AHRQ Health Information Technology

Multi-Year Report 2013-2015

AHRQ
Agency for Healthcare
Research and Quality

AHRQ Health Information Technology Division's Multi-Year Annual Report: 2013-2015

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I. About the Health IT Division

The Agency for Healthcare Research and Quality (AHRQ) Health Information Technology (IT) Division's mission is to produce and disseminate evidence about how health IT can make healthcare safer, higher quality, more accessible, equitable, and affordable, and to work within the U.S. Department of Health and Human Services and with other partners to make sure that the evidence is understood and used. Beginning in 2004, AHRQ has worked to fulfill this mission by investing in more than 500 research grants and contracts awarded to over 270 distinct institutions in 48 States and the District of Columbia.

AHRQ has focused its health IT activities on improving healthcare decision making, supporting patient-centered care, and improving the quality and safety of medication management. Early efforts evaluated the facilitators and barriers to health IT adoption and the value of health IT implementation. More recent efforts have focused on understanding healthcare providers' information needs and healthcare decision making processes to inform health IT development, understanding how consumers use health IT to manage and access their personal health information, and using health IT to collect and effectively use patient-reported outcome measures.

In calendar years 2013, 2014, and 2015, AHRQ supported new research grants and contracts to build on the evidence to improve the quality, safety, effectiveness, and efficiency of U.S. healthcare through the power of health IT, inform Stage 3 Meaningful Use requirements, and use mobile health technology (mHealth) to facilitate the dissemination and implementation of findings from patient-centered outcomes research (PCOR) into clinical practice. See Section V for the full list of projects funded during 2013, 2014, and 2015.

This entire body of research helps identify successful approaches to effective use of health IT to improve healthcare quality, barriers and facilitators to implementation, and how the use of health IT may impact outcomes. In addition, Health IT Division staff serve as program officials to support the Health IT Division's activities, advance the U.S.'s goal of modernizing healthcare through effective use of health IT, and collaborate with colleagues from other AHRQ offices and Federal agencies to disseminate information from various health IT endeavors.

This report highlights the Health IT Division's initiatives in calendar years 2013, 2014, and 2015. A total of 224 grants and contracts funded by the Health IT Division were active during this time. These projects span various areas of interest, funding mechanisms, and geographic distribution.

This report illustrates AHRQ's commitment to improving the quality of healthcare for all Americans. The research put forth by AHRQ's Health IT Division produces field-leading research and summarizes evidence to inform healthcare stakeholders' and policymakers' future decisions about health IT. Ultimately, it provides the best evidence on how health IT can improve the quality of the U.S. healthcare system and results in evidence-based tools that are developed for adoption and meaningful use of health IT.

Individual project profiles for all active and closed projects, project-related news, and publications are available on the AHRQ Health IT website at www.healthit.ahrq.gov.

II. Health IT Division Projects

A. Funding Opportunities

The Health IT Division uses a variety of funding mechanisms to achieve its research goals; these include grants, contracts, and interagency agreements. Each mechanism specifies the content, format, and timeline for deliverables, including periodic reporting requirements for completion of milestones and budget updates. Collectively, these mechanisms provide funding for a wide variety of health services research and administrative activities and are described in more detail below.

Grants

Grants provide money, property, or other direct assistance for approved projects or activities that support a public purpose that does not directly benefit the government. Grant proposals are submitted to AHRQ in response to a funding opportunity announcement (FOA). One-time FOAs are known as request for applications (RFAs), and recurring FOAs are known as program announcements (PAs).

There were 205 Health IT Division funded grants active at any time during calendar years 2013, 2014, or 2015, with lifetime AHRQ funding

> **Grant Highlight: Assessing Risk of Wrong Patient Errors in an EMR That Allows Multiple Records Open at Once**
>
> This project is investigating the relationship between the number of medical records open at the time of placing an order, and the risk of placing an order on the wrong patient to help inform decision makers on the optimal configuration of their computerized provider order entry systems.

equaling $184.8 million. Lifetime AHRQ funding refers to the total financial support that AHRQ obligates to a project during the entire project period.

