



# AHRQ Health Information Technology Ambulatory Safety and Quality

Findings and Lessons From  
the Improving Management  
of Individuals With Complex  
Health Care Needs Through  
Health IT Grant Initiative



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Agency for Healthcare Research and Quality  
U.S. Department of Health and Human Services  
540 Gaither Road  
Rockville, MD 20850  
[www.ahrq.gov](http://www.ahrq.gov)

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**Prepared by:**

Westat  
Russell Mardon, Ph.D., Project Director

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## Preface

The Improving Management of Individuals With Complex Healthcare Needs Through Health IT initiative is part of the Agency for Healthcare Research and Quality's (AHRQ's) Ambulatory Safety and Quality (ASQ) program. The purpose of the AHRQ ASQ program is to improve the safety and quality of ambulatory health care in the United States. The program's components, with the exception of the risk assessment grant initiative (FOA HS-07-003), emphasize the role of health information technology (IT). The ASQ program included the following grant initiatives:

- Enabling Quality Measurement Through Health IT (FOA HS-07-002), which focused on strategies for the development of health IT to assist clinicians, practices, and systems to measure the quality and safety of care in ambulatory care settings.
- Ambulatory Care Patient Safety Proactive Risk Assessment (FOA HS-07-003), which supported research in risk assessment and modeling to identify preventable patient injuries and harms and to inform the development and deployment of intervention strategies to reduce threats to patient safety in ambulatory care settings and during transitions of care.

- Improving Quality Through Clinician Use of Health IT (FOA HS-07-006), which supported research related to the development, implementation and use of health IT to assist clinicians, practices, and systems in improving the quality and safety of care delivery in ambulatory care settings.
- Enabling Patient-Centered Care Through Health IT (FOA HS-07-007), which was designed to investigate approaches to improve the patient experience of care through the use of health IT in ambulatory care settings.
- Improving Management of Individuals With Complex Healthcare Needs Through Health IT (FOA HS-08-002), which was aimed at clinician and patient and family use of health IT in ambulatory settings to improve outcomes through more effective decision support or care delivery for patients with complex health care needs.

This is one of a series of five reports highlighting findings and lessons from the health IT-focused ASQ grant initiatives. These reports summarize the projects in each initiative and identify practical insights regarding the use of health IT to improve safety and quality in ambulatory settings.

## Acknowledgments

This report was developed through a collaborative process that would not have been possible without the contributions of many individuals. The project director would especially like to thank the following key participants who contributed to and guided the work:

- The Improving Management of Individuals With Complex Healthcare Needs Through Health IT (MCP) grantees, whose work in advancing the use of health IT to improve the quality and safety of care for patients with complex health care needs inspired and informed this report.
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- Vera Rosenthal, M.P.H., Program Manager, Health IT, and lead for the MCP initiative, whose feedback and guidance shaped the report.
- The Synthesis Team, a group of Westat senior staff, including Nathan Botts, Ph.D.; Brenda Leath, M.H.S.A.; Russell Mardon, Ph.D.; Lauren Mercincavage, M.H.S.; Eric Pan, M.D.; Jonathan Ratner, Ph.D.; Helga Rippen, M.D., Ph.D., M.P.H., FACPM; and Larry Stepnick, M.B.A., of The Severyn Group; and the Westat project manager Julie Bergmann, M.H.S.

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## Executive Summary

This report highlights key findings, lessons, and insights from the experiences of 12 projects awarded in 2007 under the Agency for Healthcare Research and Quality's (AHRQ's) Improving Management of Individuals with Complex Healthcare Needs Through Health IT initiative (Funding Opportunity Announcement [FOA] HS-08-002 (<http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-08-002.html>)).

This initiative was designed to investigate approaches for using health information technology (IT) to improve the coordination and quality of services for patients with complex health conditions, including during transitions of care. It is part of AHRQ's Ambulatory Safety and Quality (ASQ) program, which was designed to improve the safety and quality of ambulatory health care in the United States.

This report summarizes the extent to which the projects addressed the areas of interest laid out in the FOA, and identifies practical insights regarding the use of health IT to improve management of patients with complex conditions in the ambulatory setting. It presents illustrative project findings in an effort to inform research discussion and provide guidance to other entities implementing health IT systems for this purpose. As the researchers continue to disseminate findings from these projects, additional lessons and insights may become evident.

The body of the report is organized around the five main areas of interest outlined in the FOA. Each is described below:

- Novel approaches to providing high-quality, appropriate care through the use of health IT, addressed in 12 projects, includes a variety of uses for health IT, such as linking clinical health IT systems to practice management systems and using health IT to engage patients and their families to enhance self-care and comanagement of chronic conditions.

- Integrating patient information across transitions in care to improve quality, addressed in eight projects, by making sure that clinicians, patients, and families have access to relevant information during transitions between ambulatory care settings and other settings such as hospitals, home care, assisted living centers, and nursing homes.
- Shared decisionmaking and patient-clinician communication was addressed in four projects. This included the use of health IT to support collaboration between patients and clinicians to arrive at decisions about patient care that are informed and mutual. These projects also used health IT to support effective clinical interactions during office visits as well as the delivery of clinical services through secure messaging or electronic visits.
- Strategies for safe, successful, and productive adoption of health IT in ambulatory settings, addressed in three projects, includes managing the impact of health IT implementation on team roles, team-based care, and workflows within a practice and across settings.
- The impact of health IT on outcomes related to patients with complex health care needs in ambulatory settings and across high-risk transitions of care includes process, intermediate, health, and economic outcomes. Seven projects reported a significant impact on outcomes.

The MCP projects were carried out in a variety of ambulatory care settings, including primary care and specialty care clinics. In addition, many projects focused on improving transitions across settings. They addressed a range of relevant care topics, including many of the priority areas for health care quality improvement identified by the Institute of Medicine (IOM, 2003). The names of the principal investigators, their institutions, and the project titles are shown in the Appendix, along with links to additional information about the projects on the AHRQ National Resource Center for Health IT Web site (<http://healthit.ahrq.gov/portfolio>).

The projects funded under the initiative advanced understanding of the effective use of health IT to improve management of individuals with complex health care needs in the ambulatory setting. Several projects showed a positive impact on clinician acceptance and use of health IT as well as improvement in the flow of information when patients transition from one clinician to another. Other projects demonstrated high levels of patient engagement and activation in self-care. Still others reported reductions in hospital or emergency department (ED) use. The findings add to the evidence of the positive impact on health care-related outcomes of health IT applications designed to support management of patients with complex health conditions.

The studies also highlighted a number of barriers and facilitators to the use of health IT. For example, several projects experienced difficulties integrating health IT interventions into existing clinical data systems, while others achieved successes through careful implementation and staff training. The continuing interest in use of health IT to improve health and health care delivery, and the positive impact of these approaches on a range of health care outcomes, make the results of this body of research timely and relevant to ongoing efforts to improve management of patients with complex health care needs.



