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Models of Care for High-Need, High-Cost Patients: An Evidence Synthesis

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Abstract This brief analyzes experts' reviews of evidence about care models designed to improve outcomes and reduce costs for patients with complex needs. It finds that successful models have several common attributes: targeting patients likely to benefit from the intervention; comprehensively assessing patients' risks and needs; relying on evidence-based care planning and patient monitoring; promoting patient and family engagement in self-care; coordinating care and communication among patients and providers; facilitating transitions from the hospital and referrals to community resources; and providing appropriate care in accordance with patients' preferences. Overall, the evidence of impact is modest and few of these models have been widely adopted in practice because of barriers, such as a lack of supportive financial incentives under fee-for-service reimbursement arrangements. Overcoming these challenges will be essential to achieving a higher-performing health care system for this patient population.

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INTRODUCTION

Patients who have complex health needs account for a disproportionate share of health care spending or may be at risk of incurring high spending in the near future.[1] These individuals typically suffer from multiple chronic health conditions and/or functional limitations.[2] Moreover, their health care needs may be exacerbated by unmet social needs.[3] They are often poorly served by current health care delivery and financing arrangements that fail to adequately coordinate care across different service providers and care settings.[4]

This brief describes research about clinical care models or care management programs implemented by health care provider organizations to improve outcomes and reduce costs for high-need, high-cost patients (see About the Study). Based on a review of literature that assesses the evidence on the impact and features of such care models or care management programs, this brief identifies common attributes of effective models and programs, as well as barriers to their uptake, to identify opportunities for improving health system performance. This literature synthesis is the first in a series of publications that will address this topic in more detail.

FINDINGS

Assessing the Evidence on the Value of Care Models

In a review conducted for the Institute of Medicine, Chad Boult and his colleagues at Johns Hopkins University identified 15 models of comprehensive care for older adults with chronic illness, which fit into six broad categories related to care settings.[5] Exhibit 1 summarizes evidence of positive impact,* which was most frequently observed in quality of care or patient's quality of life. Most models reduced hospital use or length of stay, although the evidence was mixed in some cases. Three models—interdisciplinary primary care for heart failure patients, transitional care from hospital to home, and "hospital-at-home" programs that substitute care in the patient's home in lieu of a hospital stay—showed some evidence of lower cost, although this was not directly measured in all studies.

Exhibit 1. Comprehensive Care Models: Typology and Evidence of Impact

Categories	Models or Examples*	Evidence of Positive Impact**					
		QoC	QoL	FA	Surv	Use	Cost
1. Interdisciplinary primary care	Guided Care, GRACE, IMPACT, PACE	X	X	X	X	X	M
2. Enhancements to primary care	Care and case management	X	X			M	
	Disease management		X			X	
	Preventive home visits			X	X	X	
	Geriatric evaluation and management	X	X	X		M	
	Pharmaceutical care	X				X	
	Chronic disease self-management		X	X		X	
	Proactive rehabilitation		X	X			
	Caregiver education and support		X			X	
3. Transitional care	Hospital to home		X			X	X
4. Acute care in patients' homes	Substitutive hospital-at-home		X			LOS	X
	Early-discharge hospital-at-home					X	
5. Team care in nursing homes	Minnesota Senior Health Options, Evercare	X				M	
6. Comprehensive care in hospitals	Prevention/management of delirium		X			LOS	
	Comprehensive inpatient care		X	X	X		

* Examples: GRACE = Geriatric Resources for Assessment and Care of Elders; IMPACT = Improving Mood: Promoting Access to Collaborative Treatment; PACE = Program of All-Inclusive Care for the Elderly.
** Impact: QoC = quality of care; QoL = quality of life; FA = functional autonomy; Surv = survival; LOS = length of stay; M = mixed evidence.
Source: Adapted from C. Boult et al., *Journal of the American Geriatrics Society,* Dec. 2009 57(12):2328–37.

A review conducted for the Robert Wood Johnson Foundation by Thomas Bodenheimer and Rachel Berry-Millett, at the University of California, San Francisco, analyzed evidence on the effects of care management programs for patients with complex health care needs. They defined care management as "a set of activities designed to assist patients and their support systems in managing medical conditions and related psychosocial problems more effectively, with the aim of improving patients' health status and reducing the need for medical services."[6] The strength of the evidence varied by site or modality of care (Exhibit 2). Studies of hospital-to-home transitions for patients with complex

* Note: For the purposes of Exhibit 1, we defined evidence of positive impact to mean a majority of identified studies or a meta-analysis of studies reported an improvement in an outcome that was assessed in more than one study of a model. Mixed evidence means there were both positive and negative findings.

conditions exhibited the most consistently positive findings. Several studies offered convincing evidence that care management improved quality in primary care settings, but hospital use was reduced in only a few studies.

Exhibit 2. Summary of Evidence for Complex Care Management by Site and Modality of Care

Site of Care Management	Impact on Quality	Impact on Hospital Use and/or Costs
Primary care	Improved (7 of 9 studies)	Some reduced use (3 of 8 studies)
Via telephone (vendor supported)	Some improvement	Inconclusive evidence
Integrated multispecialty group	Improved (2 of 3 studies)	Some reduced cost (1 of 3 studies)
Hospital-to-home transition	Improved (many studies)	Reduced use and cost (many studies)
Home-based	No clear evidence	No evidence

* Note: Studies of home-based interventions reviewed by Bodenheimer and Berry-Millett differed from those reviewed by Boult and colleagues, who found positive impact for hospital-at-home interventions (Exhibit 1).
Source: Adapted from T. Bodenheimer and R. Berry-Millett, *Care Management of Patients with Complex Health Care Needs,* Research Synthesis Report No. 19 (Princeton, N.J.: Robert Wood Johnson Foundation, Dec. 2009).

