QUERI

Scoping Brief: Care Coordination Theoretical Models and Frameworks

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PREFACE

The VA Evidence-based Synthesis Program (ESP) was established in 2007 to provide timely and accurate syntheses of targeted healthcare topics of particular importance to clinicians, managers, and policymakers as they work to improve the health and healthcare of Veterans. QUERI provides funding for four ESP Centers, and each Center has an active University affiliation. Center Directors are recognized leaders in the field of evidence synthesis with close ties to the AHRQ Evidence-based Practice Centers. The ESP is governed by a Steering Committee comprised of participants from VHA Policy, Program, and Operations Offices, VISN leadership, field-based investigators, and others as designated appropriate by QUERI/HSR&D.

The ESP Centers generate evidence syntheses on important clinical practice topics. These reports help:

- Develop clinical policies informed by evidence;
- Implement effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures; and
- Set the direction for future research to address gaps in clinical knowledge.

The ESP disseminates these reports throughout VA and in the published literature; some evidence syntheses have informed the clinical guidelines of large professional organizations.

The ESP Coordinating Center (ESP CC), located in Portland, Oregon, was created in 2009 to expand the capacity of QUERI/HSR&D and is charged with oversight of national ESP program operations, program development and evaluation, and dissemination efforts. The ESP CC establishes standard operating procedures for the production of evidence synthesis reports; facilitates a national topic nomination, prioritization, and selection process; manages the research portfolio of each Center; facilitates editorial review processes; ensures methodological consistency and quality of products; produces "rapid response evidence briefs" at the request of VHA senior leadership; collaborates with HSR&D Center for Information Dissemination and Education Resources (CIDER) to develop a national dissemination strategy for all ESP products; and interfaces with stakeholders to effectively engage the program.

Comments on this evidence inventory are welcome and can be sent to Nicole Floyd, ESP CC Program Manager, at Nicole.Floyd@va.gov.

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EXECUTIVE SUMMARY

Improving coordination of multidisciplinary care for patients with multiple, complex conditions could potentially improve the effectiveness, safety, and efficiency of their health care. Many theoretical frameworks exist to guide providers and researchers in improving and evaluating care coordination. However, understanding and use of these frameworks is currently limited by their complexity and wide variability.

Among 4,389 citations, we retained 35 separate frameworks, including 12 recent frameworks unidentified by previous reviews. Frameworks reflected a wide range of conceptual and structural diversity. Among the 35, 50% were developed in the US, 66% addressed overall health versus a specific disease or setting (*eg*, hospice, palliative care, intensive care), and 28% were considered patient-centered (*ie*, explicitly naming patients/individuals as a key component that was placed at the center of the framework). Only one-third of frameworks explicitly identified a specific definition for care coordination or integration that served as a foundation of their framework, with the 2014 Agency for Healthcare Research and Quality's (AHRQ) definition proposed by McDonald and colleagues being the most frequently cited. Theoretical bases for frameworks were highly variable, with organizational design theory as the most commonly cited (17%). Few frameworks were developed primarily based on formal literature review and key informant discussions. The 14 key components identified by the Van Houdt et al 2013 review of frameworks appear to generally still be up to date. Among the newer frameworks we identified, Sustainable intEgrated chronic care modeLs for multi-morbidity: delivery, FInancing, and performancE (SELFIE) was the most comprehensive, encompassing 11 of the 14 components from Van Houdt 2013. Common approaches to group framework components included Donabedian's Structure-Process-Outcome model and the 6 WHO health system components (*ie*, service delivery, leadership and governance, workforce, financing, technologies and medical products, and information and research).

Three frameworks were self-described as measurement-focused. Each of these described distinct measurement approaches, including identification of ideal targets for each of 5 "objects" of coordination, 4 general levels of increasing integration, and short-term and long-term outcomes specific to 5 Patient-Centered Medical Home (PCMH)-essential care coordination domains. We identified 23 framework-associated measures unidentified by previous reviews, many of which address previously-identified gaps in care coordination measurement, except for system representation perspective.

Based on assessment of number of annualized forward citations and whether a measure and/or an intervention was derived from the framework, we identified The Integrated Team Effectiveness

Model, the Development Model for Integrated Care (DMIC), and the Rainbow Model of Integrated Care (RMIC) as the most influential care coordination frameworks.

One of the main gaps in the care coordination frameworks that we studied was the limited guidance provided on how to implement care coordination in health systems. Also, few of the frameworks identified in this review have led to development of interventions for improving care coordination or led to development of measures that evaluate system representation perspective.

Our initial review provides a basis for understanding similarities and variation among available care coordination conceptual frameworks. The structured information provided in this review led to SOTA work group domain experts' identification of 5 major dimensions that could be used to distinguish the focus of care coordination frameworks and facilitate their adoption by clinicians/managers and researchers: (1) contextual factors, (2) coordination domains, (3) levels of coordination, (4) types of coordination, and (5) coordination mechanisms. To further increase its usefulness, future research should similarly classify care coordination interventions, measures, and evaluation metrics along these 5 theory-based dimensions.

INTRODUCTION

PURPOSE

The ESP Coordinating Center (ESP CC) is responding to a request from the VHA Health Services Research and Development (HSR&D) and the VHA Office of Community Care (OCC) for an Evidence Compendium on care coordination theoretical models and conceptual frameworks that (1) identifies new models/frameworks published since the most recent systematic review in 2010, and provides (2) structured data abstraction on key components of each model/framework in a sortable format, (3) a very brief descriptive summary of key components across models/frameworks, and (4) an annotated bibliography. Findings from this Evidence Compendium will be used by the VHA's State of the Art (SOTA) Care Coordination Conference's Measures, Models, and Definitions work group as a foundation for discussion and further identification of and organization by major concepts and, in turn, will inform the Care Coordination SOTA overall in development of priorities and future research questions around care coordination models and measures.

BACKGROUND

Clinical care of patients with multiple, complex, chronic conditions often requires input from multiple providers from a variety of clinical disciplines and social services. Lack of deliberate organization, cooperation, and sharing of information amongst patients and providers can lead to fragmented care, which can jeopardize the effectiveness, safety, and efficiency of health care delivery. Care coordination strategies are of great interest as they have the potential to improve quality of care, efficiency, and patient outcomes.[1] Many theoretical frameworks exist to guide providers and researchers in improving and evaluating care coordination. However, understanding and use of these frameworks is currently limited by their complexity and wide variability in factors such as their foundation, structure, target population(s), main components, mechanisms, and the health system levels they address.[2] Understanding of existing care coordination theoretical models and conceptual frameworks is important in developing measures and addressing research gaps.

SCOPE

Our objective is to prepare a compendium of the available care coordination theoretical models and conceptual frameworks.

KEY QUESTIONS

Key Question 1: What are the theoretical models and conceptual frameworks for guiding practitioners in coordinating care in research or practice, and what are their key characteristics?

  a) What motivated its development?
  b) From what theory/context was the model/framework derived? (none, unclear, yes-specific theory)
  c) What definition does it use for care coordination?
  d) Which population(s)/setting(s) were planned for application of the model/framework?

e) What are the main components of the model/framework?

Key Question 2: What are the theoretical models and conceptual frameworks for guiding practitioners in evaluating care coordination in research or practice, and what are their key characteristics?

a) What motivated its development?

b) From what theory was the model/framework derived? (none, unclear, yes-specific theory)

c) What definition does it use for care coordination?

d) Which population(s)/setting(s) were planned for application of the model/framework?

e) What are the main components of the model/framework?

Key Question 3: Among those theoretical models/frameworks identified, which have been the most influential?

a) Was a measure derived from the model/framework (yes, no) and has this measure been validated (none, some, extensive)?

b) Has the model/framework been used to develop an intervention? (yes, no)

ELIGIBILITY CRITERIA

The ESP included studies that met the following criteria:

·   **Population***:* Adults (≥ 18 years)

·   **Models and frameworks:** Developed with a purpose related to guiding or evaluating care coordination research and/or practice

·   **Timing***:* Any

·   **Setting:** Any

METHODS

The original purpose of this project was to provide a compendium of existing care coordination models and frameworks, with data abstraction and limited organization of the evidence. As time allowed, the product was expanded to a "scoping brief" which includes further synthesis and detailed categorization of the existing frameworks.

DATA SOURCES AND SEARCHES

To identify articles relevant to Key Questions 1 and 2, we searched the following databases: MEDLINE, Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, Database of Abstracts of Reviews of Effects, PsycINFO, CINAHL, and SocINDEX. Our search strategy used terms for care coordination, integrated care, theory, framework, model, and concept. Additional citations were identified from hand-searching reference lists, relevant journals, and grey literature sources. We limited the search to articles published from 2010 forward, based on the final search date of the most recent systematic review[2] on the topic (see supplemental materials for complete search strategies).

To identify articles or associated measures relevant to Key Question 3, we hand-searched reference lists of systematic reviews[1,3-5] on care coordination measures or tools and ran a forward citation search in SCOPUS for each framework identified for Key Questions 1 and 2. Due to the our short time frame, we limited the search to articles published from 2015 forward, based on the final search date of the most recent systematic review[5] on the topic. We also limited our search for measures to frameworks in which we had not previously identified associated measures or tools, and to frameworks explicitly described as being developed specifically for care coordination as determined by the ESP CC[6-31] (see supplemental materials for complete search strategies).

Additionally, we queried subject matter experts in the care coordination field (operational partners) and emailed all authors of included frameworks requesting identification of measures or tools or interventions based on their framework.

STUDY SELECTION

Study selection was based on the eligibility criteria described above. For Key Questions 1 and 2, we operationalized the eligibility criteria by prioritizing titles and abstracts where (1) the title included the word 'care coordination' or 'integrated'—or some derivation thereof; (2) the title or abstract included the word 'conceptual', 'framework', or 'theory'—or some derivation thereof; or (3) the abstract proposed a definition related to care coordination. Titles and abstracts were uploaded to Abstrakr[32] and reviewed by a single reviewer. Included abstracts and abstracts of unclear relevance were reviewed by a second reviewer. Full-text articles were sequentially reviewed by 2 reviewers and any disagreements were resolved by a third reviewer. Due to the volume of results, we utilized focused inclusion criteria and a single reviewer for title and abstract review, and it is possible that some articles may have been missed. However, there is a low likelihood that we missed influential relevant frameworks due to our contact with subject matter experts.

For Key Question 3, we performed dual independent review of abstracts and sequential review of full-text articles. We excluded measures or tools only used in pediatric populations, and those not

specifically linked to an included framework. Any disagreements were resolved by a third reviewer.

DATA ABSTRACTION AND SYNTHESIS

All data abstraction was first completed by one reviewer and then checked by another. All disagreements were resolved by consensus. We used a standardized format to abstract data on framework or model characteristics, including object of coordination, main components, care coordination definitions, setting or population in which the model was developed, and whether measures or interventions have been developed based on the framework. For identified assessments measures/tools, we abstracted brief data on instrument type, perspective, domains and characteristics assessed, setting, and level of validation (*ie,* none, some, extensive). However, our listing of the frameworks and the measures in this brief is not an endorsement of their validity, as the ESP did not conduct formal quality analysis or evaluate the strength of evidence.

RESULTS

LITERATURE FLOW

The literature flow diagram (Figure 1) summarizes the results of search and study selection (see supplemental materials for full list of excluded studies). Our search identified 4,389 unique, potentially relevant articles. Of these, we included 35 original frameworks (Key Questions 1, 2). Additionally, we identified 10 publications[10,33-41] defining and/or validating measures or tools and 2 on interventions[20,21] (Key Question 3) developed based on the identified frameworks.

