service provision to improve access to primary care. <i>Br J Gen Pract</i> . 2004;54(502):374-81.	Not care coordination
Chelf JH, Agre P, Axelrod A, et al. Cancer-related patient education: an overview of the last decade of evaluation and research. <i>Oncol Nurs Forum</i> . 2001;28(7):1139-47.	Not care coordination
Chen CC, Kenefick AL, Tang ST, McCorkle R. Utilization of comprehensive geriatric assessment in cancer patients. <i>Crit Rev Oncol Hematol</i> . 2004;49(1):53-67.	Not a systematic review
Christakis DA, Wright JA, Koepsell TD, Emerson S, Connell FA. Is greater continuity of care associated with less emergency department utilization? <i>Pediatrics</i> . 1999;103(4 part 1):738-42.	Not a systematic review
Cifu DX, Stewart DG. Factors affecting functional outcome after stroke: a critical review of rehabilitation interventions. <i>Arch Phys Med Rehabil</i> . 1999;80(5 Suppl 1):S35-9.	Not care coordination
Cloonan PA, Belyea MJ. Limits of using patient characteristics in predicting home health care coordination. <i>Western Journal of Nursing Research</i> . 1993;15(6):742-51.	Not a systematic review

Connors HR. Impact of evaluation of a statewide continuing education program. Journal of Continuing Education in Nursing 1989; 20(2), 64-69.	Not a systematic review
Corser WD. A complex sense of advocacy: the challenges of contemporary discharge planning. Case Manager. 2003;14(3):63-9.	Not a systematic review
Costich TD, Lee FC. Improving cancer care in a Kentucky managed care plan: a case study of cancer disease management. Disease Management. 2003;6(1):9-20.	Not a systematic review
Coulton CJ, Dunkle RE, Goode RA. Discharge planning and decision making. Health and Social Work. 1982;7(4):253-61.	Not a systematic review
Cox K, Wilson E. Follow-up for people with cancer: nurse-led services and telephone interventions. J Adv Nurs. 2003;43(1):51-61.	Not care coordination
Cox WK, Penny LC, Statham RP, Roper BL. Admission Intervention Team: medical center based intensive case management of the seriously mentally ill. Care Management Journals: Journal of Case Management, The Journal of Long Term Home Health Care. 2003;4(4):178-84.	Not a systematic review
Cram P, Ettinger WH, Jr. Generalists or specialists--who does it better? Physician Exec. 1998;24(1):40-5.	Not care coordination
Currell R, Urquhart C. Nursing record systems: effects on nursing practice and health care outcomes. Cochrane Database Syst Rev. 2003(3):CD002099.	Not care coordination
da Cruz ICF, Larrubia EO, de Azevedo NM, et al. Strategic plan for developing nursing professional standards at an university hospital, Rio de Janeiro, Brazil. Online Brazilian Journal of Nursing. 2002;1(3).	Not a systematic review
Dallas C, Burton L. Health disparities among men from racial and ethnic minority populations. Annu Rev Nurs Res. 2004;22:77-100.	Not care coordination
Daneels M, Cannoodt L. Child-oriented emergency care: a literature survey. Paediatr Nurs. 2003;15(2):14-9.	Not care coordination
Davidson G, Moscovice I, McCaffrey D. Allocative efficiency of case managers for the elderly. Health Services Research. 1989;24(4):539-54.	Not a systematic review
Delaney B, Moayyedi P, Deeks J, et al. The management of dyspepsia: a systematic review. Health Technol Assess. 2000;4(39):iii-v, 1-189.	Not care coordination
Dellefield ME. Interdisciplinary care planning and the written care plan in nursing homes: a critical review. Gerontologist. 2006 Feb;46(1):128-33.	Not a systematic review
Dephillips H. Advancing care management: from utilization review to evidence-based medicine. Lippincotts Case Manag. 2005 Sep-Oct;10(5):265-7.	Not a systematic review
Doleys DM, Marino L, Howell M, Nicholson B. Pain management programs in hand therapy: a literature review and appraisal. J Hand Ther. 1997;10(2):175-82.	Not care coordination
Dorman T, Angood PB, Angus DC, et al. Guidelines for critical care medicine training and continuing medical education. Crit Care Med. 2004;32(1):263-72.	Not a systematic review
Dreachslin JL, Hunt PL, Sprainer E. Communication patterns and group composition: implications for patient-centered care team effectiveness... including commentary by Snook ID Jr. Journal of Healthcare Management. 1999;44(4):252-68.	Not a systematic review