A Congressional Budget Office report, authored by Lyle Nelson, reviewed evaluations of 34 disease management and care coordination programs for Medicare fee-for-service beneficiaries and found that only one-third reduced hospital use by 6 percent or more.[7] Although the programs were developed under six different demonstrations (Appendix A), they shared a common feature: the use of nurses as care managers "to educate patients about their chronic illnesses, encourage them to follow self-care regimens, monitor their health, and track whether they received recommended tests and treatments."[8] The programs increased teaching about self-care, but had little effect on patients' adherence to self-care and no systematic effects on care quality. Medicare realized net savings for only two programs: a care management program operated by Massachusetts General Hospital and its affiliated physicians and a telemedicine program operated by the Health Buddy Consortium (Appendix B).

Finally, Randall Brown at Mathematica Policy Research and colleagues[9] at the University of Illinois, Chicago, found the following types of care models had the strongest evidence for reducing hospital use and costs of care for high need, high cost patients: select interdisciplinary primary care models (e.g., Care Management Plus developed at Intermountain Healthcare and Oregon Health and Science University); care coordination programs focused on high-risk patients (e.g., the Medicare Care Coordination Demonstration program implemented at Washington University); chronic disease self-management programs (e.g., the model developed at Stanford University); and transitional care interventions (e.g., Naylor Transitional Care Model developed at the University of Pennsylvania). (For more information on the specific programs cited, see Appendix B; for an example of how the Medicare Care Coordination Demonstration program was implemented at one site, see the box on page 4.)

CASE EXAMPLE: WASHINGTON UNIVERSITY'S CARE COORDINATION PROGRAM

A natural experiment at Washington University, an academic medical center in St. Louis that participated in the Medicare Care Coordination Demonstration, illustrates the importance of program design. An evaluation found that the site had increased costs when relying on remote telephone care management of most of its enrollees during the first four years of participation in the demonstration. The site achieved net savings for Medicare after reconfiguring its program to focus on higher-risk patients through better assessment of health risks and more in-person contacts by local care managers, which in turn supported stronger transitional care. In addition, the supervised use of care manager assistants for patients at lower-risk levels helped nurse care managers focus greater attention on higher-risk patients. The redesign also improved comprehensive medication management and streamlined and standardized care planning, which promoted efficiency.

Source: D. Peikes, G. Peterson, R. S. Brown et al., "How Changes in Washington University's Medicare Coordinated Care Demonstration Pilot Ultimately Achieved Savings," *Health Affairs,* June 2012 31(6):1216–26.

Identifying Common Attributes of Successful Care Models

Interdisciplinary primary care models have demonstrated a range of positive outcomes and are of particular interest because they may have broad potential application in current practice. Chad Boult and Darryl Wieland, at Johns Hopkins University, distilled four features associated with more effective and efficient primary care for older adults with chronic illnesses.[10] They are:

- comprehensive assessment of the patient's health conditions, treatments, behaviors, risks, supports, resources, values, and preferences;
- evidence-based care planning and monitoring to meet the patient's health-related needs and preferences;
- promotion of patients' and family caregivers' active engagement in care; and
- coordination and communication among all the professionals engaged in a patient's care, especially during transitions from the hospital.

Bodenheimer and Berry-Millett identified several characteristics of more successful care management programs:

- selecting patients with complex needs but not those with illness so severe that palliative or hospice care would be more appropriate than care management;
- using specially trained care managers on multidisciplinary teams that include physicians;
- emphasizing person-to-person encounters, including home visits;
- coaching patients and families to engage in self-care and recognize problems early to avoid emergency visits and hospitalizations; and
- relying on informal caregivers in the home to support patients.

Nelson's analysis of program design in the Medicare demonstrations found that the nature of interactions between care managers and patients and physicians was the strongest predictor of success in reducing hospital use. These interactions occurred in a variety of ways, such as by meeting patients in the hospital or occasionally accompanying patients on visits with their physician. In primary care practices affiliated with Massachusetts General Hospital, care managers were embedded in the

practices so that they had access to patient information and worked closely with physicians.[11] When care-managed patients of these practices visited the emergency departments or were admitted to the hospitals, care teams received real-time notifications, which allowed them to intervene in a timely way.

An analysis of the Medicare Care Coordination Demonstration (one of the six Medicare demonstrations examined by Nelson) by Randall Brown and colleagues at Mathematica Policy Research found that four different programs were more successful than others in reducing hospital use (by 11% on average) among a subset of enrollees at high risk of near-term hospitalization (Appendix A). As a group, the four programs reduced Medicare spending by 5.7 percent for high-risk enrollees, although they were cost-neutral after accounting for administrative fees.[12] These findings point to the importance of targeting those most likely to benefit, rather than all patients, and keeping intervention costs low to generate savings. The evaluators identified six practices that care coordinators performed in at least three of the four more-successful programs targeting high-risk beneficiaries:

- supplementing telephone calls to patients with frequent in-person meetings;
- occasional in-person meetings with providers;
- acting as a communications hub for providers;
- educating patients;
- helping patients manage medications; and
- providing timely and comprehensive transitional care after hospitalizations.

Although transitional care is receiving attention for its role in reducing hospital readmissions, it is only one of several interventions needed to improve outcomes for high-need, high-cost patients. Successful transitional care consists of several interrelated elements,[13] which might be considered together as one feature in a broader care model.

Implementing Care Models Successfully: Context Matters

Some interventions with seemingly similar features achieve disparate results.[14] Their relative success or failure may be attributed to how an intervention is executed, including social and technical aspects.[15] Organizations that develop care management programs are not necessarily seeking to design broadly applicable models but an approach that works in a specific setting. For example, evaluators found the success of high-cost care management at Massachusetts General Hospital stemmed from an institutional commitment to developing a program tailored and fully integrated into its health care system.[16]

To this point, a recent examination of 18 primary care-integrated complex care management programs by Hong and colleagues[17] identified common managerial and operational approaches:

- customizing the approach to the local context and caseload;
- using a combination of qualitative and quantitative methods to identify patients;
- focusing on building trusting relationships with patients and their primary care providers;
- matching team composition and interventions to patient needs;
- offering specialized training for team members;
- using technology to bolster care management efforts.