Grants active during calendar years 2013, 2014, and 2015 were awarded under the following programs.

Ambulatory Safety and Quality (ASQ) RFAs. The ASQ program awarded grants in 2007 and 2008 to support projects that focused on patient-centered care, quality measurement, and clinical management of complex patients in ambulatory healthcare settings. The ASQ program, now closed, funded grants through the following four RFAs:

> *Enabling Quality Measurement (EQM) Through Health IT RFA (HS-07-002):*
> Intended to develop safety and quality measures in ambulatory care settings, automate quality measurement, demonstrate the ability of electronic data systems, expand potential safety and quality measures, and demonstrate improved ability to export data for reporting performance on measures and improvement. All funded projects awarded through this RFA were closed by 2012.

> *Enabling Patient-Centered Care (PCC) Through Health IT RFA (HS-07-007):*
> Designed to fund grants to investigate novel methods or evaluate existing strategies for using health IT to create or enhance patient-centered models of care. All funded projects awarded through this RFA were closed by 2012.

Improving Quality through Clinician Use of Health IT (IQHIT) RFA (HS-07-006):
Designed to investigate novel methods or evaluate existing strategies for clinician use of
health IT to improve outcomes through more effective clinical decision support,
medication management, or care delivery. All funded projects awarded through this RFA
were closed by 2012.

***Improving Management of Individuals with Complex Healthcare Needs Through
Health IT RFA (HS-08-002), also referred to as "Management of Complex Patients"
(MCP):*** Served to demonstrate the ability of health IT to assist clinicians, practices,
systems, patients, and families in improving the quality and safety of care delivery for
individuals with complex healthcare needs in ambulatory care settings, particularly in
high-risk care transitions. Three of the projects funded through this RFA ended in 2013;
the remainder ended in 2012 or earlier.

Health IT Funding Opportunities. Active grants were also supported by the following ongoing
or closed Health IT Division funding opportunities.

***Small Research Grants to Improve Healthcare Quality Through Health IT (R03)
(PAR-08-268):*** Supports different types of small research studies including: 1) pilot and
feasibility or self-contained health IT research projects, 2) secondary data analysis of
health IT research, and 3) economic prospective or retrospective analyses of health IT
implementation. Eight of these grants were active during calendar years 2013, 2014, or
2015; all ended by the end of 2015.

***Exploratory and Developmental Grant to Improve Healthcare Quality Through Health
IT (R21) (PAR-08-269, PA-14-001):*** Provides funding for health IT exploratory and
developmental research projects that support the conduct of short-term preparatory, pilot,
or feasibility studies. The R21 grants are intended to be more comprehensive and broader
in scope than the projects supported by the health IT R03 FOA. There were 69 projects
active at any point in calendar years 2013, 2014, or 2015.

***Policy Relevant Evaluations to Inform Development of Health IT Meaningful Use
Objectives (R18) (NOT-HS-13-006):*** In early 2013, AHRQ solicited research
applications to evaluate proposed Stage 3 objectives. These projects evaluated proposed
objectives and proposed strategies for improving the objectives at the policy level,
electronic health record (EHR) innovations that would support meeting the proposed
objectives, and suggestions for primary care practices to increase the value of Meaningful
Use objectives. Eight grants were funded in 2013, and all ended by the end of 2015.

***Disseminating and Implementing Evidence from Patient-Centered Outcomes Research
in Clinical Practice Using Mobile Health Technology (R21) (HS-14-010):*** Funds
developmental research projects on using mHealth to facilitate the dissemination and
implementation of findings from PCOR into clinical practice. The purpose of this FOA
is to develop and evaluate the effectiveness of novel approaches that use mHealth tools
to enable the timely incorporation and appropriate use of PCOR evidence in clinical
practice. Ten projects have been funded through this initiative; all are ongoing as of
the end of 2015.