Figure 1: Literature Flow Chart

Identification	
Records identified through database searching **(n=6398)** Medline (n=2328) PsycINFO (n=1508) CDSR (n=6) CCRCT (n=306) CINAHL (n=1961) SocINDEX (n=289)	Records identified through reference lists and grey literature searching **(n=159)**

Records remaining after removal of duplicates **(n=4390)**

Excluded **(n=4282)**

Screening / Eligibility

Records remaining after title and abstract review **(n=108)**

Excluded **(n=63)**
· No framework presented (n=27)
· Framework not specific to care coordination (n=7)
· Previously captured framework(s) (n=22)
· Measure not specific to included framework (n=5)
· Full text not available (n=2)

Included

Records remaining after full-text review and included in synthesis
· **Original frameworks (n=35)**
· **Measurement tools for existing frameworks (n=12)**
· **Total n=45***
*Not mutually exclusive

KEY QUESTION 1: What are the theoretical models and conceptual frameworks for guiding practitioners in coordinating care in research or practice, and what are their key characteristics?

The 35 frameworks identified in this review reflected a wide range of conceptual and structural diversity. The supplemental Excel® file provides detailed data abstraction on all included frameworks. Additionally, a more concise summary of their characteristics can be found in Appendix A of the Supplemental Materials, along with an annotated bibliography at the end of this report. Among these frameworks, several are older, foundational, and not specific to health care coordination,[42,43] and/or have unclear key characteristics because we were unable to locate full-text articles.[16,44-46] Therefore, we have focused on discussing the similarities and unique features of the more recent frameworks. Of these, 12[12,13,16,19,21,25,42-47] were previously identified by the McDonald 2007 and Van Houdt 2013 reviews and 23[2,4-11,14,15,17,18,20,22-24,26-31,48] are new.

Development of the majority of frameworks was motivated by the perceived need for a general framework that identifies, describes, and structures relevant concepts. Most frameworks were based on a combination of existing theories, which were highly variable. Organizational design theory was the most commonly cited (17%).[7,12,13,26,27,45] The Team Focused and Clinical Content Framework was unique in that its theoretical/contextual basis was 'crew resources management in aviation'.[14] Only a few frameworks were developed primarily based on formal literature review and key informant discussions.[2,4,17] Only one-third of frameworks explicitly identified a specific definition for care coordination or integration that served as a foundation of their framework,[2,4,5,7,17,24,26-31] with the 2014 Agency for Healthcare Research and Quality's (AHRQ) definition proposed by McDonald and colleagues being the most frequently cited.[2,4,24,31] Regarding planned populations/setting(s), 66% addressed overall health while others focused on a specific disease or care setting: 2 in palliative care,[6,28] one in mental health,[7] one in long-term care,[8] 2 in critical or intensive care,[19,25] one in hospice care,[21] one in care transitions,[24] one in communicable disease control programs,[26] and 2 in primary care (Table 1).[29,31] Twenty-eight percent were considered patient-centered (*ie*, explicitly naming patients/individuals as a key component that was placed at the center of the framework). Other components of interest include that 50% were developed in the US and 2 were either based on VA data[7] or involved VA funding/researchers.[30] Eight frameworks were not specific to health care coordination or integration, but focused on broader areas of organization or integration,[12,36,42-47] and 3 publications describe implementation strategies.[9,14,15]

In terms of main components of the included models and frameworks, a review by Van Houdt et al in 2013 identified the following 14 components: external factors, structure, task characteristics, cultural factors, knowledge and technology, need for coordination, administrative operational processes, exchange of information/communication, goals, roles, quality of relationship, patient outcome, team outcome, and organizational or inter-organizational outcome.[2] From any of the newer frameworks, we did not identify any additional key concepts that were missing from Van Houdt's 2013 list. Based on assessment of those 14 components, the Van Houdt 2013 review identified Gittell's Relational Coordination Theory and Multi-Level Framework as the most comprehensive as it addressed 11 of the 14 components.[12,13] Among the newer frameworks we identified, the Sustainable intEgrated chronic care modeLs for multi-morbidity: delivery, FInancing, and performancE (SELFIE) is the most comprehensive and unique – also encompassing 11 of the 14 components from Van Houdt 2013. It encompasses the widest range of concepts and groups them both by WHO health system components and by

micro (care team), meso (organizational infrastructure and resources), and macro levels (regulatory, market and policy environment), with individuals and their environments at the center.[17] SELFIE was based on a systematic review which includes several of the frameworks identified by this brief.[10,20,23,27]

Table 1. Characteristics of Included Models and Frameworks

Characteristic	Number of Frameworks (%)*	Specific Frameworks
Framework developed in the US	16 (50.0)	Alter 1993,[44] Andersen 1995,[42] Benzer 2015,[7] Donabedian 1966,[43] Gittell 2002,[12] Gittell 2004,[13] Klein 2001,[16] Malhotra 2007,[19] McDonald 2014,[4] McGrath 1991,[47] Nadler 1988,[45] Oliver 2010,[21] Radwin 2016,[24] Singer 2011,[27] Weaver 2018,[30] Zlateva 2015[31]
Framework based on VA data or done by VA researchers	2 (6.25)	Benzer 2015,[7] Weaver 2018[30]
Frameworks conceptualizing the phenomenon/mechanisms/actions of care coordination/integration	8 (25.0)	Bradbury 2014,[9] Klein 2001,[16] Leijten 2018,[17] Lemiuex-Charles 2006,[18] Minkman 2012,[20] Palmer 2018,[23] Singer 2011,[38] Weaver 2018[30]
Person-centered frameworks (explicitly have "Person" or "Individual" at the center of the framework)	9 (28.1)	Bainbridge 2010,[6] Billings 2014,[8] Evans 2016,[11] Kates 2012,[15] Leitjen 2018,[17] Oliver 2010,[21] Radwin 2016,[24] Singer 2011,[27] Valentijn 2013[29]
Frameworks with narrow focus (specific disease or setting, *etc*)	11 (34.4)	Bainbridge 2010,[6] Benzer 2015,[7] Billings 2014,[8] Malhotra 2007,[19] Oliver 2007,[21] Radwin 2016,[24] Reader 2009,[25] Shigayeva 2010,[26] Siouta 2016,[28] Valentijn 2013,[29] Zlateva 2015,[31]
Frameworks that have led to measures	11 (34.38)	Bainbridge 2010,[6] Bradbury 2014,[9] Calciolari 2016,[10] Gittell 2002,[12] Lemieux-Charles 2006,[18] McDonald 2014/Schultz 2013,[3,4] Minkman 2012,[20] Oliver 2010,[21] Singer 2011,[27] Valentijn 2013,[29] Zlateva 2015[31]
Frameworks with validated measures	9 (28.13)	Bainbridge 2010,[6] Calciolari 2016,[10] Gittell 2002,[12] Lemieux-Charles 2006,[18] McDonald 2014/Schultz 2013,[3,4] Oliver 2010,[21] Singer 2011,[27] Valentijn 2013,[29] Zlateva 2015[31]
Frameworks that have led to interventions**	2 (6.25)	Minkman 2012,[20] Oliver 2010[21]
Frameworks focused on organizing and/or evaluating measure	3 (9.4)	Bautista 2016,[5] McDonald 2014/Schultz 2013,[3,4] Strandberg-Larsen 2009[48]

*Does not include Alter 1993, Klein 2001, or Nadler 1988 as we were unable to locate full-text articles of these publications (n=32 frameworks total)

**Only captures interventions defined in the original framework publication. We did not do a systematic search for interventions from each framework.

In addition to key components, we considered similarities in general structure and purpose across frameworks and describe some observed groupings below.

Structure-Process-Outcome Frameworks

Several frameworks use Donabedian's basic structure-process-outcome (SPO) framework and share many components.[6,10,11,18,25,30] However, these differ in the level of their focus, where they position certain concepts, and what they call the domains. The framework by Bainbridge 2010 is the only one to incorporate meso-level components, such as broader population factors (*eg*, population density).[6] Although Bainbridge 2010 developed the approach for application in palliative care, the framework itself is very general. Three frameworks have a team focus[18,25,30] and do not incorporate meso-level features. Lemieux-Charles 2006[18] and Reader 2009[25] seem very similar, although Lemieux-Charles 2006 seems more detailed. Weaver 2018 is unique in that it stratifies the team components by within-team and between-team levels.[30] Two frameworks similarly have an organizational-level focus.[10,11] Evans 2016 is unique for its highlighting of factors that key informant interviews ranked as most important.[11] McDonald 2014 is unique in that its framework was intended to be used to organize measures based on perspective of measurement (*eg*, patient/family, healthcare professional, system).[4] An interesting difference in domain naming and positioning is that in the Evans 2016 Context and Capabilities for Integrating Care (CCIC) Framework, they created an additional domain located between Structure and Process to separate out "People and Values" concepts and located concepts there, such as Provider Characteristics (job satisfaction, attitudes toward change), which in the Bainbridge 2010 framework are located in the Process of Care domain. Table 2 below describes how the SPO categories are characterized. To illustrate the variability, we note where "provider attitudes" are located. We also note some other unique features in Table 2.

Table 2. Structure-Process-Outcome Frameworks

Author Year	Level/Focus	Structure-like domains	People and value-like domains	Process-like domains	Where "provider attitudes" are located	Unique features
Bainbridge 2010[6]	Nature and extent of inter-professional collaboration, community readiness, and client-centered care	Environmental factors, network characteristics, economic factors	In process of care domain	Provider characteristics, extent of collaboration among providers, information transfer, organizational factors	Under "Provider Characteristics" Subdomain, within Process of Care	Identifies and defines 15 patient outcomes within 3 categories: Satisfaction, Perception of Client-Centeredness, Perceptions of Continuity
Calciolari 2016[10]	Antecedents	Contextual traits, organizational arrangements	Transition management culture	Care integration	Transition management culture	Some unique indicators, such as *flexibility* of financing sources and provider *adaptability*
Evans 2016 CCIC[11]	Organizational and inter-organizational capabilities: 18 factors in 3 categories	Basic structures: Physical features, resources, *etc*	People and values: Leadership approach, commitment to learning	Key processes: Partnering, delivering care, *etc*	Under "Readiness for Change" subdomain, within People and Values Domain	Highlights contextual factors and capabilities that key informant interviews ranked most important. Suggests can be used to assess readiness to integrate.
Lemieux-Charles 2006 (ITEM)[18]	Health care team	Social and policy context, organizational context, task type, task features, team composition	Team psycho-social traits	Team processes	NR	Although domain names are different and "team psycho-social traits" are separated out in a unique way, the actual content seems identical to Bainbridge 2010
McDonald 2014[4] Schultz 2013[3]	Framework for organizing measures	Goals	N/A	Coordination activities, Broad approaches	NR	Emphasized that effects can be experienced differently depending on perspective (patient/family, healthcare professional, system representative)
Reader 2009[25]	Team	Input: Team, task, leader	N/A	Team processes: Communication, leadership,	Under "team" subheading as "Input" (which seems similar to "structure")	Really doesn't incorporate meso system factors, such as economic factors. But, dives deeper into task

Author Year	Level/Focus	Structure-like domains	People and value-like domains	Process-like domains	Where "provider attitudes" are located	Unique features
				coordination, decision-making		specific and leader factors, like time pressure, resilience to stress
Weaver 2018[30]	Chronic and Complex Disease Management	Context and setting	Emergent integrating conditions (*eg*, accountability, predictability, trust)	Coordination mechanisms and Coordinating actions	NR, but similar concepts in 'emergent integrating conditions'	Stratified by intrateam and interteam levels; separates out behaviors and conditions underlying effective coordination

Abbreviations: NR= Not reported

Systems Models Mapped onto SELFIE (WHO Health Care System)

Several frameworks were similarly structured with a central core – typically the individual and their environment – around which concepts pertaining to integrated care were placed, explicitly[17] or generally split according to WHO components: service delivery, leadership and governance, workforce, financing, technologies and medical products, and information and resources.[8,9,17,23] The SELFIE framework is the most recent and most comprehensive, and unique in stratifying by micro, meso, and macro levels.[17] The AQUA framework is unique in that outcomes are at the center of the framework and patient and career engagement is one of the contributing factors.[9]

Table 3. Systems Models Mapped onto SELFIE

	What is in center of model?	Individual	Environment	Service delivery	Leadership & Governance	Workforce	Financing	Technologies and medical products	Information & Research	Additional
SELFIE[17]	Individual with multi-morbidity and environment	At core	At core	Service delivery	Leadership & Governance	Workforce	Financing	Technologies and medical products	Information & Research	Stratified by micro, meso, and macro levels
INTER-LINKS[8]	People	People	Identity of LTC	Pathways and processes; organizational structures	Policy and Governance; Management and Leadership		Means and resources	Means and resources	Means and resources	Identity of LTC
AQUA[9]	Outcomes	Patient and caregiver engage-ment	Culture	Service and Care Model Design	Leadership; Governance	Workforce	Financial and contractual mechanisms		Information and IT	
JA-CHRODIS (5 domains)[23]	No physical center	Self-manage-ment	Social and community resources	Care delivery			Decision support		Information systems	

Implementation

Only 3 frameworks describe implementation strategies (Table 4).[9,14,15] Of these, the Kates 2012 and Bradbury 2014 frameworks are the most comprehensive.[9,15] Kates 2012 is unique in proposing a implementation strategy that includes factors such as incorporation of a quality improvement "coach", and an effective spread strategy and description of system-level enablers. Bradbury 2014 is unique in describing their actual experiences translating theory into practice.