Best practices may need to be customized to accommodate different populations' needs and changes in technology. For example, a care manager's role of serving as a "communications hub" may

evolve as digital health technologies facilitate new ways of engaging patients and convening a virtual care team.[18] Likewise, electronic teaching aids may help teach self-care to patients with low health literacy, while also lessening care managers' workloads.[19]

Putting the Pieces Together: Content and Execution

Our synthesis of the common attributes of successful care models, identified across multiple reviews, distinguishes between features that describe the general content of an intervention (i.e., what it does) and those related to the execution of that content (i.e., how it's done) (Exhibit 3).

Exhibit 3. Common Attributes of Successful Care Models

Content/Features	Execution/Methods
• **Targeting** individuals most likely to benefit from intervention • **Comprehensive assessment** of patients' health-related risks and needs • Evidence-based **care planning** and routine **patient monitoring** • Promotion of patients' and family caregivers' **engagement in patient self-care** • **Coordination** of care and communication among the patient and care team • **Facilitation of transitions** from hospital to postacute care and referral to **community resources** • Provision of **appropriate care** in accordance with patients' goals and priorities	• Effective **interdisciplinary teamwork** (e.g., defined roles and scope of work, trusting relationships, use of team meetings) • Specially trained **care manager builds rapport through face-to-face contact** with patients and collaborative relationship with physicians • Use of **coaching and behavior-change techniques** to teach self-care skills • Use of **standardized processes** for medication management, advanced care planning • **Effective use of health IT** to provide timely and reliable information on hospital use, enable care management, remote monitoring, analytics • **Outcomes measurement** to evaluate and improve performance

Source: Authors' synthesis of key literature reviews (see Appendix A).

IMPLICATIONS

Overcoming Barriers to Sustainability and Spread

We identified five kinds of barriers or challenges to sustaining and spreading new care models (Exhibit 4), which help to explain why few of these models have been widely adopted in practice.[20]

Simply identifying barriers and enabling factors does not produce change. To advance the field, practitioners can use evidence-based implementation and dissemination frameworks, which have shown promise in helping to guide the adaptive design and spread of programs.[21] Packaging tools, training, and technical assistance together with supportive financial incentives may increase the likelihood that local champions can develop capacity to take up effective programs and practices.[22]

Exhibit 4. Barriers to Sustainability and Spread of Successful Care Models

Barrier		Description
Financial incentives		Lack of incentives to provide care coordination and supportive services under fee-for-service payment; difficulty of prevailing against fee-for-service incentives to generate sufficient cost savings in an acceptable time frame
Capacity to change		Stresses on primary care and limited capacity to implement care management models, despite the logic of doing so in this setting
Culture and workforce		Professional uncertainty and lack of training and skills to take on new roles, adopt a patient-centered paradigm, and change the culture
Infrastructure		Inadequate electronic health records systems and interoperability to support integrated care management and coordination across the care continuum
Evidence		Difficulty scaling up limited evidence from single-site or single-condition studies to multiple contexts and chronic conditions (e.g., determining the relative importance and ideal intensity of each feature in the bundle, etc.)

Source: Authors' synthesis of evidence reviews, case studies, and conference proceedings.

Applying the Evidence to Design Effective Programs for Particular Subpopulations

Care models are typically designed to meet the needs of particular population segments under different payment arrangements and organizational settings (Exhibit 5).[23] For example, frail elderly patients with functional limitations who need long-term services and supports may benefit from a care model

Exhibit 5. Context Matters: What Works by Population and Payment

Population	Examples of models that work in managed care arrangements	Examples of models that work in fee-for-service arrangements
Using long-term services and supports in the community	• PACE (Program of All-Inclusive Care for the Elderly) • Commonwealth Care Alliance (Mass. Senior Care Options)	• GRACE (Geriatric Resources for the Assessment and Care of Elders)
With severe chronic illness, but no long-term services and supports	• CareMore	• Select programs from the Medicare Care Coordination Demonstration, e.g., Health Quality Partners, Washington University • Select programs from the Medicare Care Management for High-Cost Beneficiaries, e.g., Massachusetts General Hospital
With less severe chronic illness		• Accountable care organizations (ACOs)*

* Note: ACOs are shown as a current model that builds on evidence from the Physician Group Practice Demonstration; their potential has not yet been fully demonstrated.
Source: Adapted in part from R. Brown, "Care Coordination Programs for Improving Outcomes for High-Need Beneficiaries: What's the Evidence?" Presentation to the Commission on Long-Term Care, July 17, 2013.

such as the Program of All-Inclusive Care for the Elderly (PACE), which offers a comprehensive set of services to support independent living by pooling funding from the Medicare and Medicaid programs. On the other hand, Medicare beneficiaries with serious chronic illnesses who do not need such long-term services and supports may benefit from a care model such as the Washington University care coordination program, which builds on existing provider relationships and fee-for-service payment.