Utilizing Health IT to Improve Healthcare Quality Grant (R18) (PAR-08-270):
Supports demonstration research grants that study health IT implementation and use to improve the quality, safety, effectiveness, and efficiency of healthcare in ambulatory settings and transitions between care settings. This PA expired in May 2011; however, during 2013, 2014, and 2015, there were a total of 23 active grants funded through this program announcement.

Understanding Clinical Information Needs and Healthcare Decision Making Processes in the Context of Health IT (R01) (PA-11-198): Funds research aimed at elucidating the nature of cognition, task distribution, and work in healthcare delivery settings. While now closed, during 2013, 2014, and 2015, there were 16 active projects funded through this initiative.

Understanding User Needs and Context to Inform Consumer Health IT Design (R01) (PA-11-199): Funds projects that help build a knowledge base about consumers' personal health information management needs and practices and related design principles. This program announcement, now closed, funded 12 projects that were active in 2013, 2014, or 2015.

Career and Dissertation Awards (R36, K01, K08): In 2008, AHRQ published a Special Emphasis Notice (SEN) (NOT-HS-08-014), to fund Career Development (K01, K08) and Dissertation (R36) grants designed to support the next generation of health IT-focused researchers. In 2011, this SEN was reissued (NOT-HS-11-016).

- AHRQ Grants for Health Services Research Dissertation (R36) (PAR-06-118, PAR-09-212, PA-12-256, PA-15-318). There were seven AHRQ-funded dissertation projects active at any point in calendar years 2013, 2014, or 2015.

- Mentored Clinical Scientist Research Career Development Award (K08) (PAR-09-085, PA-13-039). There were nine K08 projects active at any point in calendar years 2013, 2014, or 2015.

- Mentored Research Scientist Research Career Development Award (K01) (PAR-09-087). There were four K01 projects active at any point in calendar years 2013, 2014, or 2015.

Active Aging: Supporting Individuals and Enhancing Community-Based Care through Health IT (P50) RFA (HS-10-016): P50 grants focus on applied research with the objective of developing sustainable and reproducible strategies to translate research into practice effectively and efficiently. This RFA is now closed. There was one project funded in 2011; it was ongoing at the end of 2015.

Electronic Data Methods (EDM) Forum for Comparative Effectiveness Research (U13) (RFA-HS-10-006): This FOA, supported by funds provided to AHRQ under the American Recovery & Reinvestment Act of 2009, supported one project to advance the national dialogue on the use of electronic health data for research and quality improvement. This project ended in 2013, and a followup project was funded in the same year (see below, U18).

Electronic Data Methods (EDM) Forum: Second Phase (U18) (RFA-HS-13-004):
This FOA supported one project to continue and expand the work of the EDM forum.
This project was ongoing at the end of 2015.

Other Health IT-Funded Grants. In addition to the grants described above, the Health IT
Division funds grants with a health IT focus, solicited through the following general Agency
FOAs:

Conference Support Awards (R13): AHRQ supports conferences through its grant
programs to fund both small (PAR-09-231) and large (PAR-09-257) conferences to help
further its mission to improve the quality, safety, efficiency, and effectiveness of
healthcare. In 2013, AHRQ issued a new program announcement (PA-13-017) that
supersedes the previous conference grant FOAs. A total of seven conference grants were
active at any point in 2013, 2014, or 2015.

AHRQ Health Services Research (R01): AHRQ funds projects through an Agency-wide
FOA (PA 07-243, PA-09-070, PA-13-045, PA-14-291) for ongoing extramural grants for
research, demonstration, dissemination, and evaluation projects to support improvements
in health outcomes, strengthen quality measurement and improvement, and identify
strategies to improve access. There were 18 grants funded through these FOAs during
calendar years 2013, 2014, and 2015.

*AHRQ Health Services Research Demonstration and Dissemination Grants (R18, PA-
09-071, PA-13-046).* The AHRQ Health IT Division funds health IT demonstration and
dissemination projects through an Agency-wide FOA. During 2013, 2014, and 2015,
there were a total of three active grants funded through these program announcements.