Table 4. Frameworks Describing Implemention Strategies

Author Year	Unique Focus	Description
Bradbury 2014[9] (AQUA)	Describes experience translating theory into practice	Describes steps they used to build a community created to translate theory into practice: Identify participants, develop leadership, select and implement theory of change (Kotter's) in step 5 of which (empower others to act on the vision) they discussion the Integrated Care Framework as part of the technical workshop curriculum for development of leadership capability
Kates 2012[15]	Proposes a framework, implementation strategies, and system-level structures and policies needed to support primary care transformation	Proposes implementation strategies including increasing skills of staff, providing access to tools and resources, quality improvement coaches, and an effective spread strategy. It also identifies 10 system-level enablers of primary care transformation
Hepworth 2010[14]	Proposes general practical framework for establishing and monitoring team practices – drawing on analogy of crew resource management in aviation	Ideal pathway: (1) Planning, (2) Meetings: (2a) Team monitoring and (2b) Clinical content; (3) Review, monitor, evaluate, (4) Team integration.

Quality Improvement/Management Models

Two publications identified themselves as quality management models that were designed to highlight conditions thought to be associated with effective integration, which, in the case of Minkman's Development Model for Integrated Care (DMIC), was based on literature review and/or expert consensus.[15,20] The frameworks share several similar components, such as patient engagement, innovation, measurement and improvement, and partnerships, but the DMIC contains the greatest number of components (Table 5).

Table 5. Quality Management Models

Author Year	Focus	Components	Other
Minkman 2012[20]	Identifies elements and clusters of a quality management model for integrated care	Identifies 89 elements in 9 clusters: quality care, performance management, inter-professional teamwork, delivery system, roles and tasks, patient-centeredness, commitment, transparent entrepreneurship, and results-focused learning, some of which highlight conditions for effective collaboration (*eg*, commitment,	They validated the model and developed a web-based self-assessment tool

	clear roles) and could be used as a set of performance measures	
Kates 2012[15]	Describes key elements of high-performing primary care and the supports required to attain it	3 components: (1) patients, their families and the communities in which they live; (2) surrounding that core is a ring representing 6 key characteristics of a transformed model of primary care (partnerships, population approach, team-based care, measurement and improvement, innovation, patient engagement, partnerships; (3) desired IHI triple aim outcomes at the bottom	Proposes implementation strategies including increasing skills of staff, providing access to tools and resources, quality improvement coaches, and an effective spread strategy. It also identifies 10 system-level enablers of primary care transformation

Focused on Dimensions, Objects, and Types of Integration

Several frameworks similarly focused on identifying and defining dimensions, objects, and types of integration (Table 6).[5,7,27,29] Three of them focus on dimensions/objects of integration and share the clinical and professional/organizational aspects and patient focus.[5,27,29] Singer 2011 uniquely additionally identifies link to community resources, continuous familiarity over time, continuous proactiveness between visits, and shared responsibility.[27] The Valentijn 2013 model (RMIC) uniquely additionally incorporates functional and normative integration as components ensuring connectivity between levels, and Bautista 2016 builds on this model by mapping continuum of integration and continuum of care onto the RMIC.[29] Benzer 2015 more narrowly focuses on describing organizational concepts related to personal and standardized types of coordination and presents hypothetical processes of how they impact integration.[7]

Table 6. Dimensions, Objects, and Types of Integration

Author Year	Purpose	Description
Bautista 2016[5]	Describes constructs used to describe *degree* of integration	Mapped continuum of integration (linkage, coordination, full integration) and continuum of care (health promotion, disease prevention, diagnosis treatment and rehabilitation, long-term palliative care) onto the RMIC (see above)
Benzer 2015[7]	Describes organizational concepts related to personal and standardized types of coordination and presents hypothetical processes of how they impact integration	Personal coordination: Physical proximity, interaction history, computer-mediated communication, formal meetings can lead to staff engagement, same-day access, curbside consult and collaborative care Standardized coordination: Leadership priorities, training and unscheduled time can lead to appropriate referrals and same-day access.
Singer 2011[27]	Clarifies "object of integration" and its essential components to enable assessment	Describes and provides sample items for 7 essential dimensions of integration: 5 dimensions related to different forms of coordination (differing in their 'objects' – within teams, across teams, between teams and community resources, continuous familiarity over time, continuous proactiveness between visits) 2 to patient-centeredness (patient-centered, shared responsibility)
Valentijn 2013[29] (RMIC)	Demonstrates inter-relationships among *dimensions* of integrated care from a primary-care perspective	Combines functions of primary care (person-focused, population-based) with dimensions of integrated care at micro (clinical), meso (professional, organizational) and macro levels (system), with functional and normative integration ensuring connectivity between levels

Miscellaneous

Several frameworks focused on miscellaneous specific aspects of integration or coordination to meet more specific needs,[12,13,19,21,24,28,47] such as how to integrate family involvement into hospice interdisciplinary team meetings[21] or describing cognitive workflow in critical care[19] (Table 7).

Table 7. Other Factors of Integration

Author Year	Unique Focus	Description
Gittell 2002[12]	Relationships between participants – 'Relational coordination'	Describes 3 coordinating mechanisms (routines, boundary spanners, and team meetings) and how relational coordination functions as a mediator and input uncertainty functions as a moderator of performance effects.
Gittell 2004[13]	Describes organizational design and network perspectives for coordination within and across organizations	Depicts the impact of organizational design factors on organization coordination networks and in turn on quality and efficiency for 3 levels: (1) within an organization, (2) between organizations, and (3) considering if same mechanisms are used both within and between organizations.
Malhotra 2007[19]	Cognitive workflow modeling in critical care	A continuous cycle, with no start or finish, for 7 critical zones: (1) re-orientation and pre-planning, (2) goal formulation, (3) goal execution, (4) transfers, (5) admission, (6) reassessment, (7) evening sign-out
McGrath 1991[47]	Time, Interaction and Performance (TIP) Group Theory	Describes 4 modes (inception, problem solving, conflict resolution, execution) for each of 3 key functions (production, well-being, member support) and direct and indirect paths across modes
Oliver 2010[21]	Interdisciplinary team model inclusive of family	Non-linear model that identifies 4 key components (context, structure, process and outcomes), all with feedback loops between them and all of which may encourage or discourage family involvement in teams.
Radwin 2016[24]	Care coordination across transitions in care settings	Indicates that coordination is comprised of clinician activities and continuity and defines key processes for each, and temporally portrays that pretransition patient characteristics and patient-centered care affect continuity and clinician activities, which in turn affect patient-centered care and outcomes in the setting after transition.
Siouta 2016[28]	Systematically reviewed integrated European Palliative Care models and proposed generic framework that identifies key components to use to design an intervention.	Fosters integrating PC in the disease trajectory concurrently with treatment and identifies the importance of employing a PC-trained multidisciplinary team with a 3-fold focus: treatment, consulting and training. 5 aspects are: Focus of intervention, setting, timing of intervention, composition of team, collaboration strategy

KEY QUESTION 2: What are the theoretical models and conceptual frameworks for guiding practitioners in evaluating care coordination in research or practice, and what are their key characteristics?

Three frameworks were self-described as measurement-focused (Table 8).[26,27,31] Their measurement approaches are each distinct from one another. Singer 2011 describes ideal targets for each of 5 dimensions of coordination ("objects") and 2 of patient-centeredness.[27] Shigayeva 2010 describes 4 general levels of increasing integration and provides examples for each based on TB and HIV/AIDS programs integration.[26] Zlateva 2015 suggests short-term and long-term outcomes specific to 5 domains essential to care coordination in the PCMH.[31]

Table 8. Measurement-focused Approaches

Author Year	Focus	Domains	Other notes
Singer 2011[27]	Describes ideal targets for each of 5 dimensions of coordination ("objects") and 2 of patient-centeredness	Coordination within care team, coordination across care teams, coordination between care teams and community resources, continuous familiarity with patient over time, continuous proactive and responsive action between visits, patient centered, shared responsibility	Provides sample items
Shigayeva 2010[26]	Describes 4 levels of integration along a continuum through a lens of interaction	No interactions, partial integration (includes linkage and coordination) to full integration	Describes example interactions between TB and HIV/AIDS programs for 4 program components across the levels of integration
Zlateva 2015[31]	Identifies 5 domains essential to assessing care coordination in the PCMH and defines essential structures, processes and outcomes for each of these domains.	Healthcare home, plan of care, self-management, communication, patient assessment and support, care transitions	Suggests both short-term and long-term outcomes

KEY QUESTION 3: Among those theoretical models/frameworks identified, which have been the most influential?

Based on assessment of number of annualized forward citations and whether or not a measure (Table 9) and/or an intervention was derived from the framework, we identified The Integrated Team Effectiveness Model,[18] the Development Model for Integrated Care (DMIC),[20] and the Rainbow Model of Integrated Care (RMIC)[29] as the most influential.