Assessing and monitoring high-risk patients can determine when their needs change and require an alternative care model. However, transitions between programs must be made seamlessly or will risk interrupting continuity of care. Some managed care organizations, such as the Visiting Nurse Service of New York, have developed a portfolio of programs based on common care management principles tailored to serve different segments of the population; this approach offers the opportunity to realize economies but also requires depth of expertise.[24]

Our synthesis is limited by a relative paucity of high-quality evidence on some care models, such as those that integrate long-term services and social supports into primary care. Much of the evidence reviewed comes from trials in single sites or programs that target patients with specific conditions, which raises questions about broader application. The findings of this brief will need to be augmented by new evidence from other approaches that are currently being tested.[25]

CONCLUSION

Care models for high-need, high-cost patients offer the potential to achieve the "triple aim" by reducing costs while simultaneously improving patients' health and care experiences. Few of the care models examined in this brief have demonstrated net cost savings, which suggests that our expectations should be modest when adding care management to an already fragmented fee-for-service care system. The incentives created by accountable care and other value-based purchasing initiatives may strengthen the business case for adopting carefully designed and well-executed models.[26] Public and private purchasers must consider the adequacy of payment methods and performance measurements to ensure that savings ultimately accrue to society or consumers while also attracting sufficient participation among providers and improving outcomes for patients.[27]

About This Study

We synthesized findings from six expert reviews and secondary analyses of evidence on the impact and features of clinical care models or care management programs that target high-need, high-cost patients—often defined as patients with complex health care needs. (Appendix A describes sources and definitions in detail; Appendix B describes characteristics of select care models.)

- C. Boult and colleagues, "Successful Models of Comprehensive Care for Older Adults with Chronic Conditions: Evidence for the Institute of Medicine's 'Retooling for an Aging America' Report" (article published in the *Journal of the American Geriatrics Society* in 2009).
- T. Bodenheimer and R. Berry-Millett, *Care Management of Patients with Complex Health Care Needs* (report published by the Robert Wood Johnson Foundation in 2009).
- L. Nelson, "Lessons from Medicare's Demonstration Projects on Disease Management and Care Coordination" (working paper published by the Congressional Budget Office in 2012).
- R. S. Brown and colleagues, "Six Features of Medicare Coordinated Care Demonstration Programs that Cut Hospital Admissions of High-Risk Patients" (article published in *Health Affairs* in 2012).
- R. S. Brown and colleagues, "Promising Practices in Acute/Primary Care" (chapter in the book, *Comprehensive Care Coordination for Chronically III Adults,* published by Wiley in 2011).
- C. S. Hong and colleagues, *Caring for High-Need, High-Cost Patients: What Makes for a Successful Care Management Program?* (issue brief published by The Commonwealth Fund in 2014).

We also reviewed a best-practice framework for advanced illness care published by the Coalition to Transform Advanced Care. Although there was some overlap in the research studies included in the reviews, no single review encompassed all the evidence.

Exclusions: Our primary focus was on care models sponsored by health care delivery organizations. Therefore, we did not select reviews focused on the effectiveness of capitated managed care plans or state-sponsored programs for Medicaid beneficiaries.[28] (Some care models targeting these populations were included in the general reviews.) While care models often included behavioral health in comprehensive care, we did not include reviews focused specifically on interventions that integrate behavioral health in primary care, which may serve a broader population.[29]

Limitations: Individual research studies included in the reviews may not have been strictly comparable because of differences in intensity and scope of interventions, in populations served, and in duration of study periods. We did not ascertain whether the programs cited in the literature are still in existence. Many studies used reductions in hospitalizations to indicate the potential for reduced health care spending; however, this outcome depends on whether cost savings from reduced utilization exceed the costs of care enhancements and program administration, which was often not measured.

Notes

[1] J. A. Schoenman, *The Concentration of Health Care Spending,* NIHCM Foundation Data Brief (Washington, D.C.: National Institute for Health Care Management Research and Educational Foundation, July 2012).

[2] L. Alecxih, S. Shen, I. Chan et al., *Individuals Living in the Community with Chronic Conditions and Functional Limitations: A Closer Look* (Washington, D.C.: U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation, Jan. 2010).

[3] D. Bachrach, H. Pfister, K. Wallis et al., *Addressing Patients' Social Needs: An Emerging Business Case for Provider Investment* (New York: The Commonwealth Fund, May 2014).

[4] C. Schoen, R. Osborn, D. Squires, M. M. Doty, R. Pierson, and S. Applebaum, "New 2011 Survey of Patients with Complex Care Needs in Eleven Countries Finds That Care Is Often Poorly Coordinated," *Health Affairs* Web First, published online Nov. 9, 2011; and S. M. Asch, E. A. Kerr, J. Keesey et al., "Who Is at Greatest Risk for Receiving Poor-Quality Health Care?" *New England Journal of Medicine,* March 16, 2006 354(11):1147–56.

[5] C. Boult, A. F. Green, L. B. Boult et al., "Successful Models of Comprehensive Care for Older Adults with Chronic Conditions: Evidence for the Institute of Medicine's 'Retooling for an Aging America' Report," *Journal of the American Geriatrics Society,* Dec. 2009 57(12):2328–37.

[6] T. Bodenheimer and R. Berry-Millett, *Care Management of Patients with Complex Health Care Needs,* Research Synthesis Report No. 19 (Princeton, N.J.: Robert Wood Johnson Foundation, Dec. 2009).

[7] L. Nelson, *Lessons from Medicare's Demonstration Projects on Disease Management and Care Coordination,* Working Paper 2012-01 (Washington, D.C.: Congressional Budget Office, Jan. 2012).

[8] L. Nelson, *Lessons from Medicare's Demonstration Projects on Disease Management, Care Coordination, and Value-Based Payment,* Issue Brief (Washington, D.C.: Congressional Budget Office, Jan. 2012).

[9] R. S. Brown, A. Ghosh, C. Schraeder et al., "Promising Practices in Acute/Primary Care," In: C. Schraeder and P. Shelton, eds., *Comprehensive Care Coordination for Chronically III Adults* (New York: Wiley, 2011).

[10] C. Boult and G. D. Wieland, "Comprehensive Primary Care for Older Patients with Multiple Chronic Conditions," *Journal of the American Medical Association,* Nov. 3, 2010 304(17):1936–43.