Centers for Education and Research on Therapeutics (CERTs) (U19, HS-11-004):
AHRQ was given responsibility for administering the CERTs demonstration program
authorized by Congress as part of the Food and Drug Administration Modernization Act
of 1997 (Public Law 105-115). CERTs conduct research and provide education to
advance the optimal use of drugs, medical devices, and biological products; increase
awareness of the benefits and risks of therapeutics; and improve quality while cutting the
costs of care. There were two U19 grants active in calendar years 2013, 2014, and 2015.

*Research Centers in Primary Care Practice-Based Research and Learning (P30) RFA
(HS-12-002):* P30 grants support Centers of Excellence in Primary Care Practice-Based
Research and Learning, promoting clinical, behavioral, and translational research
activities. This FOA is intended for consortiums of three or more regional practice-based
research networks (PBRNs), or national PBRNs with at least 120 member practices.
There were two PBRN grants funded through this initiative in 2012 that were ongoing at
the end of 2015.

*Patient-Centered Outcomes Research (PCOR) Pathway to Independence Award
(K99/R00) (RFA-HS-13-002):* The purpose of this funding is to increase and maintain a
strong cohort of new and talented AHRQ-supported independent investigators trained
in comparative effectiveness methods to conduct patient care outcomes research. One
health IT-focused project was funded in 2013 and was ongoing at the end of 2015.

Contracts

A contract is an agreement that is initiated by the government to acquire a product or service under specified terms. The AHRQ Health IT Division uses various contract mechanisms to solicit requests for proposals (RFPs), including one-time RFPs and requests for task orders (RFTOs) when a master contract has been issued under an indefinite delivery indefinite quantity (IDIQ) contract. Master contracts are a special type of RFP that are issued to a group of qualified contractors who are then eligible to compete for a subsequent series of RFTOs.

The AHRQ Health IT Division had 19 research contracts active at any time in calendar years 2013, 2014, and 2015, varying in length from 1 to 5 years, and ranging in a wide variety of topics such as using health IT in practice redesign, evaluating the proposed Stage 3 Meaningful Use care coordination objectives, and a systematic literature review to determine if health information exchange (HIE) improves health or intermediate outcomes. AHRQ lifetime funding for these health IT contracts is $22.2 million.

Health IT Contracts. AHRQ funds a variety of research contracts, including those funded through the following mechanisms and RFPs:

> ***Accelerating Change and Transformation in Organizations and Networks (ACTION):***
> ACTION I, II (both closed to new funding opportunities), and III are networks designed to conduct field-based research to promote innovation in healthcare delivery by accelerating the diffusion of research into practice. The ACTION I network included 15 large partnerships and collaborating organizations. The ACTION II network includes 17 large partnerships and more than 350 collaborating organizations. The ACTION III network includes 13 large partnerships and more than 300 collaborating organizations. The networks conduct practice-based implementation research focused on testing or expanding the investigation of innovations that are new to the healthcare field, implementing interventions or improvement approaches that have been demonstrated to work in a limited type or number of settings, spreading one or more proven innovations or delivery system improvements, and evaluating and supporting sustainability. In 2013, 2014, or 2015, there was one active ACTION I and seven ACTION II task order contracts funded by the Health IT Division; no projects were funded by ACTION III during the time period.

> One ACTION II project was the *Using Health IT in Practice Redesign: Impact of Health IT on Workflow* contract (Contract # 290-10-00031I-2), led by Dr. Pascale Carayon. This project studied the impact on workflow of applications that allow patients to electronically share information with clinics on workflow. It also looked at how clinics redesign information workflows to incorporate patient-generated data. The project team found that allowing patients to share their information with clinicians electronically facilitated communication, improved the organization of work, reduced workload, and increased patient satisfaction. However, the team also found that, while the use of these technologies had benefits, they can also hinder workflow and may increase physicians' workload. In addition, usability issues of applications represented a significant workflow barrier.