Eakin EG, Bull SS, Glasgow RE, Mason M. Reaching those most in need: a review of diabetes self-management interventions in disadvantaged populations. <i>Diabetes Metab Res Rev.</i> 2002;18(1):26-35.	Not care coordination
Edwards J, Reiley P, Morris A, Doody J. An analysis of the quality and effectiveness of the discharge planning process. <i>Journal of Nursing Quality Assurance.</i> 1991;5(4):17-27.	Not a systematic review
Eke N, Eke FU. Collaboration in urological practice in the new millennium. <i>Niger Postgrad Med J.</i> 2002;9(3):167-72.	Not a systematic review
Engstrom S, Foldevi M, Borgquist L. Is general practice effective? A systematic literature review. <i>Scand J Prim Health Care.</i> 2001;19(2):131-44.	Not care coordination
Ensor T, Ronoh J. Impact of organizational change on the delivery of reproductive services: a review of the literature. <i>Int J Health Plann Manage.</i> 2005 Jul-Sep;20(3):209-25.	Not a systematic review
Erstad TL. Analyzing computer based patient records: a review of literature. <i>J Healthc Inf Manag.</i> 2003;17(4):51-7.	Not a systematic review
Evans R, Stone D, Elwyn G. Title Organizing palliative care for rural populations: A systematic review of the evidence. <i>Source Family Practice.</i> 2003;20(3):304-310.	Not care coordination
Every NR, Hochman J, Becker R, Kopecky S, Cannon CP. Critical pathways : a review. Committee on Acute Cardiac Care, Council on Clinical Cardiology, American Heart Association. <i>Circulation.</i> 2000;101(4):461-5.	Not a systematic review
Fahey T, Schroeder K, Ebrahim S. Educational and organisational interventions used to improve the management of hypertension in primary care: a systematic review. <i>Br J Gen Pract.</i> 2005 Nov;55(520):875-82.	Not care coordination
Farris KB, Kirking DM. Assessing the quality of pharmaceutical care. II. Application of concepts of quality assessment from medical care. <i>Ann Pharmacother.</i> 1993;27(2):215-23.	Not a systematic review
Finley PR, Crismon ML, Rush AJ. Evaluating the impact of pharmacists in mental health: a systematic review. <i>Pharmacotherapy.</i> 2003;23(12):1634-44.	Not care coordination
Finucane TE, Harper GM. Attempting resuscitation in nursing homes: policy considerations. <i>J Am Geriatr Soc.</i> 1999;47(10):1261-4.	Not care coordination
Fleming E, Carter B, Gillibrand W. The transition of adolescents with diabetes from the children's health care service into the adult health care service: a review of the literature. <i>J Clin Nurs.</i> 2002;11(5):560-7.	Not care coordination
Fonarow GC, Gheorghiade M, Abraham WT. Importance of in-hospital initiation of evidence-based medical therapies for heart failure-a review. <i>Am J Cardiol.</i> 2004;94(9):1155-60.	Not a systematic review
Foster SA, Goode JV, Small RE. Home blood glucose monitoring. <i>Ann Pharmacother.</i> 1999;33(3):355-63.	Not a systematic review
French J, Bilton D, Campbell F. Nurse specialist care for bronchiectasis. <i>Cochrane Database Syst Rev.</i> 2003(3):CD004319.	Not care coordination
Frich LM. Nursing interventions for patients with chronic conditions. <i>J Adv Nurs.</i> 2003;44(2):137-53.	Not care coordination