[11] N. McCall, J. Cromwell, and C. Urato, *Evaluation of Medicare Care Management for High Cost Beneficiaries (CMHCB) Demonstration: Massachusetts General Hospital and Massachusetts General Physicians Organization, Final Report* (Washington, D.C.: Centers for Medicare and Medicaid Services, Sept. 2010).

[12] R. S. Brown, D. Peikes, G. Peterson et al., "Six Features of Medicare Coordinated Care Demonstration Programs That Cut Hospital Admissions of High-Risk Patients," *Health Affairs,* June 2012 31(6):1156–66.

[13] K. J. Verhaegh, J. L. MacNeil-Vroomen, S. Eslami et al., "Transitional Care Interventions Prevent Hospital Readmissions for Adults with Chronic Illnesses," *Health Affairs,* Sept. 2014 33(9):1531–39.

[14] For example, among PACE programs, higher self-rated interdisciplinary team performance and other program characteristics were associated with better enrollee functional health outcomes. See: D. B. Mukamel, H. Temkin-Greener, R. Delavan et al., "Team Performance and Risk-Adjusted Health Outcomes in the Program of All-Inclusive Care for the Elderly (PACE)," *Gerontologist,* April 2006 46(2):227–37; and D. B. Mukamel, D. R. Peterson, H. Temkin-Greener et al., "Program Characteristics and Enrollees' Outcomes in the Program of All-Inclusive Care for the Elderly (PACE)," *Milbank Quarterly,* 2007 85(3):499–531.

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[17] C. S. Hong, A. L. Siegel, and T. G. Ferris, *Caring for High-Need, High-Cost Patients: What Makes for a Successful Care Management Program?* (New York: The Commonwealth Fund, Aug. 2014).

[18] S. Klein, M. Hostetter, and D. McCarthy, *A Vision for Using Digital Health Technologies to Empower Consumers and Transform the U.S. Health Care System* (New York: The Commonwealth Fund, Oct. 2014).

[19] T. W. Bickmore, L. M. Pfeifer, D. Byron et al., "Usability of Conversational Agents by Patients with Inadequate Health Literacy: Evidence from Two Clinical Trials," *Journal of Health Communication,* 2010 15(Suppl. 2):197–210; and B. Jack and T. Bickmore, "Louise: Saving Lives, Cutting Costs in Health Care" (Boston: Boston University School of Medicine).

[20] Several barriers to the adoption of new care models were identified by C. Boult in "Challenges to CaRe-Align," Presentation to the CaRe-Align Collaboration Meeting, Dallas, Texas, April 23, 2014 (CaRe-Align is an initiative of the Patient-Centered Outcomes Research Institute and the John A. Hartford Foundation).

[21] L. J. Damschroder, D. C. Aron, R. E. Keith et al., "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science," *Implementation Science,* Aug. 7, 2009 4:50.

[22] A. Wandersman, V. H. Chien, and J. Katz, "Toward an Evidence-Based System for Innovation Support for Implementing Innovations with Quality: Tools, Training, Technical Assistance, and Quality Assurance/Quality Improvement," *American Journal of Community Psychology,* Dec. 2012 50(3–4):445–59.

[23] R. Brown, "Care Coordination Programs for Improving Outcomes for High-Need Beneficiaries: What's the Evidence?" Presentation to the Commission on Long-Term Care, July 17, 2013.

[24] M. Bihrle-Johnson and D. McCarthy, *The Visiting Nurse Service of New York's Choice Health Plans: Continuous Care Management for Dually Eligible Medicare and Medicaid Beneficiaries* (New York: The Commonwealth Fund, Jan. 2013).

[25] For example, see: D. O. Meltzer and G. W. Ruhnke, "Redesigning Care for Patients at Increased Hospitalization Risk: The Comprehensive Care Physician Model," *Health Affairs,* May 2014 33(5):5770–77.

[26] D. McCarthy, S. Klein, and A. Cohen, *The Road to Accountable Care: Building Systems for Population Health Management* (New York: The Commonwealth Fund, Oct. 2014).

[27] For a discussion of capitation rates in Medicare Advantage plans, see: R. Brown and D. R. Mann, *Best Bets for Reducing Medicare Costs for Dual Eligible Beneficiaries: Assessing the Evidence* (Washington, D.C.: Henry J. Kaiser Family Foundation, Oct. 2012).

[28] For example, see: A. Hamblin and S. A. Somers, *Introduction to Medicaid Care Management Best Practices* (Princeton, N.J.: Center for Health Care Strategies, Dec. 2011).

[29] For example, see: AcademyHealth, *Evidence Roadmap: Integration of Physical and Behavioral Health Services for Medicaid Enrollees* (Washington, D.C.: AcademyHealth, May 2015).