## Introduction

This report highlights key findings and lessons from the experiences of 12 projects awarded in 2008 under the Agency for Healthcare Research and Quality's (AHRQ's) Improving Management of Individuals With Complex Healthcare Needs Through Health IT (MCP) initiative (Funding Opportunity Announcement [FOA] HS-08-002 (<http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-08-002.html>)). This initiative was designed to investigate approaches for using health information technology (IT) to improve the coordination and quality of services for patients with complex health conditions, including during transitions across settings of care. It is part of AHRQ's Ambulatory Safety and Quality (ASQ) program, which fostered research on the use of health IT to improve the safety and quality of ambulatory health care in the United States.

This report summarizes the extent to which the projects addressed the areas of interest laid out in the FOA and identifies practical insights regarding the use of health IT to improve management of complex patients in the ambulatory setting. It presents illustrative project findings in an effort to inform research discussion and provide guidance to other entities implementing health IT systems for this purpose. The report is organized around the five main areas of interest laid out in the FOA. Each section includes a brief background section on the topic, followed by a summary of how the projects addressed the topic, and specific descriptions of each relevant project. In addition, the report includes a synopsis of key findings from the projects that bear on several types of outcomes, including process outcomes, intermediate outcomes, and economic outcomes.

The names of the principal investigators, their institutions, the project titles, and the MCP areas of interest addressed in each project are included in the Appendix, along with links to additional information about the projects on the AHRQ National Resource Center for Health IT Web site (<http://healthit.ahrq.gov/portfolio>).

### **The Potential for Health IT To Improve Management of Patients With Complex Health Care Needs**

The importance of providing treatment and supportive services for individuals with complex health care needs continues to increase. Approximately one in four Americans has multiple chronic conditions, including one in 15 children and as many as three out of four persons age 65 and older (Anderson, 2010). Yet care for these patients often remains fragmented, occurring across multiple settings and clinicians, with limited or no communication or coordination and no sense of overarching responsibility by any one member of the care team. Patients often do not seek services until a crisis occurs, a crisis that may have been avoidable had they sought care earlier or had their care been better coordinated.

Currently, the management of patients with complex health care needs involves a web of relationships, with information moving haphazardly among different clinicians, settings, and the patient. The patient is rarely engaged directly in the management of his or her care (Schoen et al., 2011; Wagner, 1998). Yet multiple studies show that patients who are involved with their care decisions and management have better outcomes than those who are not (Wagner, Grothaus, et al., 2001; Wagner, Glasgow, et al., 2001; Greenfield et al., 1985; Greenfield et al., 1988). Patient self-management, particularly for chronic conditions, has been shown to be associated with improvements in health status and reductions in utilization of services (Lorig et al., 1999). Recognizing the central role of the patient can support information exchange across clinical encounters. This is not to imply that there is no role for clinician-to-clinician communications, only that that communication can be made more efficient by incorporating the patient either as a participant or conduit.

Research has demonstrated that health IT can improve patient safety and quality of care (Choudhry et al., 2006; Fitzmaurice et al., 2002), and the rate of health

IT adoption in ambulatory settings is increasing. Data from the National Ambulatory Medical Care Survey indicate that in 2011, 57 percent of office-based physicians used electronic health records (EHRs), with use by State ranging from 40 to 84 percent (Hsiao et al., 2011), although adoption continues to lag for nonprimary care specialists, physicians age 55 and older, and physicians in small (1–2 clinicians) and physician-owned practices (Decker et al., 2012). Once implemented, health IT has the potential to facilitate new interventions and new models of care delivery for patients with complex health care needs.

### **The Improving Management of Individuals With Complex Healthcare Needs Through Health IT Initiative**

The MCP initiative was designed to identify and evaluate methods and strategies for both clinician and patient and family use of health IT in ambulatory settings to improve outcomes through more effective decision support or care delivery for patients with complex health care needs and across high-risk health care transitions. The goal was to strengthen the evidence demonstrating the value of health IT in improving the quality and safety of ambulatory care for patients with complex health care needs, for use by health care professionals, payers, policymakers, and the public.

As noted above, the FOA highlighted five areas of interest:

- Novel approaches to providing high-quality, appropriate care through the use of health IT includes a variety of uses for health IT, such as linking clinically oriented health IT systems to practice management systems and using health IT to engage patients and their families to enhance self-care and comanagement of chronic conditions.
- Integrating patient information across transitions in care to improve quality by making sure that clinicians, patients, and families have access to relevant information during transitions between ambulatory care settings and other settings such as hospitals, home care, assisted living centers, and nursing homes.

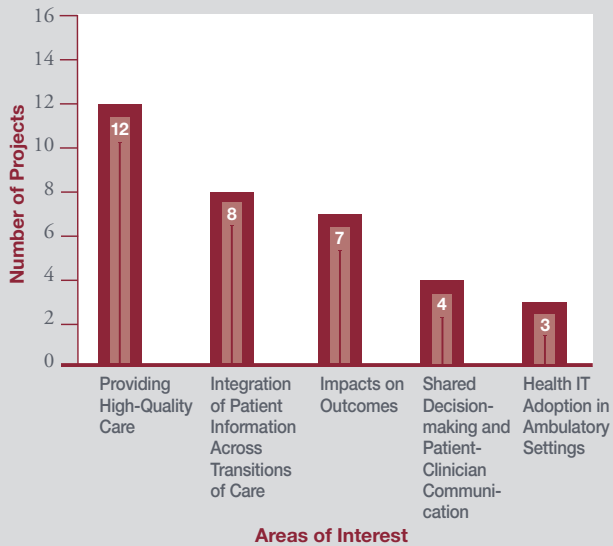
- Shared decisionmaking and patient-clinician communication through the use of health IT to support collaboration between patients and clinicians to arrive at decisions about patient care that are informed and mutual. Patient-clinician communication includes the use of health IT to support effective clinical interactions during office visits as well as the delivery of clinical services through secure messaging or electronic visits.
- Strategies for safe, successful adoption of health IT in ambulatory settings includes managing the impact of health IT implementation on team roles, team-based care, and collaborative workflows within a practice and across settings.
- The impact of health IT on outcomes related to patients with complex health care needs in ambulatory settings and across high-risk transitions of care, includes process, intermediate, health, and economic outcomes.

Some of the projects addressed more than one area of interest. As shown in Figure 1, the most commonly addressed areas were approaches to providing high-quality care, addressed in all 12 projects, and the integration of patient information across care transitions, addressed in 8 projects. Seven projects demonstrated a significant impact on outcomes, while four projects worked on supporting shared decisionmaking or patient-clinician communication, and three identified strategies for successful adoption of health IT.