Bibliometric analysis found that the average number of annualized forward citations for coordination-focused frameworks[2,4-11,14-21,23-31,44,46-48] was 4.99 (range, 0 to 26.54). At 26.54, the Integrated Team Effectiveness Model[18] was notable as having the highest number of annualized citations, as well as leading to development of the Integrated Team Effectiveness Instrument, a provider survey with demonstrated construct validity.[40] Similarly, the Rainbow Model of Integrated Care (RMIC) had 17.17 annualized forward citations and led to the development of a 44-item provider survey with demonstrated face validity, internal consistency, construct validity, and reliability.[29] Although

Minkman's DMIC had a much lower number of annualized forward citations (0.71), it is the only model we identified that has both led to the development of a survey that has been partially validated, as well as to formation of multidisciplinary teams working incorporating the DMIC framework in the care of patients with stroke, acute myocardial infarct (AMI), or dementia.[20] Oliver's Integrative Model is the only other model that we identified that has led to development of an intervention, which involved incorporating telemedicine for hospice patients and caregivers.[21]

Other frameworks for which we did not yet identify a measure, but that showed potential for measure development or field use, include several that had qualitative assessments of a framework concept[11,13,14,20] and that hinted at future measures.[17,23,24,30]

Table 9. Measures Associated with Included Models and Frameworks

Framework	Associated Measure/Tool	Instrument Type	Perspective	Description (Domains, Characteristics)	Setting	Validated*
Bainbridge, 2010[6]	Health Care Provider Integration Survey[35] Adapted from Index of Interdisciplinary Collaboration and Partnership Self-Assessment Tool.	Survey	Providers	Adapted items from the Index of Interdisciplinary Collaboration (IIC) and Partnership Self-Assessment Tool and 14 new questions. Evaluates extent of interprofessional collaboration and information sharing, as well as provider and organization characteristics that facilitate horizontal integration. Uses 5-point Likert scale from "strongly agree" to "strongly disagree"	Palliative care	Some: Face and construct validity and internal reliability
Bradbury, 2014[9] (AQuA Integrated Care)	Integrated Care Toolkit[33] Available at https://www.aquanw.nhs.uk/resources/integrated-care-toolkit/20649	System Integration Assessment chart, Measurement guide, Domain guide	Providers, Mangers	This toolkit is not a step-by-step guide to system integration. Rather, it supports understanding where changes need to be made and in identifying what those changes might look like, particularly across 8 key areas which are referred to as domains throughout this Toolkit.	Multiple UK Health and Social Care Economies	No
Calciolari, 2016[10]	Ad-hoc survey[10]	Survey	Providers	24 items on the following areas: Integration, Transition Management Culture, Contextual Traits, Organizational Arrangements, Operating Means, Care Improvement. The majority of items were measured on a 7-point Likert scale anchored at the end points, with the exception of items concerning the presence/absence of operating means (based on a binary scale).	Italian local health units	Some: construct validity
Gittell, 2002[1,2,12] (Relational Coordination Framework)	Relational Coordination Survey[36]	Survey	Providers	A total of 7 survey questions including 4 about communication (frequency, timeliness, accuracy, problem-solving) and 3 about relationships (shared goals, shared knowledge, mutual respect).	Inpatient, primary care, outpatient specialty; LTC	Some: Construct validity
Lemieux-Charles, 2006[18] (ITEM)	Integrated Team Effectiveness Instrument[40]	Survey	Providers	Measures 25 relevant aspects of teamwork effectiveness, with answer choices on a 4-point Likert Scale.	COPD	Some: Construct validity

Framework	Associated Measure/Tool	Instrument Type	Perspective	Description (Domains, Characteristics)	Setting	Validated*
McDonald 2014[4] Shultz 2013[3] (Care Coordination Measures Atlas)	Care Coordination Quality Measure for Primary Care (CCQM-PC)[41]	Survey	Patients	A patient experience of care survey that was developed, cognitively tested, and piloted with patients from a diverse set of 13 primary care practices to comprehensively assess patient perceptions of the quality of their care coordination experiences. Questions focused on communication and information sharing, as well as person-centered care.	Primary Care	Some: Reliability, internal consistency
Minkman, 2012[20]	Publication mentions web-based self-assessment tool, but we were unable to locate it.[20]	Survey	Unknown	A digital self-assessment tool containing a set of 89 elements of integrated care grouped into 9 clusters: quality care, performance management, inter-professional teamwork, delivery system, roles and tasks, patient-centeredness, commitment, transparent entrepreneurship, result-focused learning	Multiple integrated care settings	Some: Face and construct validity
Oliver, 2010[2,21] (Integrative Model)	Modified Index for Interdisciplinary Collaboration[22]	Survey	Providers	42-item questionnaire measured on a 5-point Likert scale. Included questions on the following areas: Interdependence and flexibility, Newley created professional activities, Collective ownership of goals, Reflection on process. Webpage of other publications: http://www.hospice-research.org/Publications.html	Hospice	Some: Reliability
Singer, 2011[27] (Integrated Patient Care)	Patient Perception of Integrated Care Survey[38]	Survey	Patients	29 items with yes/no or 4-point scales measuring 7 constructs of coordination and patient-centeredness	Primary care clinics of patient with multiple chronic conditions	Extensive; internal consistency, discriminant validity, and goodness of fit
Valentijn, 2013[29] (Rainbow Model of Integrated Care -RMIC)	RMIC Measurement Tool[34,37,39]	Survey	Provider, Manager	44 items grouped into 8 dimensions corresponding to 8 domains assessing micro-level (clinical), meso-level (professional and organizational), macro-level (system), and enabling (functional and normative) aspects of integrated care; uses 5-point Likert scale ranging from never to all the time	Regional Health System of Singapore	Extensive: face validity, internal consistency, construct validity and reliability

Framework	Associated Measure/Tool	Instrument Type	Perspective	Description (Domains, Characteristics)	Setting	Validated*
Zlateva, 2015[31] (PCMH CC Conceptual Model)	Medical Home Care Coordination Survey-Patient[31] Medical Home Care Coordination Survey-Healthcare Team[31] .	Survey	Patients and providers	13 items for patients across plan of care, communication, link to community resources and care transitions domains; 32 items for providers across those same domains as well as accountability, IT capacity, follow-up plan, and self-management. Questions were measured on a 5-point Likert scale	Primary care	Extensive: internal consistency, reliability, discriminant and convergent validity.

*Measures were considered validated if the located publication stated them as such

Previous reviews of care coordination measures (Table 10), had identified level of validation and professional and system representation perspectives as gaps in existing measures.[3-5,18,48] We identified 23 measures unidentified by previous reviews.[2,4-11,14,15,17,18,20,22-24,26-31,48] Among those, several appear to address these previously identified gaps – with most having some[3,4,6,10,12,18,20,21] to extensive[27,29,31] levels of validation and several focusing on provider perspectives.[6,9,10,12,18,21,29,31] System representation perspective still appears to be a gap in the available measures we identified that were associated with the included frameworks. As this review was not designed to identify all available measures – only those associated with frameworks – other measures may exist in general and that provide system representation perspectives.

Table 10. Reviews of Care Coordination Measures

Author Year	Measures	Components	Objective	Key findings	Identified gaps
Bautista 2016[5]	379 validation studies (209 instruments administered to patients [60%], providers [20%])	Clinical integration, professional, organizational, functional integration	Provide evidence on state of the art in measuring integrated care	Most instruments measure constructs related to care integration and patient-centered care, which map to the clinical integration domain	Quality of measurement properties of instruments is in need of improvement
Lemieux-Charles 2006[18]	Team effectiveness measures	Team	Appraise existing research on team care interventions and provide recommendations for enhancement of conceptualization, design, and management of future health care team effectiveness research	Most instruments used to measure teamwork have not been well-validated nor evaluated in health care settings	Future team effectiveness research needs to use a more consistent and clearly defined set of variables to examine task features and team composition in relation to both processes and outcomes
McDonald 2014[4] Schultz 2013[3]	AHRQ Measures Atlas with all measures mapped to a framework, and	Coordinating mechanisms, broad approaches, perspective	Organize measures of care coordination to create a measure selection guide	Measures of care coordination can be mapped to different perspectives:	Fewer measures available for health care professional and system representation

	summary of validations for each			patient/family, health care professional, and system representative	perspectives compared with patient perspectives.
Strandberg-Larsen 2009[48]	24 measurement methods	Structural, cultural, process aspects	Use criteria to assess whether methods to measure integrated healthcare delivery are "sound": Based on theoretical model? Concept clearly defined? Level of analysis clearly defined? Does it include structural, cultural, and process aspects? Does it measure integration relative to an ideal target? Is the measure quantifiable? Has internal validity been demonstrated? Has validity across settings been established?	Frameworks measured a variety of concepts that reflects the conceptual diversity within the field	Most methods lack information regarding validity and reliability

DISCUSSION

Understanding and use of the large number of care coordination conceptual frameworks is currently limited by their complexity and wide variability. To our knowledge, ours is the most recent review of care coordination conceptual frameworks that provides structured information designed to help identify similarities, differences, and unique features to assist with greater adoption. Among the 35 frameworks we identified for guiding care coordination, development of most was motivated by perceived need for a general framework that identifies, describes, and structures relevant concepts. Organizational design theory was the most commonly cited foundational theory. A minority of frameworks explicitly identified a specific definition for care coordination or integration that served as a foundation of their framework, with the 2014 Agency for Healthcare Research and Quality's (AHRQ) definition proposed by McDonald and colleagues being the most frequently cited. Regarding planned populations/setting(s), most addressed overall health.

In terms of main components of the included models and frameworks, the 14 components identified by Van Houdt et al in 2013 appear to generally still be up to date.[2] Among the newer frameworks we identified, SELFIE was the most comprehensive, encompassing 11 of the 14 components from Van Houdt 2013.[17] Common approaches used to group framework components included Donabedian's Structure-Process-Outcome model and the 6 WHO health system components (*ie*, service delivery, leadership and governance, workforce, financing, technologies and medical products, and information and research).

Three frameworks were self-described as measurement-focused. Each described distinct measurement approaches including identification of ideal targets for each of 5 dimensions of coordination ("objects") and 2 of patient-centeredness, 4 general levels of increasing integration with examples for each based on TB and HIV/AIDS programs integration, and short-term and long-term outcomes specific to 5 domains essential to care coordination in the PCMH.

Based on assessment of number of annualized forward citations and whether or not a measure and/or an intervention was derived from the framework, we identified The Integrated Team Effectiveness Model,[18] the Development Model for Integrated Care (DMIC),[20] and the Rainbow Model of Integrated Care (RMIC)[29] as the most influential. Previous reviews of care coordination measures identified level of validation and professional and system representation perspectives as gaps in existing measures. Among the 23 measures unidentified by previous reviews, several appear to address these previously identified gaps, except for system representation perspective. However, as this review was not designed to identify all available measures – only those associated with frameworks – other measures may exist in general and that provide system representation perspectives.

One of the main gaps in the care coordination frameworks that we studied was the limited guidance provided on how to implement care coordination in health systems. Also, few frameworks have led to development of interventions for improving care coordination.

The structured information provided in this review led to SOTA work group domain experts' identification of 5 major dimensions that could be used to distinguish the focus of care coordination frameworks and facilitate their adoption by clinicians/managers and researchers: (1) contextual factors, (2) coordination domains, (3) levels of coordination, (4) types of coordination, and (5) coordination mechanisms. Contextual factors refer to myriad environmental conditions that may promote or detract from clinicians' ability to coordinate care. Coordination domains emphasize distinctions according to

the locus of coordination between primary and specialty care or between medical care and social services. Levels of coordination refer to where the coordination is taking place. Types of coordination differentiate aspects of coordination such as structural, functional, and clinical. Lastly, coordination mechanisms focus on the means of coordination such as personal and relationship-oriented mechanisms versus technical/feedback-oriented mechanisms.

Our initial review provides a basis for understanding similarities and variation among available care coordination conceptual frameworks. The findings will facilitate further development of interventions and measures along these 5 theory-based dimensions. This rapid evidence synthesis will facilitate application of theory to further research and practice aims for care coordination. To further increase its usefulness, future research should similarly classify care coordination interventions, measures, and evaluation metrics along these 5 theory-based dimensions.

ACKNOWLEDGMENTS

ANNOTATED BIBLIOGRAPHY

1.   McDonald KM, Sundaram V, Bravata DM, et al. Closing the quality gap: A critical analysis of quality improvement strategies (vol. 7: Care coordination). *AHRQ technical reviews*. Rockville (MD): Agency for Healthcare Research and Quality (US); 2007. 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((R)), and November 15, 2006 for CINAHL((R)), 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 Gittell'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.