Appendix A. Primary Sources

Source	Evidence reviewed	Models studied
C. Boult, A. F. Green, L. B. Boult et al., "Successful Models of Comprehensive Care for Older Adults with Chronic Conditions: Evidence for the Institute of Medicine's 'Retooling for an Aging America' Report," *Journal of the American Geriatrics Society,* Dec. 2009 57(12):2328–37.	123 high-quality studies published between 1987 and 2008 reporting at least one statistically significant positive outcome (quality, health, or efficiency) compared with usual care. Studies were considered high-quality if they had a strong design, adequate sample, valid measures, reliable data collection, and rigorous data analysis.	15 clinical models staffed primarily by health care professionals and intended to "address several health-related needs of older persons, such as care for several chronic conditions, several aspects of one chronic condition, or persons receiving care from several health care providers" (see Supplement Tables A-O of the Boult paper.)
T. Bodenheimer and R. Berry-Millett, *Care Management of Patients with Complex Health Care Needs,* Research Synthesis Report No. 19 (Princeton, N.J.: Robert Wood Johnson Foundation, Dec. 2009).	Controlled and observational studies of care management programs for patients with complex care needs (e.g., multiple chronic conditions, many providers, polypharmacy, frequent hospitalizations, functional limitations) published since 1990, as well as interviews with health care leaders who implemented these programs.	Care management programs defined as "a set of activities designed to assist patients and their support systems in managing medical conditions and related psychosocial problems more effectively, with the aim of improving patients' health status and reducing the need for medical services (see Appendices III and IV of the Bodenheimer paper).
L. Nelson, *Lessons from Medicare's Demonstration Projects on Disease Management and Care Coordination,* Working Paper 2012-01 (Washington, D.C. Congressional Budget Office, Jan. 2012); and L. Nelson, *Lessons from Medicare's Demonstration Projects on Disease Management, Care Coordination, and Value-Based Payment,* Issue Brief (Washington, D.C.: Congressional Budget Office, Jan. 2012).	20 commissioned and peer-reviewed evaluations of programs targeting Medicare fee-for-service beneficiaries, including high-cost beneficiaries with multiple chronic conditions and dually eligible beneficiaries.	34 disease management and care coordination programs from six major Medicare demonstrations "aimed at improving the care of beneficiaries with chronic conditions or high expected health care costs." The demonstrations included the: • Demonstration of Care Management for High-Cost Beneficiaries (6 sites); • Medicare Coordinated Care Demonstration (15 sites); • Medicare Health Support Pilot Program (8 sites); • Demonstration of Disease Management for Dual Eligible Beneficiaries (1 site); • Demonstration of Informatics for Diabetes Education and Telemedicine (1 site); and • Demonstration of Disease Management for Severely Chronically Ill Beneficiaries (3 sites).
R. S. Brown, D. Peikes, G. Peterson et al., "Six Features of Medicare Coordinated Care Demonstration Programs That Cut Hospital Admissions of High-Risk Patients," *Health Affairs,* June 2012 31(6):1156–66	Written reports, telephone interviews, and site visits with programs from the Medicare Coordinated Care Demonstration, covering fee-for-service beneficiaries with at least one chronic condition. The high-risk subgroup associated with significant reductions in hospital use across the four programs was defined as patients with coronary artery disease, chronic heart failure, and/or chronic obstructive pulmonary disease and at least one hospitalization in the prior year; or those with any of 12 conditions and at least two hospitalizations in the prior two years.	11 diverse care coordination programs, of which four demonstrated reduced hospitalizations: • Health Quality Partners (a health care quality improvement service provider in suburban and rural southeastern Pennsylvania), • Hospice of the Valley (a hospice and home health agency in the Phoenix area), • Mercy Medical Center (a hospital within an integrated delivery system in rural Iowa), • Washington University (a safety-net academic medical center in St. Louis).

Source	Evidence reviewed	Models studied
R. S. Brown, A. Ghosh, C. Schraeder et al., "Promising Practices in Acute/Primary Care," in C. Schraeder and P. Shelton, eds., *Comprehensive Care Coordination for Chronically Ill Adults* (Wiley, 2011).	Evidence and lessons from rigorously evaluated primary and acute care coordination programs that reduced hospitalizations and expenditures.	Care coordination defined as "a set of activities that assist patients and their families in self-managing their health conditions and related psychosocial problems more effectively; coordinating their care among multiple health and community providers; bridging gaps in care; and receiving the appropriate levels of care."
C. S. Hong, A. L. Siegel, and T. G. Ferris, *Caring for High-Need, High-Cost Patients: What Makes for a Successful Care Management Program?* (New York: The Commonwealth Fund, Aug. 2014).	Key informant interviews, review of published manuscripts and program materials for each program serving complex patients with multiple chronic conditions or advanced illness.	18 successful primary care-integrated complex care management programs "in which specially trained, multidisciplinary teams coordinate closely with primary care teams to meet the needs of patients with multiple chronic conditions or advanced illness, many of whom face social or economic barriers in accessing services" (see Appendix Table 1 of Hong paper).
Coalition to Transform Advanced Care, *Advanced Care: A Model for Person-Centered, Integrated Care for Late Stage Chronic Illness,* http://advancedcarecoalition.org.	Best practices derived from interdisciplinary care coordination models.	Interdisciplinary care coordination models "tightly linking inpatient, ambulatory and home/ community settings" for those with advanced illness, which "occurs when a person with one or more chronic diseases begins to decline in health status and ability to function."

Appendix B. Example Care Models

The following examples represent a sample of care models and programs described in the text, for which there is relatively stronger evidence of impact. These examples were compiled from published literature and are not exhaustive. Bolded terms correspond to the attributes summarized in Exhibit 3.