The projects developed and implemented a range of health IT applications, including EHRs, disease management systems, health information exchange (HIE) applications, secure messaging, interactive voice response (IVR) systems, personal health records (PHRs), and clinical decision support tools. The projects took place in both primary care and specialty care ambulatory settings. Furthermore, eight of the projects involved transitions to ambulatory settings from acute care, skilled nursing, or home health care. The clinical specialties of participating clinicians included primary care (defined here to include geriatrics, an internal medicine subspecialty, and adolescent medicine, a pediatrics subspecialty) and psychiatry.

**FIG. 1**

**Grant Initiative Areas of Interest Addressed Across Projects\***

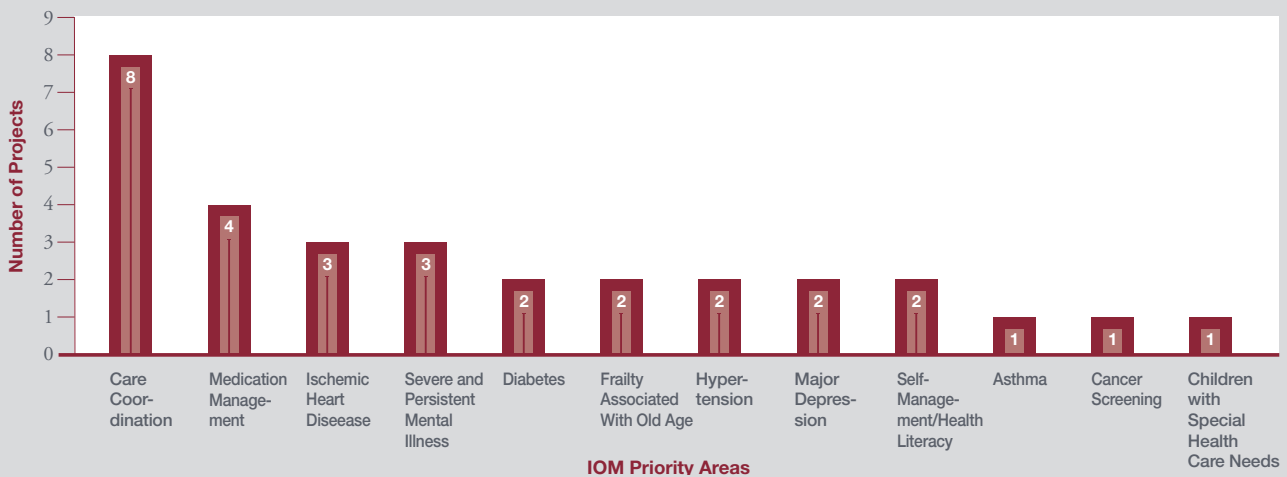


\*Many projects addressed multiple MCP areas of interests.

As shown in Figure 2, the projects also addressed a range of relevant care topics, including 12 of the priority areas for health care quality improvement identified by the Institute of Medicine (IOM, 2003). The two most common priority areas addressed involve care processes (care coordination and medication management), while many of the remaining priority areas addressed in the MCP projects concern specific diseases or patient populations. Each project addressed at least one Institute of Medicine priority area.

**FIG. 2**

**IOM Priority Areas Addressed Across Projects\***



\*Many projects addressed multiple priority areas.

## Providing High-Quality, Appropriate Care Through the Use of Health IT

### Background

Patients who have complex health care needs such as frail elders, patients with multiple chronic conditions, or those with comorbid mental and physical illnesses typically require both medical care and social services and support from a wide variety of professionals and caregivers. Novel approaches to the use of health IT may help patients, caregivers, clinicians, and social service providers communicate and coordinate to improve the delivery of needed services. This communication may take place between health care professionals and patients and their families, within teams of health and social service professionals, and across care teams, particularly when patients transfer between care settings (Rich et al., 2012). Specifically, health IT tools and systems may be used for (1) maintaining, updating, and tracking care plans; (2) initiating referrals and returning results from lab and radiologic tests, specialty consultations, and home health care, community-based services; (3) real-time monitoring of critical events such as hospital admissions, ED visits, or patient-reported warning signs that trigger a need for followup; (4) prompts and reminders to patients regarding visits and preventive care; (5) clinician decision-support tools such as clinical care paths and guidelines; (6) delivering patient educational and self-management support; and (7) maintaining lists of available community resources and support services.

### Highlights From the Projects

The MCP projects used a variety of novel approaches to provide high-quality, appropriate care using health IT. These included enhancing EHR systems with decision support to ensure timely diagnosis and improved medication reconciliation, designing HIE systems and secure messaging to ensure that information is shared across clinicians to improve the coordination of care, using IVR to followup with patients after a hospital discharge, and using PHRs to educate and enable patients to improve self-care and help them prepare for visits with clinicians. These projects are described in more detail below.

**Wende Baker, M.Ed.** (R18 HS 17838) implemented and evaluated a regional HIE designed to serve patients living in rural areas who are being treated for mental illness in urban settings, due to the lack of clinicians in the local community, by exchanging clinical information within the region. The system provides timely access to patient information between and among clinicians serving the patient, including behavioral health care clinicians, primary care practitioners, hospitals in rural areas, and emergency behavioral health systems. The researchers evaluated the impact of the HIE on length of stay, patient functioning, and readmissions for patients with major depression, schizophrenia, or bipolar disorder by comparing patients for whom clinical information was available in the HIE system with patients for whom it was not.

**Elizabeth L. Ciemins, Ph.D.** (R18 HS 17864) developed and implemented a system that facilitates the exchange of information between the hospital and ambulatory care providers after a patient in a rural area is discharged home from the hospital. The program initially focused on adults with at least two chronic conditions, but was later expanded to all patients, with the goal of increasing ambulatory followup visits and reducing hospital readmissions and ED visits compared to the baseline period. The system prompts clinicians in rural areas to access more complete medical information through the hospital EHR. An enhanced medication reconciliation component at the time of admission was also added to the intervention 2 years after its launch.

**David Dorr, M.D.** (R18 HS 17832) assessed a health IT-enabled approach to care coordination and care management in primary care. This approach uses financial incentives, specially trained care managers, and tracking software to help clinics better care for patients with complex chronic illness such as frail elders, those with multiple comorbidities, or patients with previous high utilization. The approach helps the clinical team prioritize health care needs and

develop a care plan based on structured protocols, and it provides tools to assist patients and caregivers to self-manage chronic diseases, with the goal of reducing hospitalizations and ED visits while increasing patient satisfaction.

A mental health PHR developed by **Benjamin Druss, M.D.** (R18 HS 17829) was designed to improve and coordinate care for patients with serious mental illness and one or more comorbid conditions. The PHR includes information on the care team, patient, diagnoses, goals and action steps, health indicators, medications and allergies, medical history, hospital visits, immunizations, and patient and family health history. The researchers tailored the PHR to the needs of patients with mental health conditions through a series of patient and clinician focus groups, and used clinical care specialists to teach patients how to use the PHR. The researchers evaluated the impact of the PHR on a set of standard quality indicators for hypertension, diabetes, asthma, and other chronic conditions, as well as schizophrenia and bipolar disorder by comparing randomly assigned patients who had the opportunity to use the PHR with a usual-care group.