2.   Van Houdt S, Heyrman J, Vanhaecht K, Sermeus W, De Lepeleire J. An in-depth analysis of theoretical frameworks for the study of care coordination. *International Journal of Integrated Care (IJIC).* 2013;13:e024-e024.
Introduction: Complex chronic conditions often require long-term care from various healthcare professionals. Thus, maintaining quality care requires care coordination. Concepts for the study of care coordination require clarification to develop, study and evaluate coordination strategies. In 2007, the Agency for Healthcare Research and Quality defined care coordination and proposed five theoretical frameworks for exploring care coordination. This study aimed to update current theoretical frameworks and clarify key concepts related to care coordination.
Methods: We performed a literature review to update existing theoretical frameworks. An in-depth analysis of these theoretical frameworks was conducted to formulate key concepts related to care coordination.
Results: Our literature review found seven previously unidentified theoretical frameworks for studying care coordination. The in-depth analysis identified fourteen key concepts that the theoretical frameworks addressed. These were 'external factors', 'structure', 'tasks characteristics', 'cultural factors', 'knowledge and technology', 'need for coordination', 'administrative operational processes', 'exchange of information', 'goals', 'roles', 'quality of relationship', 'patient outcome', 'team outcome', and '(inter)organizational outcome'.
Conclusion: These 14 interrelated key concepts provide a base to develop or choose a framework for studying care coordination. The relational coordination theory and the multi-level framework are interesting as these are the most comprehensive.

3.   Schultz EM, Pineda N, Lonhart J, Davies SM, McDonald KM. A systematic review of the care coordination measurement landscape. *BMC Health Serv Res.* Mar 28 2013;13:119.
BACKGROUND: Care coordination has increasingly been recognized as an important aspect of high-quality health care delivery. Robust measures of coordination processes will be essential tools to evaluate, guide and support efforts to understand and improve coordination, yet little agreement exists among stakeholders about how to best measure care coordination. We aimed to review and characterize existing measures of care coordination processes and identify areas of high and low density to guide future measure development. METHODS: We conducted a systematic review of measures published in MEDLINE through April 2012 and identified from additional key sources and informants. We characterized included measures with respect to the aspects of coordination measured (domain), measurement perspective (patient/family, health care professional, system representative), applicable settings and patient populations (by age and condition), and data used (survey, chart review, administrative claims). RESULTS: Among the 96 included measure instruments, most relied on survey methods (88%) and measured aspects of communication (93%), in particular the transfer of information (81%). Few measured changing coordination needs (11%). Nearly half (49%) of instruments mapped to the patient/family perspective; 29% to the system representative and 27% to the health care professionals perspective. Few instruments were applicable to settings other than primary care (58%), inpatient facilities (25%), and outpatient specialty

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care (22%). CONCLUSIONS: New measures are needed that evaluate changing coordination needs, coordination as perceived by health care professionals, coordination in the home health setting, and for patients at the end of life.

4. McDonald KM, Schultz E, Albin L, et al. Care coordination measures atlas. 2014. Since the original Atlas was published in December 2010, interest in care coordination has continued to grow, and many new coordination measures have been developed and published. This updated version of the Atlas contains some of those new measures, with a particular focus on those that reflect coordination efforts within the primary care setting. Primary care was selected as a focus given its often central role in coordinating care across settings, particularly as accountable care organization and patient-centered medical home delivery models are more widely implemented. Furthermore, this focus aligns with the original scope of the Atlas that centered on measures that might reasonably be applied in the ambulatory care setting. Measures selected for this update are also applicable to broad groups of patients, such as the general population or patients with any chronic condition, rather than measures tailored to individuals with a single disease or condition.

    This update also contains a new section on emerging trends in care coordination measurement. It focuses, in particular, on measures that utilize data from electronic health records (EHR), in addition to a brief discussion of approaches based on social network analysis. Use of EHRs both to carry out and to measure care coordination is central to the Centers for Medicare and Medicaid Services' (CMS) EHR incentive programs. The Medicaid EHR Incentive Program and the Medicare EHR Incentive Program offer additional payments to eligible professionals and hospitals that can attest to and implement Meaningful Use of EHRs through reporting of measures established by the Office of the National Coordinator (ONC). Implementation of that program was just beginning at the time the original Atlas was published; many new EHR-based measures of care coordination have been developed in the intervening years. This update reviews and discusses those measures, including those used for Meaningful Use.

5. Bautista MAC, Nurjono M, Lim YW, Dessers E, Vrijhoef HJ. Instruments measuring integrated care: A systematic review of measurement properties. *Milbank Quarterly.* Dec 2016;94(4):862-917.
    Context: Integrated care is an important strategy for increasing health system performance. Despite its growing significance, detailed evidence on the measurement properties of integrated care instruments remains vague and limited. Our systematic review aims to provide evidence on the state of the art in measuring integrated care. Methods: Our comprehensive systematic review framework builds on the Rainbow Model for Integrated Care (RMIC). We searched MEDLINE/PubMed for published articles on the measurement properties of instruments measuring integrated care and identified eligible articles using a standard set of selection criteria. We assessed the methodological quality of every validation study reported using the COSMIN checklist and extracted data on study and instrument characteristics. We also evaluated the measurement properties of each examined instrument per validation study and provided a best evidence synthesis on the adequacy of measurement properties of the index instruments. Findings: From the 300 eligible articles, we assessed the methodological quality of 379 validation studies from which we identified 209 index instruments measuring integrated care constructs. The majority of studies reported on instruments measuring constructs related to care integration (33%) and patient-centered care (49%);

fewer studies measured care continuity/comprehensive care (15%) and care coordination/case management (3%). We mapped 84% of the measured constructs to the clinical integration domain of the RMIC, with fewer constructs related to the domains of professional (3.7%), organizational (3.4%), and functional (0.5%) integration. Only 8% of the instruments were mapped to a combination of domains; none were mapped exclusively to the system or normative integration domains. The majority of instruments were administered to either patients (60%) or health care providers (20%). Of the measurement properties, responsiveness (4%), measurement error (7%), and criterion (12%) and cross-cultural validity (14%) were less commonly reported. We found <50% of the validation studies to be of good or excellent quality for any of the measurement properties. Only a minority of index instruments showed strong evidence of positive findings for internal consistency (15%), content validity (19%), and structural validity (7%); with moderate evidence of positive findings for internal consistency (14%) and construct validity (14%). Conclusions: Our results suggest that the quality of measurement properties of instruments measuring integrated care is in need of improvement with the less-studied constructs and domains to become part of newly developed instruments. (PsycINFO Database Record (c) 2017 APA, all rights reserved)

6.   Bainbridge D, Brazil K, Krueger P, Ploeg J, Taniguchi A. A proposed systems approach to the evaluation of integrated palliative care. *BMC Palliative Care.* 2010;9(1):8.
BACKGROUND: There is increasing global interest in regional palliative care networks (PCN) to integrate care, creating systems that are more cost-effective and responsive in multi-agency settings. Networks are particularly relevant where different professional skill sets are required to serve the broad spectrum of end-of-life needs. We propose a comprehensive framework for evaluating PCNs, focusing on the nature and extent of inter-professional collaboration, community readiness, and client-centred care.
METHODS: In the absence of an overarching structure for examining PCNs, a framework was developed based on previous models of health system evaluation, explicit theory, and the research literature relevant to PCN functioning. This research evidence was used to substantiate the choice of model factors.
RESULTS: The proposed framework takes a systems approach with system structure, process of care, and patient outcomes levels of consideration. Each factor represented makes an independent contribution to the description and assessment of the network.
CONCLUSIONS: Realizing palliative patients' needs for complex packages of treatment and social support, in a seamless, cost-effective manner, are major drivers of the impetus for network-integrated care. The framework proposed is a first step to guide evaluation to inform the development of appropriate strategies to further promote collaboration within the PCN and, ultimately, optimal palliative care that meets patients' needs and expectations.

7.   Benzer JK, Cramer IE, Burgess JF, Mohr DC, Sullivan JL, Charns MP. How personal and standardized coordination impact implementation of integrated care. *BMC Health Services Research.* 2015;15(1).
Background: Integrating health care across specialized work units has the potential to lower costs and increase quality and access to mental health care. However, a key challenge for healthcare managers is how to develop policies, procedures, and practices that coordinate care across specialized units. The purpose of this study was to identify how organizational factors impacted coordination, and how to facilitate implementation of integrated care. Methods: Semi-structured interviews were conducted in August 2009

with 30 clinic leaders and 35 frontline staff who were recruited from a convenience sample of 16 primary care and mental health clinics across eight medical centers. Data were drawn from a management evaluation of primary care-mental health integration in the US Department of Veterans Affairs. To protect informant confidentiality, the institutional review board did not allow quotations. Results: Interviews identified antecedents of organizational coordination processes, and highlighted how these antecedents can impact the implementation of integrated care. Overall, implementing new workflow practices were reported to create conflicts with pre-existing standardized coordination processes. Personal coordination (i.e., interpersonal communication processes) between primary care leaders and staff was reported to be effective in overcoming these barriers both by working around standardized coordination barriers and modifying standardized procedures. Discussion: This study identifies challenges to integrated care that might be solved with attention to personal and standardized coordination. A key finding was that personal coordination both between primary care and mental health leaders and between frontline staff is important for resolving barriers related to integrated care implementation. Conclusion: Integrated care interventions can involve both new standardized procedures and adjustments to existing procedures. Aligning and integrating procedures between primary care and specialty care requires personal coordination amongst leaders. Interpersonal relationships should be strengthened between staff when personal connections are important for coordinating patient care across clinical settings. Â© 2015 Benzer et al.

8.   Billings J, Leichsenring K. Methodological development of the interactive INTERLINKS framework for long-term care. *International Journal of Integrated Care.* Apr 2014;14:e021.
      There is increasing international research into health and social care services for older people in need of long-term care (LTC), but problems remain with respect to acquiring robust comparative information to enable judgements to be made regarding the most beneficial and cost-effective approaches. The project 'INTERLINKS' ('Health systems and LTC for older people in Europe') funded by the EU 7th Framework programme was developed to address the challenges associated with the accumulation and comparison of evidence in LTC across Europe. It developed a concept and method to describe and analyse LTC and its links with the health and social care system through the accumulation of policy and practice examples on an interactive web-based framework for LTC. This paper provides a critical overview of the theoretical and methodological approaches used to develop and implement the INTERLINKS Framework for LTC, with the aim of providing some guidance to researchers in this area. INTERLINKS has made a significant contribution to knowledge but robust evidence and comparability across European countries remain problematic due to the current and growing complexity and diversity of integrated LTC implementation.

9.   Bradbury E. Integrated care communities: Putting change theory into practice. *Journal of Integrated Care.* 2014;22(4):132-141.
      Purpose - The purpose of this paper is to reflect on the experience of the Advancing Quality Alliance's (AQuA) regional Integrated Care Discovery Community created to translate integrated care theory into practice at scale and to test ways to address the system enablers of integrated care. Design/methodology/approach - Principles of flexibility, agility, credibility and scale influenced Community design. The theoretical framework drew on relevant complexity, learning community and change management

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theories. Co-designed with stakeholders, the discovery-based Community model incorporated emergent learning from change in complex adaptive environments and focused bespoke support on leadership capability building. Findings - In total, 19 health and social care economies participated. Kotter's eight-step change model proved flexible in conjunction with large-scale change theories. The tension between programme management, learning communities and the emergent nature of change in complex adaptive systems can be harnessed to inject pace and urgency. Mental models and simple rules were helpful in managing participant's desire for a directive approach in the context of a discovery programme. Research limitations/implications - This is a viewpoint from a regional improvement organisation in North West England. Social implications - The Discovery Community was a useful construct through which to rapidly develop multiple integrated health and social care economies. Flexible design and bespoke delivery is crucial in a complex adaptive environment. Capability building needs to be agile enough to meet the emergent needs of a changing workforce. Collaborative leadership has emerged as an area requiring particular attention. Originality/value - Learning from AQuA's approach may assist others in structuring large-scale integrated care or complex change initiatives.