Program/Sponsor	Target Population	Key Components	Results
Geriatric Resources for Assessment and Care of Elders (GRACE), Indiana University[1]	Low-income (<200% of the federal poverty level) seniors with multiple diagnoses[2] 25% of seniors enrolled were deemed high-risk for hospitalization; these patients were categorized as a high-risk subgroup for analysis[3]	• Support team consisting of advanced practice nurse and social worker work with elderly **in the home** and community[4] • In-home **assessment** and specific care protocols inform individualized **care plan** • Support team works closely with larger **interdisciplinary care team** • **Patient education** and **self-management** plans include tools for low-literacy seniors	After two intervention years of a three-year controlled research study[5]: • use of emergency department significantly lower in intervention group compared to usual care • hospitalization rate significantly lower in high-risk patients in intervention group compared with high-risk patients receiving usual care • among high-risk patients, the program was cost-neutral in the first two years, and cost-saving in the third year (postintervention)
Guided Care, Johns Hopkins University[6]	Older adults with multiple chronic conditions at high risk of high health expenditures in the next year	• Predictive modeling and 12 months of claims data used to **identify** the 20%–25% of patients most at risk of needing complex care in the near future[7] • RNs trained in complex care management perform **in-home assessments** and develop **care plans** to coordinate care with **multidisciplinary providers**[8] • **Patient education** and **self-management** strategies focus on addressing issues before hospitalization becomes necessary	A 32-month cluster-randomized trial at eight urban and suburban practices in the Baltimore–Washington area, representing over 900 patients and 300 family caregivers, found that Guided Care participants experienced:[9] • 29% decrease in home health episodes • 26% fewer skilled nursing facility days • 13% fewer hospital readmissions • 8% fewer skilled nursing facility admissions These improvements were more pronounced among Guided Care patients receiving primary care from an integrated delivery system.
Naylor Transitional Care Model, University of Pennsylvania[10]	Hospitalized, high-risk older adults with chronic conditions[11]	• **Multidisciplinary** provider team led by advanced practice nurses engages in comprehensive **discharge planning** • Three-month post-discharge follow-up includes **frequent home visits** and are telephone availability • Involve **patients and family members** in **identifying goals** and building **self-management** skills	Randomized controlled trial found the following one year after discharge:[12] • 36% fewer readmissions • 38% reduction in total costs • Short-term improvements in overall quality of life and patient satisfaction
Improving Mood: Promoting Access to Collaborative Treatment (IMPACT), University of Washington[13] (pilot-tested at 18 primary care clinics at 7 sites across the U.S.)[14]	Older adults suffering from depression[15] The model has also been adapted for other populations with depression, including adults of all ages, adolescents, cancer patients, and patients with chronic illnesses, including diabetes. Evaluations indicate that these IMPACT adaptions are also effective.[16]	• **Collaborative care:** Primary care physician works with **depression care manager** (e.g., nurse, social worker, or psychologist supported by medical assistant or other paraprofessional) to develop and implement treatment plan including anti-depressant medication and/or short-term counseling. Team includes **consulting psychiatrist**. • Care manager also **educates patient** about depression and coaches in self-care. • Providers utilize **ongoing measurement and tracking of outcomes** with validated depression screening tool, such as Patient Health Questionnaire-9, and **adapt care** to changing symptoms • Once a patient improves, case manager and patient **jointly develop a plan** to prevent relapse.[17]	A randomized controlled trial of 1801 adults age 60 or older with major depression, dysthymic disorder, or both, found that: • After 12 months, about half of IMPACT patients had a 50% or greater reduction in depressive symptoms from their baseline assessment compared to 19 percent of patients who received usual primary care.[18] • Over a four year period, total health care costs for IMPACT patients were approximately $3,300 lower per patient on average than those of patients receiving usual primary care—even after accounting for the cost of providing the IMPACT intervention.[19]

Program/Sponsor	Target Population	Key Components	Results
Health Quality Partners[20] (participant in the Medicare Coordinated Care Demonstration)	Medicare beneficiaries with chronic conditions	• RN care coordinators focus on changing **patient behavior**[21] • Focus on **frequent in-person** contact with both patients and physicians • Evidence-based **patient education** including condition-specific **self-monitoring** training[22]	Randomized controlled study found that after six years the intervention, among high-risk subgroup[23]: • Reduced hospitalizations by 25% • Reduced emergency department visits by 28% • Reduced average monthly Medicare Part A and B expenditures by 21%
Massachusetts General Physicians Organization Care Management Program[24] (participant in the Medicare Demonstration for High Cost Medicare Beneficiaries)	Medicare beneficiaries who are high cost and/or have complex conditions	• Care managers are integrated into primary care practices[25] • Care managers provide **patient education** and address both **medical and psychosocial needs** • Focus on **preventing exacerbations** that lead to emergency department visits and inpatient admissions • Case managers also support **end-of-life decision-making**	After three years, intervention group exhibited[26]: • 20% reduction in hospital admissions • 13% reduction in emergency department visits • 7% annual savings after accounting for intervention costs
Chronic Disease Self-Management Program (CDSMP), Stanford University[27] (as piloted at Kaiser Permanente, Northern California)	Adults with one or more chronic conditions[28]	• **Patient education** occurs in small group courses in a **community setting**, including family members and caregivers, and teaches strategies and skills to better cope with and manage common problems and symptoms • Course facilitated by two trained **peer leaders**, at least one of whom is a nonmedical professional, who often have chronic conditions themselves • Patients practice strategies and skills and receive highly **interactive feedback** in a supportive environment to enhance their sense of self-efficacy, and their confidence in their **ability to manage their conditions** • Program is of limited duration (2.5 hours per week over 6-week period) and easy to export	A randomized clinical trial of 952 patients age 40 and older with chronic conditions that compared CDSMP patients with wait-list control subjects found that after six months, treatment patients experienced: • fewer physician visits, ER visits, and hospitalizations and shorter lengths of stay • more energy, less fatigue, fewer social limitations, and greater improvement in self-reported health[29] • fewer ER and physician visits, reduced health distress, and improved self-efficacy, compared to baseline, even after two years[30] A national survey of 1,170 CDSMP participants in 17 states at baseline, six months, and one year and found: • significant reductions in ER visits and hospitalizations at six months and a reduction in ER visits at one year • potential net savings in health care costs of $364 per participant, after accounting for cost of program; if 5% of adults with one or more chronic conditions participated in program, national savings in health care costs would be an estimated $3.3 billion.[31]
Care Management Plus, Oregon Health and Science University and the John A. Hartford Foundation[32] (piloted at Intermountain Healthcare)	Originally designed to serve adults 65 years and older, who have multiple comorbidities, diabetes, frailty, dementia, depression and other mental health needs; entry is by referral from the primary care provider. (The model has been adapted to serve non-elderly patients with complex needs.)	• Specially trained care managers (usually RNs or social workers) located in primary care clinics perform **person-centered assessment** and work with families and providers to formulate and implement a **care plan**[33] • Care manager ensures **continuity of care** and regular follow up in office, in the home, or by phone • Continuity of care enhanced by specialized **IT system** • Care manager provides **coaching and self-care** education for **patients and families**	Controlled study comparing patients receiving care management in seven intervention clinics with similar patients in six control practices within Intermountain Healthcare found: • decreased hospitalization rates after two years for intervention patients, although this result was only significant among patients with diabetes[34] • approximately 20% reduction in mortality among all Care Management Plus patients, reduction most pronounced in patients with diabetes[35]