**Penny Feldman, Ph.D.** (R18 HS 17837) developed two interventions designed to facilitate patient-clinician communication when they move to home health care from an acute care setting, with a particular focus on avoiding serious medication problems. The first uses an algorithm to provide alerts, reminders, and point-of-care decision support to home health nurses visiting patients at risk of a potentially serious medication problem after discharge from an acute care setting. The second intervention provides information about their medications to the patients at home, using electronic, CD, and hard-copy formats.

**Terry S. Field, D.Sc.** (R18 HS 17817) created an electronic medical record-based medication reconciliation system to enhance medication monitoring and followup care for elderly patients with complex medical conditions transitioning from a skilled nursing facility to home. Most of the patients were in skilled nursing following a hospital stay. The system provides alerts and key medication information to ambula-

On February 24, 2010, AHRQ hosted a national Web conference on transitions in care featuring Dr. Field. Information about this national Web conference can be found at:

<http://healthit.ahrq.gov/transitionsincareteleconference>

tory care clinicians and to nurses making home visits with the aim of increasing appropriate monitoring for high-risk medications and reducing adverse drug events, hospital readmissions, and ED visits compared to the baseline period.

**Robert Friedman, M.D.** (R18 HS 17855) modified an existing IVR system to serve patients with complex care needs, such as those with multiple chronic conditions and who have increased health care utilization. The system uses conversational computerized telephone calls to monitor patients with complex needs after discharge from an acute care setting and between ambulatory visits to identify important clinical problems such as an exacerbation in a disease or inadequate patient self-care behaviors. The researchers are studying its effect on reducing unnecessary hospital and ED use, improving disease-specific metrics, increasing patient satisfaction, and reducing net payer costs through a randomized controlled trial compared to usual care.

**James Kahn, M.D.** (R18 HS 17784) created a secure PHR that provides information, Web-based support tools, and reminders to HIV/AIDS patients. The goal of the project was to increase the connection between clinicians and patients by promoting self-management and decision support and by providing patients with access to the medical record and links to clinicians and other patients through an online forum. The PHR includes support for tobacco cessation, depression abatement, anxiety reduction, and medication adherence improvement. The researchers studied its impact on improved outcomes including impact on patient behaviors, patient-clinician trust, clinical outcomes, medication safety, and utilization through a randomized controlled trial compared to usual care.

**David Lobach, M.D., Ph.D.,** and **Eric Eisenstein, D.B.A.** (R18 HS 17795) created a regional HIE network to connect providers serving 42,000 Medicaid beneficiaries in rural and urban settings in a six-county region in central and northern North Carolina. The project enhanced an existing HIE and decision support tool so as to detect transitions in care and provide patient-specific information to patients, primary care clinicians, and members of the multidisciplinary care management team. By facilitating information sharing about diagnoses, procedures, the identities of clinicians on the care team, scheduled appointments, and specialist notes, the HIE was intended to increase followup of recommended care, while reducing hospitalizations, ED visits, and costs.

**Ann Mertens, Ph.D.** (R18 HS 17831) created a PHR for pediatric cancer survivors that provides evidence-based recommendations and other educational materials to primary care and specialty clinicians who are treating adults who had cancer as children. The system is intended to improve both clinician and patient knowledge and awareness of cancer survivorship issues and risks as well as increase the receipt of recommended screenings and other followup services.

**Christine Ritchie, M.D., M.S.P.H.** (R18 HS 17786) developed an alternative to the traditional approach of having a nurse conduct home visits and telephone followup after discharge from the hospital. The project team developed an IVR system that helps coach primarily patients in rural areas after they are discharged from the hospital to the home. The IVR system calls patients during specified intervals after discharge and stores the patient responses regarding symptoms, signs, behaviors, or other issues in a secure database that is monitored by a care transitions nurse. The nurse follows up on potential warning signs by telephone with the goal of reducing hospital readmissions. Dr. Ritchie evaluated the impact of the

system on reducing rehospitalizations in a randomized controlled trial of patients.

**Hardeep Singh, M.D.** (R18 HS 17820) created a system to identify patients who experience delays during the cancer diagnosis and treatment process and then facilitate their progression through the diagnosis and treatment process through information sharing with relevant clinicians. The system includes three types of cancer where early detection and treatment may improve survival—colon, lung, and prostate. It uses trigger-based data mining of an EHR repository to identify patients experiencing delays, combined with targeted electronic communication and surveillance techniques to facilitate care designed to reduce the time intervals between several key steps in the optimal pathway of cancer diagnosis and treatment. Dr. Singh evaluated the impact of the system on reducing delays in diagnosis in a randomized controlled trial of clinicians.

On February 20, 2014, AHRQ hosted a national Web conference on care coordination for patients with complex healthcare needs featuring Drs. Ciemins, Feldman, and Eisenstein. Information about this national Web conference can be found at:

<http://healthit.ahrq.gov/carecoordinationcomplexneedsteleconference>

# Integrating Patient Information Across Transitions in Care

## Background

Safe and effective transitions across care settings or providers of care are critically important for patients with complex health care needs, as there is increased risk of adverse events (e.g., medication interactions, new or worsening symptoms, transfer to a higher intensity care setting, or death) during transitions between ambulatory care settings and other settings such as hospitals, home care, and nursing homes. Health IT can play an important role in ensuring effective transitions by integrating or transferring patient information across settings. Key issues for research include what information is needed from the various participants in care delivery (e.g., primary care practices, home health care, skilled nursing facilities, patients themselves) to enable effective ambulatory care and improve patient outcomes; how the integration of information from all clinicians (e.g., physicians, nurses, and other clinicians) and settings can improve the quality and safety of care, including effectiveness, patient-centeredness, efficiency, and equity; and how health IT can alleviate miscommunication at the time of patient hand-offs and transitions in institutional and community settings.

## Highlights From the Projects

Eight of the projects focused on the quality of care before, during, or after transitions. These projects all focused on patients who were transitioning to or from an ambulatory setting and included strategies for transferring or integrating information across settings of care. The investigators used a variety of technologies for this purpose, including regional HIEs, PHRs linked with EHRs, and automated telephone systems, although not all were able to achieve electronic integration of information across clinicians and settings of care. These technologies supported a range of approaches for delivering high-quality care across transitions, such as enhanced hospital discharge management, improved patient monitoring following transitions, and improved medication reconciliation and management. Figure 3 illustrates the type of transitions studied across the MCP projects. Ambulatory care settings included both primary care and specialty care. These projects are described in more detail below.