10.   Calciolari S, Ilinca S. Unraveling care integration: Assessing its dimensions and antecedents in the Italian health system. *Health Policy.* Jan 2016;120(1):129-138.
In recent decades, consensus has grown on the need to organize health systems around the concept of care integration to better confront the challenges associated with demographic trends and financial sustainability. However, care integration remains an imprecise umbrella term in both the academic and policy arenas. In addition, little substantive knowledge exists on the success factors for integration initiatives. We propose a composite measure of care integration and a conceptual framework suggesting its relationships with three types of antecedents: contextual, cultural, and organizational factors. Our framework was tested using data from the Italian National Health System (NHS). We administered an ad-hoc questionnaire to all Italian local health units (LHUs), with a 60.4% response rate, and used structural equation modeling to assess the relationships between the relevant latent constructs. The results validated our measure of care integration and supported the hypothesized relationships. In particular, integration was found to be fostered by results-oriented institutional settings, a professional culture conducive to inclusiveness and shared goals, and organizational arrangements promoting clear expectations among providers. Thus, integration improves care and mediates the effects of specific operating means on care enhancement. (PsycINFO Database Record (c) 2017 APA, all rights reserved)

11.   Evans JM, Grudniewicz A, Baker GR, Wodchis WP. Organizational context and capabilities for integrating care: A framework for improvement. *International Journal of Integrated Care.* Aug 31 2016;16(3):15.
BACKGROUND: Interventions aimed at integrating care have become widespread in healthcare; however, there is significant variability in their success. Differences in organizational contexts and associated capabilities may be responsible for some of this variability. PURPOSE: This study develops and validates a conceptual framework of organizational capabilities for integrating care, identifies which of these capabilities may be most important, and explores the mechanisms by which they influence integrated care efforts. METHODS: The Context and Capabilities for Integrating Care (CCIC) Framework was developed through a literature review, and revised and validated through

interviews with leaders and care providers engaged in integrated care networks in Ontario, Canada. Interviews involved open-ended questions and graphic elicitation. Quantitative content analysis was used to summarize the data. RESULTS: The CCIC Framework consists of eighteen organizational factors in three categories: Basic Structures, People and Values, and Key Processes. The three most important capabilities shaping the capacity of organizations to implement integrated care interventions include Leadership Approach, Clinician Engagement and Leadership, and Readiness for Change. The majority of hypothesized relationships among organizational capabilities involved Readiness for Change and Partnering, emphasizing the complexity, interrelatedness and importance of these two factors to integrated care efforts. CONCLUSIONS: Organizational leaders can use the framework to determine readiness to integrate care, develop targeted change management strategies, and select appropriate partners with overlapping or complementary profiles on key capabilities. Researchers may use the results to test and refine the proposed framework, with a focus on the hypothesized relationships among organizational capabilities and between organizational capabilities and performance outcomes.

12. Gittell J. Coordinating mechanisms in care provider groups: Relational coordination as a mediator and input uncertainty as a moderator of performance effects. *Management Science.* 2002;48(11):1408-1426.
This paper proposes a model of how coordinating mechanisms work, and tests it in the context of patient care. Consistent with organization design theory, the performance effects of boundary spanners and team meetings were mediated by relational coordination, a communication- and relationship-intensive form of coordination. Contrary to organization design theory, however, the performance effects of routines were also mediated by relational coordination. Rather than serving as a replacement for interactions, as anticipated by organization design theory, routines work by enhancing interactions among participants. Likewise, all three coordinating mechanisms, including routines, were found to be increasingly effective under conditions of uncertainty.

13. Gittell JH, Weiss L. Coordination networks within and across organizations: A multi-level framework. *Journal of Management Studies.* 2004;41(1):127-153.
BACKGROUND: Care pathways are widely used in hospitals for a structured and detailed planning of the care process. There is a growing interest in extending care pathways into primary care to improve quality of care by increasing care coordination. Evidence is sparse about the relationship between care pathways and care coordination.The multi-level framework explores care coordination across organizations and states that (inter)organizational mechanisms have an effect on the relationships between healthcare professionals, resulting in quality and efficiency of care.The aim of this study was to assess the extent to which care pathways support or create elements of the multi-level framework necessary to improve care coordination across the primary-hospital care continuum.
METHODS: This study is an in-depth analysis of five existing local community projects located in four different regions in Flanders (Belgium) to determine whether the available empirical evidence supported or refuted the theoretical expectations from the multi-level framework. Data were gathered using mixed methods, including structured face-to-face interviews, participant observations, documentation and a focus group. Multiple cases were analyzed performing a cross case synthesis to strengthen the results.

RESULTS: The development of a care pathway across the primary-hospital care continuum, supported by a step-by-step scenario, led to the use of existing and newly constructed structures, data monitoring and the development of information tools. The construction and use of these inter-organizational mechanisms had a positive effect on exchanging information, formulating and sharing goals, defining and knowing each other's roles, expectations and competences and building qualitative relationships. CONCLUSION: Care pathways across the primary-hospital care continuum enhance the components of care coordination.

14.   Hepworth J, Marley JE. Healthcare teams - a practical framework for integration. *Australian Family Physician.* Dec 2010;39(12):969-971.
BACKGROUND: Delivering integrated team care is a major priority for many countries. In Australia this is a component of the GP Super Clinic Program but it is also a focus of the broader primary care sector. Explicit consideration of human dynamics and team process is often absent from the move to integrated team care.
OBJECTIVE: To provide a practical framework that will inform the development and evaluation of integrated healthcare teams.
DISCUSSION: The Team Focused and Clinical Content Framework is an approach to building integrated teams. This has the potential to be used to monitor and evaluate team development and functioning. Both the framework and clinical pathways provide practical tools for clinics to address the need to build integration into teams.

15.   Kates N, Hutchison B, O'Brien P, Fraser B, Wheeler S, Chapman C. Framework for advancing improvement in primary care. *Healthcare Papers.* 2012;12(2):8-21.
A consistent feature of effective healthcare delivery systems is a strong and well-integrated primary care sector. This paper presents a framework that describes the key elements of high-performing primary care and the supports required to attain it. The framework was developed by the Quality Improvement and Innovation Partnership in Ontario (now part of Health Quality Ontario) to guide the process of primary care transformation. The first section of this paper presents and describes the framework, the second proposes implementation strategies and the third identifies system-level structures and policies needed to support primary care transformation. The framework has three components: (1) the major constituencies that primary care serves - patients, families and their local communities; (2) the desired outcomes of primary care (better health, better care, better value); and (3) the attributes that will enable primary care organizations to attain these outcomes. These attributes are a population focus, patient engagement, partnerships with health and community services, innovation, performance measurement and quality improvement and team-based care.Proposed transformation strategies include building system capacity and capability, ensuring access to resources, providing support from coaches and employing effective spread and sustainability strategies. Broader system-level structures and policies necessary to support and sustain a high-performing and continually improving primary care sector include clear goals; a comprehensive approach to performance measurement; systematic evaluation of innovation; funding incentives aligned with quality outcomes; a system of local primary care organizations; support for inter-professional teams; funding for research to inform primary care policy, management and practice; patient enrolment with primary care providers; and mechanisms to support coordination and integration.

16.   Klein G. Features of team coordination. In: McNeese M, Salas E, Endesley M, eds. *New trends in cooperative activities: Understanding system dynamics in complex environments*. Santa Monica, CA: Human Factors & Ergonomics Society; 2001:68-95.

17.   Leijten FRM, Struckmann V, van Ginneken E, et al. The SELFIE framework for integrated care for multi-morbidity: Development and description. *Health Policy*. Jan 2018;122(1):12-22.
BACKGROUND: The rise of multi-morbidity constitutes a serious challenge in health and social care organisation that requires a shift from disease- towards person-centred integrated care. The aim of the current study was to develop a conceptual framework that can aid the development, implementation, description, and evaluation of integrated care programmes for multi-morbidity. METHODS: A scoping review and expert discussions were used to identify and structure concepts for integrated care for multi-morbidity. A search of scientific and grey literature was conducted. DISCUSSION: meetings were organised within the SELFIE research project with representatives of five stakeholder groups (5Ps): patients, partners, professionals, payers, and policy makers. RESULTS: In the scientific literature 11,641 publications were identified, 92 were included for data extraction. A draft framework was constructed that was adapted after discussion with SELFIE partners from 8 EU countries and 5P representatives. The core of the framework is the holistic understanding of the person with multi-morbidity in his or her environment. Around the core, concepts were grouped into adapted WHO components of health systems: service delivery, leadership & governance, workforce, financing, technologies & medical products, and information & research. Within each component micro, meso, and macro levels are distinguished. CONCLUSION: The framework structures relevant concepts in integrated care for multi-morbidity and can be applied by different stakeholders to guide development, implementation, description, and evaluation.

18.   Lemieux-Charles L, McGuire WL. What do we know about health care team effectiveness? A review of the literature. *Med Care Res Rev*. Jun 2006;63(3):263-300.
This review of health care team effectiveness literature from 1985 to 2004 distinguishes among intervention studies that compare team with usual (nonteam) care; intervention studies that examine the impact of team redesign on team effectiveness; and field studies that explore relationships between team context, structure, processes, and outcomes. The authors use an Integrated Team Effectiveness Model (ITEM) to summarize research findings and to identify gaps in the literature. Their analysis suggests that the type and diversity of clinical expertise involved in team decision making largely accounts for improvements in patient care and organizational effectiveness. Collaboration, conflict resolution, participation, and cohesion are most likely to influence staff satisfaction and perceived team effectiveness. The studies examined here underscore the importance of considering the contexts in which teams are embedded. The ITEM provides a useful framework for conceptualizing relationships between multiple dimensions of team context, structure, processes, and outcomes.

19.   Malhotra S, Jordan D, Shortliffe E, Patel VL. Workflow modeling in critical care: Piecing together your own puzzle. *Journal of Biomedical Informatics*. 2007;40(2):81-92.
The intensive care unit (ICU) is an instance of a very dynamic health care setting where critically ill patients are being managed. To provide good care, an extensive and coordinated communication amongst the role players, use of numerous information systems and operation of devices for monitoring and treatment purposes are required. The

purpose of this research is to study error evolution and management within this environment. The focus is on representing the workflow of critical care environment, which emphasizes the importance such a representation may play in strategizing the management of medical errors. We used ethnographic observation and interview data to build individual pieces of the workflow, dependent on the individual and the activity concerned. Key personnel were intensively followed during their respective patient care activities and the related actions. All interactions were recorded for analysis. These clinicians and nurses were interviewed to complement the observation data and to delineate their individual workflows. These pieces of the ICU workflow were used to develop a generalize-able cognitive model to represent the intricate workflow applicable to other health care settings. The proposed model can be used to identify and characterize medical errors and for error prediction in practice.

20.   Minkman MM. Developing integrated care. Towards a development model for integrated care. *International Journal of Integrated Care.* 2012;12.
        The thesis explores the essential elements, implementation and developmental process of integrated care with a view to providing a quality management model for integrated care. Integrated care is required when a coordinated set of services is needed to cover the full range of client demands. The outcomes of this study add relevant information to our knowledge about integrated care and come together in the Development Model for Integrated Care (DMIC; in Dutch OMK: Ontwikkelingsmodel voor Ketenzorg). In addition the DMIC was empirically validated in practice

21.   Oliver D, Demiris G, Wittenberg-Lyles E, Porock D. The use of videophones for patient and family participation in hospice interdisciplinary team meetings: A promising approach. *European Journal of Cancer Care.* 2010;19(6):729-735.
        Inclusion of patients and caregivers in decisions related to the delivery of care is inherent in the hospice philosophy. Telemedicine technologies offer a potential solution to the challenges presented by the geographic distance between team meetings and the home environment. While inclusion requires additional coordination by the hospice team, it also offers an important opportunity to improve communication between the team and the patient and family. A modified conceptual model based on two previous frameworks is outlined to support patient and family involvement in hospice team meetings. Further research is suggested to determine the structural feasibility of patient and family involvement via videophone as well as the structural and procedural changes resulting from this inclusion. Finally, clinical outcomes and family evaluation of the inclusion experience need to be thoroughly researched before final conclusions may be reached.