Program/Sponsor	Target Population	Key Components	Results
Program of All-Inclusive Care for the Elderly (PACE), operated by local nonprofit PACE organizations at 114 sites in 32 states under agreements with the Centers for Medicare and Medicaid Services (CMS)[36]	Adults age 55+ with insurance through Medicare and/or Medicaid, with chronic conditions and functional and/or cognitive impairments, and living in the service area of a local PACE organization Patients must be certified by Medicaid as eligible for nursing home level of care, and able to live safely at home with help from PACE	• Each PACE site provides **comprehensive preventive, primary, acute, and long-term care and social services**, including adult day care, meals, and transportation • **Interdisciplinary team** meets regularly to design individualized care plans • Goal is to allow patients to **live independently** in the community • Patients receive all covered Medicare and Medicaid services through the local PACE organization in their home and community and at a local PACE center, thereby enhancing **care coordination**[37] • Clinical staff are employed or contracted by the local PACE organization, which is paid on a per-capita basis and not based on volume of services provided	A recent review of the literature found that PACE enrollees experienced fewer hospitalizations but more nursing home admissions, better quality for certain aspects of care such as pain management, and lower mortality, than comparison groups.[38] Overall, PACE appeared cost-neutral to Medicare and may have increased costs for Medicaid, though more research is needed to reflect current payment arrangements.[39] A subsequent study found that PACE may be more effective than home and community-based waiver programs in reducing long-term nursing home use, especially for those with cognitive impairments.[40] Higher self-rated PACE team performance and other program characteristics were associated with better enrollee functional health outcomes.[41]
CareMore,[42] a subsidiary of Anthem	Medicare Advantage plan members in California, Nevada, Arizona, Virginia, and Ohio, and Medicaid managed care plan members in Tennessee	• Identifies members who are frail and/or chronically ill and in need of or at high risk for hospital admission via **comprehensive initial visit** upon enrollment • Extensivist physicians provide care to hospitalized patients and oversee postdischarge care in skilled nursing facilities and other settings • Frail and/or chronically ill members are also enrolled in **disease-specific management** programs • Customized **electronic health record** and **remote monitoring** let patients monitor vitals in their homes, with results immediately shared with CareMore team • Provides help to members in accessing **social and other nonmedical support services** and provides **transportation** to CareMore Care Centers	As reported in 2011, CareMore's Medicare Advantage plan achieved the following results: • 30-day hospital readmissions rate was lower than for overall Medicare population (13.6% compared to 19.6% for Medicare fee-for-service).[43] • members' per capita health spending was 15% less than the regional average.[44] • hospital length-of-stay was shorter: 3.2 days compared to 5.6 day average in Medicare fee-for-service and 4.5 day average for traditional hospitalist programs in California.[45] Results not yet available for the Medicaid program.
Commonwealth Care Alliance[46]	Dual-eligibles age 65+ enrolled in a Medicare Advantage Special Needs Plan that participates in the Massachusetts Senior Care Options program[47] Dual eligibles age 64 and younger in the Massachusetts One Care program	• Provides enhanced primary care and **care coordination** through **multidisciplinary clinical teams** led by nurse practitioners[48] • After a **comprehensive assessment, individualized care plans** are developed to promote independence and functioning • Integration of **behavioral health** care for those who need it • Care team available 24/7 **in the home**, in the hospital, or at the doctor's office • Patients' records available 24/7 in proprietary **electronic health record** system[49]	Internal Commonwealth Care Alliance data suggests that Senior Care Options enrollees experienced[50]: • 48% fewer hospital days than comparable dual eligible in a fee-for-service environment • 66% fewer nursing home placements Results not yet available for the OneCare program.

Program/Sponsor	Target Population	Key Components	Results
Hospital at Home[51] (developed at Johns Hopkins University and tested in medical centers across the U.S.)	Older patients with a targeted acute illness that requires hospital-level care, who also meet validated medical eligibility criteria and live within designated geographic catchment area (e.g. 25 miles or 30-minute travel time from hospital.)	• Potentially eligible **patients are identified** in the hospital emergency department or ambulatory care site. If they meet the validated criteria and consent to participate, they evaluated by physician and transported home, usually via ambulance • **One-on-one nursing** for initial stage and at least **daily nurse and physician visits** thereafter • Both nurses and physicians on call **around-the-clock** for urgent or emergent visits • Some diagnostic services and treatments performed **in home setting** • Same criteria and guidelines are used to judge patient readiness for transition to skilled nursing facility, or discharge from Hospital at Home as from hospital.	Evaluation of patients in Hospital at Home program and comparison group of similar inpatients in 2009–2010[52]: • Hospital at Home patients showed comparable or better clinical outcomes and higher satisfaction levels • Excluding physician costs, Hospital at Home per-patient average costs were 19% lower than similar inpatient per-patient average costs for the comparison group. Cost savings were due to lower average length-of-stay and few diagnostic and lab tests. Prospective quasi-experiment with patients 65 and older in three Medicare Managed Care plans at two sites, and at a Veterans Administration medical center, found that[53]: • patients treated at Hospital at Home had shorter length of stay and lower average costs than hospital inpatients.

Notes to Appendix B

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