- The HIE designed and implemented by **Ms. Baker** was intended to support patients in rural areas being treated for mental illness and transitioning

TABLE

1

**Number of Projects by Type of Transition in Care Addressed\***

“Transition From” Setting of Care	“Transition To” Setting of Care		
	Ambulatory	Home Health	Hospital
Ambulatory	3		1
Hospital	5	1	
Skilled Nursing	1		

\*Some projects addressed multiple types of transitions.

between behavioral health clinicians, primary care practitioners, hospitals in rural areas, or emergency behavioral health systems. The system integrates and makes available a standardized information set that is accessible by clinicians across settings of care, including diagnoses, medications, involvement with other clinicians, and treatment plans. It also provides information on available support systems in place for the patient, which may avoid the need for placement in emergency protective custody or an inpatient admission during a crisis.

- **Dr. Ciemins** studied a care transition information transfer system that facilitates the exchange of information after a patient in a rural area is discharged home from the hospital. Building off an existing EHR at a large community health system, the care transition information system provides electronically generated discharge instructions, including a patient-friendly medication list, to the patient at discharge, and sends by fax the same information to the patient's outpatient clinic. The system prompts clinicians in rural areas to access more complete medical information through the hospital EHR.



This story highlights the effectiveness of a health IT-based care transition information transfer system to improve outpatient posthospital care by Dr. Elizabeth Ciemins and her research team. Please access this video: [WMV \(60MB\)](#).

For more information about this project (Grant No. R18 HS17864), an overview is available: [PDF \(600 KB\)](#).



On August 18, 2011, AHRQ hosted a national Web conference on utilizing health IT to improve medication management for the care of elderly patients featuring Dr. Field. Information about this national Web conference can be found at:

<http://healthit.ahrq.gov/medicationmanagement-forelderlyteleconference>

- **Dr. Feldman** focused on facilitating patient-clinician communication after patients transitioned to home health care from an acute care setting. The intervention was based on improving information flow during these transitions, using an algorithm to provide a risk assessment, alerts, reminders, and point-of-care decision support to home health nurses visiting patients at risk of a potentially serious medication problem. Along with educational information for the patients, the system aimed to facilitate better communication between the home health nurse and patient.
- The EHR-based medication reconciliation system designed by **Dr. Field** supported elderly patients with complex medical conditions transitioning from a skilled nursing facility to ambulatory care. The system provides alerts to ambulatory clinicians and to nurses making home visits. Because of challenges automating the production and transmission of the alerts, the researchers relied on manual faxes to transmit them. The alerts provided key information, such as changes in clinical status and new medications and monitoring needs to improve medication monitoring and followup care during this high-risk transition.
- The automated telephone followup system developed by **Dr. Friedman** for patients with complex health care needs after discharge from an acute care setting initiated 7- to 20-minute “virtual visits” through the phone, collecting information that allows for the identification of important clinical problems (e.g., an exacerbation in a disease, inadequate patient self-care behaviors). The system organizes the alerts for a nurse's review and action. The system is linked with the EHR system that



is used by the patient's physician so the nurse can create and send a clinical note about the patient's clinical problem and what action she took (if any).

- **Drs. Lobach** and **Eisenstein** enhanced an existing HIE and decision support tool so as to detect transitions in care and deliver timely, patient-specific information about these transitions to patients, primary care clinicians, and members of the multidisciplinary care management team by fax or Email. The system focuses on three specific transitions—the transition back to the primary care provider (PCP) after an inpatient stay, ED encounter, or specialty clinic evaluation. The information communicated includes diagnoses, procedures, clinicians on the care team, and scheduled appointments. In addition, the primary care clinician is given access to encounter notes from the specialist evaluation, ED encounter, and hospitalization. The system also provides patients with educational materials related to the primary diagnosis for the encounter.
- **Dr. Mertens** focused on pediatric cancer survivors making the transition from cancer treatment by an oncologist to ongoing care by other clinicians; transitions in care clinicians due to relocation, job change, or insurance change; and the transition from pediatric to adult care at ages 18 to 21. The system enabled patients to give clinicians access to information on the patient's cancer treatment, risk

On April 8, 2010, AHRQ hosted a national Web conference on patient empowerment featuring Dr. Ritchie. Information about this national Web conference can be found at:

<http://healthit.ahrq.gov/patientempowermenttel-econference>

profile, other chronic conditions, and late effects experienced by the patient following cancer treatment. Clinicians may view or download this information in document form.

- The IVR system developed by **Dr. Ritchie** was designed to coach primarily patients in rural areas after they are discharged from the hospital to the home. The IVR system calls patients during specified intervals after discharge to gather information on symptoms, signs, behaviors, or other issues using questions tailored to each patient's medication list, problem list, and discharge instructions. The patient-reported information is stored in a secure database that is monitored by a care transitions nurse who intervenes by telephone as necessary. Patients may also grant access to the database to their primary care physician so the physician can review the patient-entered data.

## Supporting Clinical Workflow

### Background

Shared decisionmaking is a process in which both the patient and physician contribute to the medical decisionmaking process to arrive at informed, mutual choices. Clinicians explain treatment alternatives to patients, along with information on risks and benefits, so that patients can choose the option that most closely aligns with their values and priorities. Patient participation can lead to greater self-efficacy, which, in turn, can lead to better health outcomes (Heisler et al., 2002). Furthermore, when a patient more fully participates in the decisionmaking process, self-management behaviors improve (Hibbard et al., 2007).

Shared decisionmaking depends upon successful patient-clinician communication. In addition, several MCP projects focused on other aspects of improving patient-clinician communication by using health IT for either synchronous or asynchronous secure messaging or electronic visits as a substitute or supplement for in-person clinical visits or to support effective clinical interactions during office visits by helping patients and clinicians better prepare for the visit. Electronic communications can enhance and extend the personal connections patients have with their doctors and other clinicians, offering patients the opportunity for sustained collaboration and more involvement in their own care. Such communications are emerging as a key component in patient-centered care and patient-centered relationships (Francis, 2012).

### Highlights From the Projects

Four projects focused on shared decisionmaking or methods to enhance the ability of patients, families, and caregivers to share information with clinicians to improve care and facilitate timely interventions when warranted. More detailed explanations of how these researchers used health IT to enhance shared decisionmaking or patient-clinician communication follow:

- **Dr. Druss** adapted an existing PHR to meet the needs of individuals with serious mental illness and one or more comorbid medical conditions.

On February 27, 2013, AHRQ hosted a national Web conference on enhancing behavioral health care featuring Dr. Druss and Ms. Baker. Information about this national Web conference can be found at:

<http://healthit.ahrq.gov/enhancingbehavioralhealth-careteleconference>

Each patient works with a clinical care specialist to develop a shared care plan within the PHR and may use secure Email communications with the clinical care specialist and other clinicians that the patient authorizes through the PHR. The PHR thus facilitates patient-clinician communication and shared decisionmaking, with the goal of improving the quality of care.