22.   Oliver DP, Wittenberg-Lyles EM, Day M. Measuring interdisciplinary perceptions of collaboration on hospice teams. *American Journal of Hospice and Palliative Medicine®.* 2007;24(1):49-53.

23.   Palmer K, Marengoni A, Forjaz MJ, et al. Multimorbidity care model: Recommendations from the consensus meeting of the joint action on chronic diseases and promoting healthy ageing across the life cycle (JA-CHRODIS). *Health Policy.* Jan 2018;122(1):4-11.
        Patients with multimorbidity have complex health needs but, due to the current traditional disease-oriented approach, they face a highly fragmented form of care that leads to inefficient, ineffective, and possibly harmful clinical interventions. There is limited evidence on available integrated and multidimensional care pathways for multimorbid

patients. An expert consensus meeting was held to develop a framework for care of multimorbid patients that can be applied across Europe, within a project funded by the European Union; the Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (JA-CHRODIS). The experts included a diverse group representing care providers and patients, and included general practitioners, family medicine physicians, neurologists, geriatricians, internists, cardiologists, endocrinologists, diabetologists, epidemiologists, psychologists, and representatives from patient organizations. Sixteen components across five domains were identified (Delivery of Care; Decision Support; Self Management Support; Information Systems and Technology; and Social and Community Resources). The description and aim of each component are described in these guidelines, along with a summary of key characteristics and relevance to multimorbid patients. Due to the lack of evidence-based recommendations specific to multimorbid patients, this care model needs to be assessed and validated in different European settings to examine specifically how multimorbid patients will benefit from this care model, and whether certain components have more importance than others.

24.   Radwin LE, Castonguay D, Keenan CB, Hermann C. An expanded theoretical framework of care coordination across transitions in care settings. *Journal of Nursing Care Quality.* Jul-Sep 2016;31(3):269-274.
        For many patients, high-quality, patient-centered, and cost-effective health care requires coordination among multiple clinicians and settings. Ensuring optimal care coordination requires a clear understanding of how clinician activities and continuity during transitions affect patient-centeredness and quality outcomes. This article describes an expanded theoretical framework to better understand care coordination. The framework provides clear articulation of concepts. Examples are provided of ways to measure the concepts.

25.   Reader TW, Flin R, Mearns K, Cuthbertson BH. Developing a team performance framework for the intensive care unit. *Critical Care Medicine.* 2009;37(5):1787-1793.
        Objective: There is a growing literature on the relationship between teamwork and patient outcomes in intensive care, providing new insights into the skills required for effective team performance. The purpose of this review is to consolidate the most robust findings from this research into an intensive care unit (ICU) team performance framework.
        Data Sources: Studies investigating teamwork within the ICU using PubMed, Science Direct, and Web of Knowledge databases.
        Study Selection: Studies investigating the relationship between aspects of teamwork and ICU outcomes, or studies testing factors that are found to influence team working in the ICU.
        Data Extraction: Teamwork behaviors associated with patient or staff-related outcomes in the ICU were identified.
        Data Synthesis: Teamwork behaviors were grouped according to the team process categories of "team communication," "team leadership," "team coordination," and "team decision making." A prototype framework explaining the team performance in the ICU was developed using these categories. The purpose of the framework is to consolidate the existing ICU teamwork literature and to guide the development and testing of interventions for improving teamwork.
        Conclusions: Effective teamwork is shown as crucial for providing optimal patient care in the ICU. In particular, team leadership seems vital for guiding the way in which ICU team members interact and coordinate with others.

26. Shigayeva A, Atun R, McKee M, Coker R. Health systems, communicable diseases and integration. *Health Policy & Planning.* 2010;25(suppl_1):i4-i20.
The HIV/AIDS, tuberculosis and malaria pandemics pose substantial challenges globally and to health systems in the countries they affect. This demands an institutional approach that can integrate disease control programmes within health and social care systems. Whilst integration is intuitively appealing, evidence of its benefits remains uncertain and evaluation is beset by lack of a common understanding of what it involves. The aim of this paper is to better define integration in health systems relevant to communicable disease control. We conducted a critical review of published literature on concepts, definitions, and analytical and methodological approaches to integration as applied to health system responses to communicable disease. We found that integration is understood and pursued in many ways in different health systems. We identified a variety of typologies that relate to three fundamental questions associated with integration: (1) why is integration a goal (that is, what are the driving forces for integration); (2) what structures and/or functions at different levels of health system are affected by integration (or the lack of); and (3) how does integration influence interactions between health system components or stakeholders. The frameworks identified were evaluated in terms of these questions, as well as the extent to which they took account of health system characteristics, the wider contextual environment in which health systems sit, and the roles of key stakeholders. We did not find any one framework that explicitly addressed all of these three questions and therefore propose an analytical framework to help address these questions, building upon existing frameworks and extending our conceptualization of the 'how' of integration to identify a continuum of interactions that extends from no interactions, to partial integration that includes linkage and coordination, and ultimately to integration. We hope that our framework may provide a basis for future evaluations of the integration of programmes and health systems in the development of sustainable and effective responses to communicable diseases. [ABSTRACT FROM AUTHOR] Copyright of Health Policy & Planning is the property of Oxford University Press / USA and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use. This abstract may be abridged. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material for the full abstract. (Copyright applies to all Abstracts.)

27. Singer SJ, Burgers J, Friedberg M, Rosenthal MB, Leape L, Schneider E. Defining and measuring integrated patient care: Promoting the next frontier in health care delivery. *Medical Care Research & Review.* Feb 2011;68(1):112-127.
Integration of care is emerging as a central challenge of health care delivery, particularly for patients with multiple, complex chronic conditions. The authors argue that the concept of "integrated patient care" would benefit from further clarification regarding (a) the object of integration and (b) its essential components, particularly when constructing measures.To address these issues, the authors propose a definition of integrated patient care that distinguishes it from integrated delivery organizations, acknowledging that integrated organizational structures and processes may fail to produce integrated patient care. The definition emphasizes patients' central role as active participants in managing their own health by including patient centeredness as a key element of integrated patient care. Measures based on the proposed definition will enable empirical assessment of the

potential relationships between the integration of organizations, the integration of patient care, and patient outcomes, providing valuable guidance to health systems reformers.

28.   Siouta N, Van Beek K, Van der Eerden ME, et al. Integrated palliative care in Europe: A qualitative systematic literature review of empirically-tested models in cancer and chronic disease. *BMC Palliative Care.* Jul 08 2016;15:56.
BACKGROUND: Integrated Palliative Care (PC) strategies are often implemented following models, namely standardized designs that provide frameworks for the organization of care for people with a progressive life-threatening illness and/or for their (in)formal caregivers. The aim of this qualitative systematic review is to identify empirically-evaluated models of PC in cancer and chronic disease in Europe. Further, develop a generic framework that will consist of the basis for the design of future models for integrated PC in Europe.
METHODS: Cochrane, PubMed, EMBASE, CINAHL, AMED, BNI, Web of Science, NHS Evidence. Five journals and references from included studies were hand-searched. Two reviewers screened the search results. Studies with adult patients with advanced cancer/chronic disease from 1995 to 2013 in Europe, in English, French, German, Dutch, Hungarian or Spanish were included. A narrative synthesis was used.
RESULTS: 14 studies were included, 7 models for chronic disease, 4 for integrated care in oncology, 2 for both cancer and chronic disease and 2 for end-of-life pathways. The results show a strong agreement on the benefits of the involvement of a PC multidisciplinary team: better symptom control, less caregiver burden, improvement in continuity and coordination of care, fewer admissions, cost effectiveness and patients dying in their preferred place.
CONCLUSION: Based on our findings, a generic framework for integrated PC in cancer and chronic disease is proposed. This framework fosters integration of PC in the disease trajectory concurrently with treatment and identifies the importance of employing a PC-trained multidisciplinary team with a threefold focus: treatment, consulting and training.

29.   Valentijn PP, Schepman SM, Opheij W, Bruijnzeels MA. Understanding integrated care: A comprehensive conceptual framework based on the integrative functions of primary care. *International Journal of Integrated Care.* Jan-Mar 2013;13:e010.
INTRODUCTION: Primary care has a central role in integrating care within a health system. However, conceptual ambiguity regarding integrated care hampers a systematic understanding. This paper proposes a conceptual framework that combines the concepts of primary care and integrated care, in order to understand the complexity of integrated care. METHODS: The search method involved a combination of electronic database searches, hand searches of reference lists (snowball method) and contacting researchers in the field. The process of synthesizing the literature was iterative, to relate the concepts of primary care and integrated care. First, we identified the general principles of primary care and integrated care. Second, we connected the dimensions of integrated care and the principles of primary care. Finally, to improve content validity we held several meetings with researchers in the field to develop and refine our conceptual framework. RESULTS: The conceptual framework combines the functions of primary care with the dimensions of integrated care. Person-focused and population-based care serve as guiding principles for achieving integration across the care continuum. Integration plays complementary roles on the micro (clinical integration), meso (professional and organisational integration) and macro (system integration) level. Functional and normative integration ensure connectivity between the levels. DISCUSSION: The presented conceptual

framework is a first step to achieve a better understanding of the inter-relationships among the dimensions of integrated care from a primary care perspective.

30. Weaver SJ, Che XX, Petersen LA, Hysong SJ. Unpacking care coordination through a multiteam system lens: A conceptual framework and systematic review. *Med Care.* Mar 2018;56(3):247-259.
BACKGROUND: The 2016 President's Cancer Panel Connected Health report calls for thoroughly characterizing the team structures and processes involved in coordinating care for people with chronic conditions. We developed a multilevel care coordination framework by integrating existing frameworks from the teams and care coordination literatures, and used it to review evidence examining care coordination processes for patients with cancer, diabetes, cardiovascular disease, and combinations of these conditions. METHODS: We searched Pubmed/MedLINE, CINAHL Plus, Cochrane, PsycINFO (December 2009-June 2016), and references from previous reviews. Studies describing behavioral markers of coordination between >/=2 US health care providers caring for adults with cancer, chronic heart disease, diabetes, or populations with a combination of these conditions were included. Two investigators screened 4876 records and 180 full-text articles yielding 33 studies. One investigator abstracted data, a second checked abstractions for accuracy. RESULTS: Most studies identified information sharing or monitoring as key coordination processes. To execute these processes, most studies used a designated role (eg, coordinator), objects and representations (eg, survivorship plans), plans and rules (eg, protocols), or routines (eg, meetings). Few examined the integrating conditions. None statistically examined coordination processes or integrating conditions as mediators of relationships between specific coordination mechanisms and patient outcomes. LIMITATIONS: Restricted to United States, English-language studies; heterogeneity in methods and outcomes. CONCLUSIONS: Limited research unpacks relationships between care coordination mechanisms, coordination processes, integrating conditions, and patient outcomes suggested by existing theory. The proposed framework offers an organizer for examining behaviors and conditions underlying effective care coordination.