Frick KD, Lantz PM. Selection bias in prenatal care utilization: an interdisciplinary framework and review of the literature. <i>Med Care Res Rev.</i> 1996;53(4):371-96.	Not a systematic review
Gagliardi A. Use of referral reply letters for continuing medical education: a review. <i>Journal of Continuing Education in the Health Professions.</i> 2002;22(4):222-9.	Not care coordination
Garg AX, Adhikari NK, McDonald H, et al. Effects of computerized clinical decision support systems on practitioner performance and patient outcomes: a systematic review. <i>JAMA.</i> 2005;293(10):1223-38.	Not care coordination
Gibson PG, Powell H, Coughlan J, et al. Self-management education and regular practitioner review for adults with asthma. <i>Cochrane Database Syst Rev.</i> 2003(1):CD001117.	Not care coordination
Gibson PG, Powell H. Written action plans for asthma: an evidence-based review of the key components. <i>Thorax.</i> 2004;59(2):94-9.	Not care coordination
Ginsberg BH, Tan MH, Mazze R, Bergelson A. Staged diabetes management: computerizing a disease state management program. <i>J Med Syst.</i> 1998;22(2):77-87.	Not a systematic review
Goldfarb N, Weston C, Hartmann CW, et al. Impact of appropriate pharmaceutical therapy for chronic conditions on direct medical costs and workplace productivity: a review of the literature. <i>Dis Manag.</i> 2004;7(1):61-75.	Not care coordination
Goodall TA, Halford WK. Self-management of diabetes mellitus: a critical review. <i>Health Psychol.</i> 1991;10(1):1-8.	Not a systematic review
Green JM, Renfrew MJ, Curtis PA. Continuity of carer: what matters to women? A review of the evidence. <i>Midwifery.</i> 2000;16(3):186-96.	Not care coordination
Grundel BL, White GL, Jr., Eichold BH, 2nd. Diabetes in the managed care setting: a prospective plan. <i>South Med J.</i> 1999;92(5):459-64.	Not a systematic review
Guevara JP, Wolf FM, Grum CM, Clark NM. Effects of educational interventions for self management of asthma in children and adolescents: systematic review and meta-analysis. <i>BMJ.</i> 2003;326(7402):1308-9.	Duplicate publication
Guevara JP. Self-management education of children with asthma: a meta-analysis. <i>LDI Issue Brief.</i> 2003;9(3):1-4.	Not care coordination
Gurses AP, Xiao Y. A systematic review of the literature on multidisciplinary rounds to design information technology. <i>J Am Med Inform Assoc.</i> 2006 May-Jun;13(3):267-76.	Study conducted in an in-patient setting
Gustafsson F, Arnold JM. Heart failure clinics and outpatient management: review of the evidence and call for quality assurance. <i>Eur Heart J.</i> 2004;25(18):1596-604.	Not care coordination
Gutierrez SL, Welty TE. Point-of-care testing: an introduction. <i>Ann Pharmacother.</i> 2004;38(1):119-25.	Not care coordination
Guzman J, Esmail R, Karjalainen K, Malmivaara A, Irvin E, Bombardier C. Multidisciplinary bio-psycho-social rehabilitation for chronic low back pain. <i>Cochrane Database Syst Rev.</i> 2002(1):CD000963.	Not care coordination
Gwady-Sridhar FH, Flintoft V, Lee DS, Lee H, Guyatt GH. A systematic review and meta-analysis of studies comparing readmission rates and mortality rates in patients with heart failure. <i>Arch Intern Med.</i> 2004;164(21):2315-20.	Not care coordination

Haaga D. Review: case management in primary health care improves symptoms and drug adherence in people with major depression. <i>Evidence-Based Mental Health</i> . 2006 Aug;9(3):79.	Abstract
Hakansson S, Gavelin C. What do we really know about the cost-effectiveness of telemedicine? <i>J Telemed Telecare</i> . 2000;6 Suppl 1:S133-6.	Not care coordination
Hall JE. Mental health integrated care pathways in the UK: a review of their content. <i>Journal of Integrated Care Pathways</i> . 2004;8(1):14-8.	Not a systematic review
Halstead LS. Team care in chronic illness: a critical review of the literature of the past 25 years. <i>Arch Phys Med Rehabil</i> . 1976;57(11):507-11.	Not a systematic review
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Appendix D: Technical Expert Panel and Peer Reviewers

Technical Expert Panel

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Val Lawrence, M.D., The University of Texas Health Science Center at San Antonio and South Texas Veterans Health Care System
James L. Zazzali, Ph.D., M.P.H., RAND Corporation
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Peer Reviewers

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Caroline Blaum, M.D., M.S., Associate Professor of Internal Medicine, Division of Geriatric Medicine, University of Michigan Research Scientist, Ann Arbor DVAMC GRECC Geriatrics Center
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Liza Greenberg, Consultant, Case Management Society of America
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