- **Dr. Friedman** focused on patients who frequently transition between the hospital or ED and ambulatory care clinicians, with particular attention to the transition back home after an acute episode and the period between ambulatory visits. The automated telephone followup system automatically alerts clinicians about patient-reported problems such as an exacerbation in a disease or inadequate patient self-care behaviors based on patient reports of symptoms, behaviors, and vital signs. Except in urgent or emergent situations, alerts go to nurses for triage rather than to physicians. The system organizes the alerts for the nurse's review, action, documentation, and communication to the PCP and other clinicians for appropriate followup.
- The enhanced PHR created by **Dr. Kahn** helps patients with HIV/AIDS understand their medical record and connect them to resources to support shared decisionmaking and communication such as medication information (e.g., photographs of medications with generic and trade names of the medications), problem lists, and guides to interpreting laboratory values. The tool also helps them access support services, including help in quitting smoking, managing depression, reducing anxiety, and adhering to medication regimens.

- The PHR developed and assessed by **Dr. Mertens** provided educational materials for clinicians to improve awareness of issues and best practices related to care of pediatric cancer survivors once they reach adulthood. The patient can share infor-

mation about their medical condition or care plan with any clinicians involved in their care so as to improve communication and provide individualized data to support shared clinical decisions.

# Strategies for Safe, Successful, and Productive Adoption of Health IT

## Background

Health IT cannot be fully effective in improving the management of patients with complex health care needs unless clinicians and patients use it. Yet clinician and patient acceptance and use of health IT is contingent on overcoming both organizational and technical barriers at different stages of the implementation process. Barriers and facilitators to adoption in clinical settings can occur at the strategic, operational, and frontline levels (Avger et al., 2012) as the implementation of health IT systems affects cultural and organizational factors at all of these levels. In addition to meeting clinician needs and preferences, consumer or patient needs and preferences must also be taken into account in the design and implementation of health IT systems that depend upon their use and adoption. The MCP initiative focused on improving understanding of the essential strategies for safe, successful, and productive adoption of health IT for the delivery of patient-centered care to patients with complex health care needs. These strategies may include changes in team roles and collaborative workflows within and across settings of care, organizational and cultural factors associated with successful adoption, payment and financing models to sustain the use of health IT, and ways to react to unanticipated consequences of health IT implementation.

## Highlights From the Projects

Three projects focused on developing an improved understanding of the strategies, benefits, and barriers to the adoption of health IT by ambulatory care clinicians:

- **Ms. Baker** evaluated acceptance and adoption of the regional HIE in behavioral health settings through interviews and surveys of behavioral health care clinicians to assess their perceived importance of benefits and barriers to electronically exchanging clinical information. Three themes emerged from the interviews regarding attitudes towards quality of care, privacy, and delivery of services. Beliefs about the quality benefits of electronic data sharing contributed to generally positive views of these technologies, but patient privacy concerns, and cost and increased staff time were frequently mentioned as significant barriers to adopting HIEs. Cost-saving approaches, such as shared computing services, may be needed to make health IT financially viable for behavioral health providers, many of whom operate in small practices.
- **Dr. Feldman** examined the adoption of the decision support system that facilitated patient transitions from an acute care setting to home health care by monitoring the ways in which home health care nurses used the tool as well as the overall level of its adoption. The intervention was designed based on strategies that had proven successful in other contexts such as ensuring that decision support information is computer-generated, provided as part of clinician workflow, offers recommendations in addition to assessments, and is delivered at the time a place of decisionmaking. During the project, the researchers learned that adoption of the system was limited by the lack of opportunity to orient and train staff about the clinical importance of the intervention supported by the decision support system as well as by the relatively short time that most post-acute patients were exposed to the intervention prior to being discharged from home care.
- As part of the implementation of the adoption of the HIE-based tool for delivering timely, patient-specific information about selected transitions in care to primary care clinicians, **Drs. Lobach** and **Eisenstein** performed workflow analyses for each study site to better understand how to integrate this new information into existing workflows. The researchers discovered that the inability to electronically exchange relevant clinical information regarding patient transitions and the need to rely on Email and fax to transmit this information instead limited the availability of the information at the time a patient visited his or her medical home provider when it would have been of most use. The integration of this new information flow into existing workflows remained a problem for a significant number of study sites.

## Impact of Health IT on Outcomes Related to Patients With Complex Health Care Needs in Ambulatory Settings and Across High-Risk Transitions of Care

This section summarizes the impact of the projects on several types of outcomes related to patients with complex health care needs in ambulatory settings and across high-risk transitions of care, including process outcomes,<sup>1</sup> intermediate outcomes,<sup>2</sup> and economic outcomes,<sup>3</sup> where the effects were statistically significant. Several projects showed an impact on process outcomes related to clinician use of health IT or the completion of ambulatory followup visits. In addition, several projects showed an impact on intermediate outcomes, including patient engagement. Other projects demonstrated an impact on economic outcomes such as hospitalizations or ED visits. None of the projects demonstrated a significant impact on health outcomes. These results are highlighted below.

To facilitate evaluation across projects, AHRQ encouraged the MCP researchers to report on particular outcome measures where applicable, including adoption and use of health IT; the delivery of appropriate care for prevention, treatment, and medication therapy; the percent of patients who have access to the personal health information; patient and clinician access to and use of quality measurement reports, and patient experience of care, especially as assessed through the Consumer Assessment of Healthcare Providers and Systems (CAHPS®) Clinician & Group Survey. Studies that addressed these measures are noted below. Several of the MCP researchers are finalizing their analyses and may report additional significant findings when their studies are complete.

### Process Outcomes

#### Clinician Use of Health IT

AHRQ encouraged the researchers to assess the adoption and use of health IT in the MCP projects. One project reported findings regarding clinician use of health IT.

- In **Dr. Feldman's** study of medication management clinical decision support for home health nurses, 80 percent of the nurses randomly assigned to the intervention arm of the study documented a medication management action in the patient-care record system. The most commonly documented actions were patient education and updating the medication list. Nurses who were older, more experienced, and who had a larger number of patients were more likely to use the system.

Another evaluation area of interest to AHRQ was patient and clinician access to and utilization of quality measurement reports, especially if accessed through an HIE. Several of the projects included quality measurement reports in the intervention, but none reported on access to or utilization of them.

#### Ambulatory Processes of Care

AHRQ also asked that the MCP researchers assess the delivery of appropriate care for prevention, treatment, and medication therapy. Three projects demonstrated an impact on the frequency of followup visits where such care may be delivered, and other process measures.

Patients who received the care transition intervention implemented by **Dr. Ciemins** that facilitates the exchange of information after a patient in a rural area is discharged home from the hospital were significantly more likely to visit a PCP within the first 14 and 30 days following discharge compared to the baseline period. For example, 49 percent of patients with medically complex conditions saw their PCP within the first 30 days after discharge, while 75 percent saw any clinician. Both rates were significantly above the baseline period (40 and 64 percent, respectively).