31. Zlateva I, Anderson D, Coman E, Khatri K, Tian T, Fifield J. Development and validation of the medical home care coordination survey for assessing care coordination in the primary care setting from the patient and provider perspectives. *BMC Health Services Research.* 2015;15(1).
Background: Community health centers are increasingly embracing the Patient Centered Medical Home (PCMH) model to improve quality, access to care, and patient experience while reducing healthcare costs. Care coordination (CC) is an important element of the PCMH model, but implementation and measurability of CC remains a problem within the outpatient setting. Assessing CC is an integral component of quality monitoring in health care systems. This study developed and validated the Medical Home Care Coordination Survey (MHCCS), to fill the gap in assessing CC in primary care from the perspectives of patients and their primary healthcare teams. Methods: We conducted a review of relevant literature and existing care coordination instruments identified by bibliographic search and contact with experts. After identifying all care coordination domains that could be assessed by primary healthcare team members and patients, we developed a conceptual model. Potentially appropriate items from existing published CC measures, along with newly developed items, were matched to each domain for inclusion. A modified Delphi approach was used to establish content validity. Primary survey data was collected from

232 patients with care transition and/or complex chronic illness needs from the Community Health Center, Inc. and from 164 staff members from 12 community health centers across the country via mail, phone and online survey. The MHCCS was validated for internal consistency, reliability, discriminant and convergent validity. This study was conducted at the Community Health Center, Inc. from January 15, 2012 to July 15, 2014. Results: The 13-item MHCCS - Patient and the 32-item MHCCS - Healthcare Team were developed and validated. Exploratory Structural Equation Modeling was used to test the hypothesized domain structure. Four CC domains were confirmed from the patient group and eight were confirmed from the primary healthcare team group. All domains had high reliability (Cronbach's α scores were above 0.8). Conclusions: Patients experience the ultimate output of care coordination services, but primary healthcare staff members are best primed to perceive many of the structural elements of care coordination. The proactive measurement and monitoring of the core domains from both perspectives provides a richer body of information for the continuous improvement of care coordination services. The MHCCS shows promise as a valid and reliable assessment of these CC efforts. © 2015 Zlateva et al.

32.   Abstrackr. http://abstrackr.cebm.brown.edu/. Accessed February 26, 2018.

33.   Advancing Quality Alliance. System integration framework assessment. 2014.

34.   Angus L, Valentijn PP. From micro to macro: Assessing implementation of integrated care in Australia. *Aust J Prim Health.* Nov 14 2017.
       Many countries and health systems are pursuing integrated care as a means of achieving better outcomes. However, no standard approaches exist for comparing integration approaches across models or settings, and for evaluating whether the key components of integrated care are present in different initiatives. This study sheds light on how integrated care is being implemented in Australia, using a new tool to characterise and compare integration strategies at micro, meso and macro levels. In total, 114 staff from a purposive sample of 38 integrated care projects completed a survey based on the Rainbow Model of Integrated Care. Ten key informants gave follow-up interviews. Participating projects reported using multiple strategies to implement integrated care, but descriptions of implementation were often inconsistent. Micro-level strategies, including clinical-professional service coordination and person-centred care, were most commonly reported. A common vision was often described as an essential foundation for joint work. However, performance feedback appeared under-utilised, as did strategies requiring macro-level action such as data linkages or payment reform. The results suggest that current integrated care efforts are unevenly weighted towards micro-level strategies. Increased attention to macro-level strategies may be warranted in order to accelerate progress and sustain integrated care in Australia.

35.   Bainbridge D, Brazil K, Krueger P, Ploeg J, Taniguchi A, Darnay J. Measuring horizontal integration among health care providers in the community: An examination of a collaborative process within a palliative care network. *Journal of Interprofessional Care.* May 2015;29(3):245-252.
       In many countries formal or informal palliative care networks (PCNs) have evolved to better integrate community-based services for individuals with a life-limiting illness. We conducted a cross-sectional survey using a customized tool to determine the perceptions of the processes of palliative care delivery reflective of horizontal integration from the

perspective of nurses, physicians and allied health professionals working in a PCN, as well as to assess the utility of this tool. The process elements examined were part of a conceptual framework for evaluating integration of a system of care and centred on interprofessional collaboration. We used the Index of Interdisciplinary Collaboration (IIC) as a basis of measurement. The 86 respondents (85% response rate) placed high value on working collaboratively and most reported being part of an interprofessional team. The survey tool showed utility in identifying strengths and gaps in integration across the network and in detecting variability in some factors according to respondent agency affiliation and profession. Specifically, support for interprofessional communication and evaluative activities were viewed as insufficient. Impediments to these aspects of horizontal integration may be reflective of workload constraints, differences in agency operations or an absence of key structural features.

36.   Gittell JH, Fairfield KM, Bierbaum B, et al. Impact of relational coordination on quality of care, postoperative pain and functioning, and length of stay: A nine-hospital study of surgical patients. *Med Care.* Aug 2000;38(8):807-819.
BACKGROUND: Health care organizations face pressures from patients to improve the quality of care and clinical outcomes, as well as pressures from managed care to do so more efficiently. Coordination, the management of task interdependencies, is one way that health care organizations have attempted to meet these conflicting demands. OBJECTIVES: The objectives of this study were to introduce the concept of relational coordination and to determine its impact on the quality of care, postoperative pain and functioning, and the length of stay for patients undergoing an elective surgical procedure. Relational coordination comprises frequent, timely, accurate communication, as well as problem-solving, shared goals, shared knowledge, and mutual respect among health care providers. RESEARCH DESIGN: Relational coordination was measured by a cross-sectional questionnaire of health care providers. Quality of care was measured by a cross-sectional postoperative questionnaire of total hip and knee arthroplasty patients. On the same questionnaire, postoperative pain and functioning were measured by the WOMAC osteoarthritis instrument. Length of stay was measured from individual patient hospital records. SUBJECTS: The subjects for this study were 338 care providers and 878 patients who completed questionnaires from 9 hospitals in Boston, MA, New York, NY, and Dallas, TX, between July and December 1997. MEASURES: Quality of care, postoperative pain and functioning, and length of acute hospital stay. RESULTS: Relational coordination varied significantly between sites, ranging from 3.86 to 4.22 (P <0.001). Quality of care was significantly improved by relational coordination (P <0.001) and each of its dimensions. Postoperative pain was significantly reduced by relational coordination (P = 0.041), whereas postoperative functioning was significantly improved by several dimensions of relational coordination, including the frequency of communication (P = 0.044), the strength of shared goals (P = 0.035), and the degree of mutual respect (P = 0.030) among care providers. Length of stay was significantly shortened (53.77%, P <0.001) by relational coordination and each of its dimensions. CONCLUSIONS: Relational coordination across health care providers is associated with improved quality of care, reduced postoperative pain, and decreased lengths of hospital stay for patients undergoing total joint arthroplasty. These findings support the design of formal practices to strengthen communication and relationships among key caregivers on surgical units.

37. Nurjono M, Valentijn PP, Bautista MA, Wei LY, Vrijhoef HJ. A prospective validation study of a rainbow model of integrated care measurement tool in Singapore. *International Journal of Integrated Care.* Apr 8 2016;16(1):1.
INTRODUCTION: The conceptual ambiguity of the integrated care concept precludes a full understanding of what constitutes a well-integrated health system, posing a significant challenge in measuring the level of integrated care. Most available measures have been developed from a disease-specific perspective and only measure certain aspects of integrated care. Based on the Rainbow Model of Integrated Care, which provides a detailed description of the complex concept of integrated care, a measurement tool has been developed to assess integrated care within a care system as a whole gathered from healthcare providers' and managerial perspectives. This paper describes the methodology of a study seeking to validate the Rainbow Model of Integrated Care measurement tool within and across the Singapore Regional Health System. The Singapore Regional Health System is a recent national strategy developed to provide a better-integrated health system to deliver seamless and person-focused care to patients through a network of providers within a specified geographical region. METHODS: The validation process includes the assessment of the content of the measure and its psychometric properties. CONCLUSION: If the measure is deemed to be valid, the study will provide the first opportunity to measure integrated care within Singapore Regional Health System with the results allowing insights in making recommendations for improving the Regional Health System and supporting international comparison.

38. Singer SJ, Friedberg MW, Kiang MV, Dunn T, Kuhn DM. Development and preliminary validation of the patient perceptions of integrated care survey. *Medical Care Research & Review.* Apr 2013;70(2):143-164.
Valid measures of the integration of patient care could provide rapid and accurate feedback on the successfulness of current efforts to improve health care delivery systems. This article describes the development and pilot testing of a new survey, based on a novel conceptual model, which measures the integration of patient care as experienced by patients. We administered the survey to 1,289 patients with multiple chronic conditions from one health system and received responses from 527 patients (43%). Psychometric analysis of responses supported a six-dimension model of integration with satisfactory internal consistency, discriminant validity, and goodness of fit. The Patient Perceptions of Integrated Care survey can be used to measure the integration of care received by chronically ill patients for two main purposes: as a research tool to compare interventions intended to improve the integration of care and as a quality improvement tool intended to guide the refinement of delivery system innovations.

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40. Van Dijk-de Vries AN, Duimel-Peeters IG, Muris JW, Wesseling GJ, Beusmans GH, Vrijhoef HJ. Effectiveness of teamwork in an integrated care setting for patients with COPD: Development and testing of a self-evaluation instrument for interprofessional teams. *International Journal of Integrated Care.* Apr 8 2016;16(1):9.
INTRODUCTION: Teamwork between healthcare providers is conditional for the delivery of integrated care. This study aimed to assess the usefulness of the conceptual

framework Integrated Team Effectiveness Model for developing and testing of the Integrated Team Effectiveness Instrument. THEORY AND METHODS: Focus groups with healthcare providers in an integrated care setting for people with chronic obstructive pulmonary disease (COPD) were conducted to examine the recognisability of the conceptual framework and to explore critical success factors for collaborative COPD practice out of this framework. The resulting items were transposed into a pilot instrument. This was reviewed by expert opinion and completed 153 times by healthcare providers. The underlying structure and internal consistency of the instrument were verified by factor analysis and Cronbach's alpha. RESULTS: The conceptual framework turned out to be comprehensible for discussing teamwork effectiveness. The pilot instrument measures 25 relevant aspects of teamwork in integrated COPD care. Factor analysis suggested three reliable components: teamwork effectiveness, team processes and team psychosocial traits (Cronbach's alpha between 0.76 and 0.81). CONCLUSIONS AND DISCUSSION: The conceptual framework Integrated Team Effectiveness Model is relevant in developing a practical full-spectrum instrument to facilitate discussing teamwork effectiveness. The Integrated Team Effectiveness Instrument provides a well-founded basis to self-evaluate teamwork effectiveness in integrated COPD care by healthcare providers. Recommendations are provided for the improvement of the instrument.

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Background: Integrated healthcare delivery is a policy goal of healthcare systems. There is no consensus on how to measure the concept, which makes it difficult to monitor progress.

Purpose: To identify the different types of methods used to measure integrated healthcare delivery with emphasis on structural, cultural and process aspects.

Methods: Medline/Pubmed, EMBASE, Web of Science, Cochrane Library, WHOLIS, and conventional internet search engines were systematically searched for methods to measure integrated healthcare delivery (published – April 2008).

Results: Twenty-four published scientific papers and documents met the inclusion criteria. In the 24 references we identified 24 different measurement methods; however, 5 methods shared theoretical framework. The methods can be categorized according to type of data source: a) questionnaire survey data, b) automated register data, or c) mixed data sources. The variety of concepts measured reflects the significant conceptual diversity within the field, and most methods lack information regarding validity and reliability.

Conclusion: Several methods have been developed to measure integrated healthcare delivery; 24 methods are available and some are highly developed. The objective governs the method best used. Criteria for sound measures are suggested and further developments should be based on an explicit conceptual framework and focus on simplifying and validating existing methods.