<sup>1</sup> Process outcomes include actions taken by members of a clinical team or by patients in the course of care delivery or self-management.

<sup>2</sup> Intermediate outcomes are indicators that are impacted by processes and that may precede or lead to health outcomes. Health outcomes are symptoms and conditions that patients can feel or experience.

<sup>3</sup> Economic outcomes include costs, and measures of utilization that drive costs, such as hospitalizations and emergency department visits.

- In **Dr. Dorr's** evaluation of the primary care intervention for enhanced care coordination and quality improvement through financial incentives, and the use of care managers and health IT, the researchers found that at clinics that were randomly assigned to receive incentive payments for care coordination, more care coordination activities (e.g., assessments, education, communication) took place. In contrast, at clinics that were randomly assigned to receive incentive payments for improving quality measures, greater improvements in measures such as screening and monitoring were observed.

On May 14, 2013, AHRQ hosted a national Web conference on using health IT to enable care coordination featuring Dr. Dorr. Information about this national Web conference can be found at:

<http://healthit.ahrq.gov/greatercarecoordination-teleconference>

- **Drs. Lobach** and **Eisenstein** found that patients randomly assigned to the intervention group (e.g., patients whose primary care providers and care managers received notifications of specific care transition events) had significantly more frequent contact with their care manager than did those receiving usual care, with most of the increased contact coming by telephone.

## Intermediate Outcomes

### Patient Engagement

AHRQ was interested in evaluations of the percent of eligible patients who have access to their personal health information. Two projects showed improvement in patient engagement, and use of personal health information as described in the following findings:

- Patients who received the care transition intervention implemented by **Dr. Ciemins** that facilitates the exchange of information after a patient in a rural area is discharged home from the hospital were

more likely to report receiving education on their medications by phone after their hospitalization.

- In **Dr. Ritchie's** study of a system for automated telephone followup for patients in rural areas after a hospital discharge, over 90 percent of patient answered one or more calls, and almost one-third answered all seven calls in the first week, a response rate considered optimal by the researchers. Nearly two-thirds had at least one red flag during the first call indicating the need for a followup call by a coach.

### Patient Experience and Patient-Clinician Communication

AHRQ encouraged use of the CAHPS® Clinician & Group Survey to assess patients' perception of and experience of care, especially in the areas of access, clinician communication, and shared decisionmaking. Four researchers used CAHPS®, although only one demonstrated a significant impact:

- **Dr. Dorr** found that patient satisfaction did not change significantly except for a 9-percent increase in appointment ease at clinics that were randomly assigned to receive incentives for care coordination; these clinics had an unusually low baseline in this area at the beginning of the study, which may explain this increase.

### Clinician Perceptions of Health IT and Health Care Processes

Two of the researchers reported findings regarding clinician perceptions of health IT systems and their impact on care processes.

- **Ms. Baker** identified perceived benefits and barriers of using HIE through interviews with 32 community behavioral health clinicians. Benefits to the quality of care, such as improved continuity and coordination, and more complete medication information, were mentioned by all of the clinicians. In contrast, more than half expressed concern about the possibility of miscommunications between clinicians. Most respondents (81 percent) expressed overall positive views toward electronic data sharing.

- Clinicians in counties that were included in the care transition intervention implemented by **Dr. Ciemins** that facilitates the exchange of information after a patient in a rural area is discharged home from the hospital were significantly more likely to report that the care transition process was efficient and reliable (63 versus 38 percent), and believed that their patients were more likely to get adequate information about their medications at the time of discharge.

### Medication Management

One project assessed the impact of the intervention on a measure of medication complexity.

- In **Dr. Feldman's** study of medication management clinical decision support for home health nurses, patients whose nurse used the system were more likely to move below the threshold for medication complexity than patients whose nurse had the opportunity to use the system, but did not, indicating that their medication regimens had been simplified (8.1 versus 4.5 percent).

### Economic Outcomes

Four studies reported an impact on an economic outcome:

- **Dr. Dorr** found a significant decrease in hospital bed days in the 6 months following the implementation of the primary care intervention for enhanced care coordination and quality improvement through financial incentive, care managers, and health IT.
- In **Dr. Feldman's** study of medication management clinical decision support for home health nurses, patients whose nurse used the system were significantly less likely to be hospitalized (17.9 versus 21.3 percent).
- In **Dr. Field's** study of medication monitoring and followup care for complex elderly patients transitioning from a skilled nursing facility to ambulatory care, ED visits within 30 days discharge were significantly lower in the intervention group (17 versus 7 percent) compared to the baseline period.
- In **Dr. Ritchie's** study of a system for automated telephone followup for patients in rural areas after a hospital discharge, patients randomly assigned to the intervention had significantly fewer days out of the community due to a readmission or death in the first 30 days after discharge (0.5 versus 1.6) compared to the control group.

## Conclusion

The projects funded under the Improving Management of Individuals With Complex Healthcare Needs Through Health IT Initiative demonstrated progress toward understanding the effective use of health IT to better deliver care to patients with complex health care needs in the ambulatory setting. They developed and tested a range of health IT-enabled approaches to better serve these patients, with a focus on approaches to providing high-quality, appropriate care, especially during transitions to ambulatory settings. Several projects showed a positive impact on outcomes related to clinician acceptance and use of health IT as well as improving the flow of information when patients transition from one clinician to another. Other projects demonstrated high levels of patient engagement in self-care, while several of them showed an impact on reducing hospital or ED use.

These projects demonstrated the potential of EHRs and PHRs to effectively move evidence-based information to the point of care, including the transfer of structured information between clinical data systems. The researchers also studied ways to increase the

participation of clinicians, patients, and families in HIE. The studies highlighted a number of barriers and facilitators to the use of health IT to improve the management of individuals with complex health care needs. For example, the researchers encountered and in some cases adapted to challenges integrating new health IT systems or components into established clinical information systems and workflows.

The findings, lessons, and insights from this initiative can inform researchers and implementers interested in using health IT to support better management of individuals with complex health care needs, including during patient transitions across care settings. Given the continuing interest in the use of health IT to improve health care delivery and health and the positive impact of these approaches on a range of health care outcomes, the results of this body of research are timely and relevant to efforts to better serve patients with complex health care needs.



## References

- Anderson G. Chronic care: making the case for ongoing care. Princeton, NJ: Robert Wood Johnson Foundation, 2010.
- Avgar AC, Adam SL, Pronovost PJ. Drivers and barriers in health it adoption: A proposed framework. *Appl Clin Inform* 2012 Dec 19;3(4):488-500.
- Choudhry B, Want J, Wu S, et al. Systematic review: impact of health information technology on quality, efficiency, and costs of medical care. *Ann Intern Med* 2006 144(10):744-52.
- Decker SL, Jamoom EW, Sisk JE. Physicians in nonprimary care and small practices and those age 55 and older lag in adopting electronic health record systems. *Health Aff (Millwood)* 2012 May;31(5):1108-14.
- Fitzmaurice JM, Adams K, Eisenberg JM. Three decades of research on computer applications in healthcare: medical informatics support at the Agency for Healthcare Research and Quality. *J Am Med Inform Assoc* 2002 Mar-Apr;9(2):144-60.
- Francis R. e-Visits: The tipping point - are we there yet? *TransforMed Online Resources* 2012 [http://www.transformed.com/e-Visits/e-Visits\\_There\\_Yet.cfm](http://www.transformed.com/e-Visits/e-Visits_There_Yet.cfm). Accessed July 20, 2012.
- Gans D, Kralewski J, Hammons T, et al. Medical groups' adoption of electronic health records and information systems. *Health Aff (Millwood)* 2005 Sep-Oct;24(5):1323-33.
- Greenfield S, Kaplan S, Ware JE. Expanding patient involvement in care. Effects on patient outcomes. *Ann Intern Med* 1985 Apr;102(4):520-8.
- Greenfield S, Kaplan SH, Ware JE, et al. Patients' participation in medical care: effects on blood sugar control and quality of life in diabetes. *J Gen Intern Med* 1988 Sep-Oct; 3(5):448-57.
- Heisler M, Bouknight RR, Hayward RA, et al. The relative importance of physician communication, participatory decision making, and patient understanding in diabetes self-management. *J Gen Intern Med* 2002 Apr;17(4):243-52.
- Hibbard JH, Mahoney ER, Stock R, et al. Do increases in patient activation result in improved self-management behaviors? *Health Serv Res* 2007 Aug;42(4):1443-63.
- Hsiao CJ, Hing E, Socey TC, et al. Electronic health record systems and intent to apply for meaningful use incentives among office-based physician practices: United States, 2001-2011. NCHS data brief, no 79. Hyattsville, MD: National Center for Health Statistics. 2011.
- Institute of Medicine. Priority areas for national action: transforming health care quality. Washington, DC: The National Academies Press; 2003.
- Lorig KR, Sobel DS, Stewart AL, et al. Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: a randomized trial. *Med Care* 1999 Jan;37(1):5-14.
- Rich E, Lipson D, Libersky J, et al. Coordinating care for adults with complex care needs in the patient-centered medical home: challenges and solutions. White Paper (Prepared by Mathematica Policy Research under Contract No. HHSA290200900019I/HHSA29032005T). AHRQ Publication No. 12-0010-EF. Rockville, MD: Agency for Healthcare Research and Quality. January 2012.
- Schoen C, Osborn R, Squires D, et al. New 2011 survey of patients with complex care needs in eleven countries finds that care is often poorly coordinated. *Health Aff (Millwood)* 2011 Dec;30(12):2437-48.

Velentgas P, Dreyer NA, Nourjah P, et al. Developing a protocol for observational comparative effectiveness research: a user's guide. AHRQ Publication No. 12(13)-EHC099. Rockville, MD: Agency for Healthcare Research and Quality; January 2013. [www.effectivehealthcare.ahrq.gov/Methods-OCER.cfm](http://www.effectivehealthcare.ahrq.gov/Methods-OCER.cfm)

Wagner EH. Chronic disease management: what will it take to improve care for chronic illness? *Eff Clin Pract* 1998 Aug-Sep;1(1):2-4.

Wagner EH, Glasgow RE, Davis C, et al. Quality improvement in chronic illness care: a collaborative approach. *Jt Comm J Qual Improv* 2001 Feb;27(2):63-80.

Wagner EH, Grothaus LC, Sandhu N, et al. Chronic care clinics for diabetes in primary care: a system-wide randomized trial. *Diabetes Care* 2001 Apr;24(4):695-700.

## Appendix: Improving Management of Individuals With Complex Healthcare Needs Through Health IT Projects

Principal Investigator (PI)*	Institution	Project Title**	MCP Initiative Areas of Interest Addressed
Baker, Wende	Southeast Nebraska Behavioral Health Information Network	<a href="#">Chronic Mental Health: Improving Outcomes Through Ambulatory Care Coordination</a>	Improving Quality, Transitions in Care, Adoption of Health IT, Impact on Outcomes
  Ciemins, Elizabeth	Billings Clinic Foundation	<a href="#">Evaluation of Effectiveness of an Health Information Technology-based Care Transition Information Transfer System</a>	Improving Quality, Transitions in Care, Impact on Outcomes
Dorr, David	Oregon Health and Science University	<a href="#">Enhancing Complex Care Through an Integrated Care Coordination Information System</a>	Improving Quality, Impact on Outcomes
Druss, Benjamin	Emory University	<a href="#">An Electronic Personal Health Record for Mental Health Consumers</a>	Improving Quality, Communication/Shared Decisionmaking
Feldman, Penny	Visiting Nurse Service of New York	<a href="#">Improving Medication Management Practices and Care Transitions Through Technology</a>	Improving Quality, Transitions in Care, Adoption of Health IT, Impact on Outcomes
Field, Terry	University of Massachusetts Medical School - Worcester	<a href="#">Using Health Information Technology to Improve Transitions of Complex Elderly Patients from Skilled Nursing Facilities (SNF) to Home</a>	Improving Quality, Transitions in Care, Impact on Outcomes
Friedman, Robert	Boston Medical Center	<a href="#">A Longitudinal Telephone and Multiple Disease Management System To Improve Ambulatory Care</a>	Improving Quality, Transitions in Care, Communication/Shared Decisionmaking
Kahn, James	University of California San Francisco	<a href="#">Randomized Control Trial Embedded in an Electronic Health Record</a>	Improving Quality, Communication/Shared Decisionmaking
Lobach, David and Eisenstein, Eric	Duke University	<a href="#">Improving Care Transitions for Complex Patients through Decision Support</a>	Improving Quality, Transitions in Care, Adoption of Health IT, Impact on Outcomes
Mertens, Ann	Emory University	<a href="#">Improving Pediatric Cancer Survivorship Care Through SurvivorLink</a>	Improving Quality, Transitions in Care, Communication/Shared Decisionmaking
Ritchie, Christine	University of Alabama at Birmingham	<a href="#">E-Coaching: IVR-Enhanced Care Transition Support for Complex Patients</a>	Improving Quality, Transitions in Care, Impact on Outcomes
 Singh, Hardeep	Baylor College of Medicine	<a href="#">Using Electronic Data To Improve Care of Patients With Known or Suspected Cancer</a>	Improving Quality

\* To access video or written success stories, please select the icons next to the "Principal Investigator" column.

\*\* To access descriptions of each project, please select the respective project title.