Clinical Decision Support (CDS) Services: In 2008, AHRQ funded two demonstration projects in support of the design, development, implementation, and evaluation of guidelines-based CDS. The demonstration projects were awarded to Brigham and Women's Hospital, the Clinical Decision Support Consortium (CDSC) project; and Yale University School of Medicine, the GuideLines Into Decision Support (GLIDES) project. The CDS demonstrations focused on translation of clinical guidelines and outcomes related to preventive healthcare and treatment of patients with chronic illnesses. AHRQ funding for the CDSC project ended in 2013, while the GLIDES project ended in 2012.

Evidence-Based Practice Centers (EPCs): AHRQ awards contracts to institutions to serve as EPCs. The EPCs review relevant scientific literature on clinical, behavioral, organizational, and financial topics to produce evidence reports and technology assessments. These reports are used for informing and developing coverage decisions, quality measures, educational materials and tools, guidelines, and research agendas. The EPCs also conduct research on methodology of systematic reviews. In calendar years 2013, 2014, and 2015, there were two EPC task orders funded through the Health IT Division.

- For the *Core Functionality for Pediatric EHRs* project (Contract # 290-2012-00009-I), the project team developed a technical brief on the state of practice and the current literature around core functionalities for pediatric EHRs to describe current practice and to provide a framework for future research. To do so, the project team 1) conducted key informant interviews with clinicians, policy experts, and researchers; 2) searched online sources for information about currently available programs and resources; and 3) conducted a literature search to identify currently available research on the effectiveness of individual functionalities.

- For the *Topic Refinement and Systematic Review for Health Information Exchange* project (Contract # 290-12-00014I-11), a team of investigators conducted a systematic review to identify the available research on HIE outcomes and identify future research needs. They found that, while there is evidence of HIE reducing specific resources and improving quality of care, its full impact on clinical outcomes is unknown.

National Resource Center (NRC) for Health IT Task Orders: From 2004 to 2014, AHRQ supported the NRC to develop and disseminate evidence and evidence-based tools on how health IT can improve healthcare quality, safety, and efficiency as well as support AHRQ's management of the Health IT Division. There were five task order projects still active during 2013 and 2014. All closed by 2015.

- One NRC contract that closed in 2015 was a follow-up project to the development of the *Children's EHR Format* that contained the requirements for data elements, standards, usability, functionality, and interoperability for a pediatric EHR. This project, the *Children's EHR Format Enhancement* contract (Contract # 290-90-00021I-9), produced the Children's EHR Format 2015 Priority List, and Recommended Uses of the Format, which are designed to provide the additional guidance that was missing in the original Format. They are intended to enhance

the use of the Format by providing a short list of items for all stakeholders to focus on as a priority, and are meant to encourage dialogue and collaboration among software developers, practitioners, provider organizations, professional organizations, and other stakeholders working to improve the care of children and the technologies supporting their care.

Interagency Agreements

Interagency agreements (IAAs) are used to provide, purchase from, or exchange goods or services with another Federal agency. In 2013, 2014 or 2015, the Health IT Division funded three projects in collaboration with other Federal agencies.

- In 2012, AHRQ and the National Science Foundation funded three research projects through a single IAA (IAA# 12-689F-12, *Advancing Health Services through System Modeling Research*) to address systems modeling in health services research, with a specific emphasis on the supportive role of health IT.

B. Geographic Distribution of Projects

During 2013, 2014, and 2015, projects were led by organizations located in 33 States plus the District of Columbia (see Figure 1). Massachusetts, with 27, was the State with the highest number of active health IT projects, followed by New York and Michigan with 22 and 17 projects, respectively. Projects are classified by the State where the lead organization is located, but many projects include collaborators from multiple organizations. For example, the Evaluation of Meaningful Use Stage 3 Objectives: Pennsylvania and Utah project (Contract #290-10-00031I-5) is led by a principal investigator from Abt Associates in Massachusetts, and evaluated Stage 3 objectives in two integrated delivery systems—Geisinger Health System and Intermountain Healthcare—in Pennsylvania and Utah, respectively.

Figure 1: Number of Projects Active in 2013, 2014, or 2015 Sponsored by AHRQ's Health IT Division by State

Note: 222 projects in 33 States plus the District of Columbia.
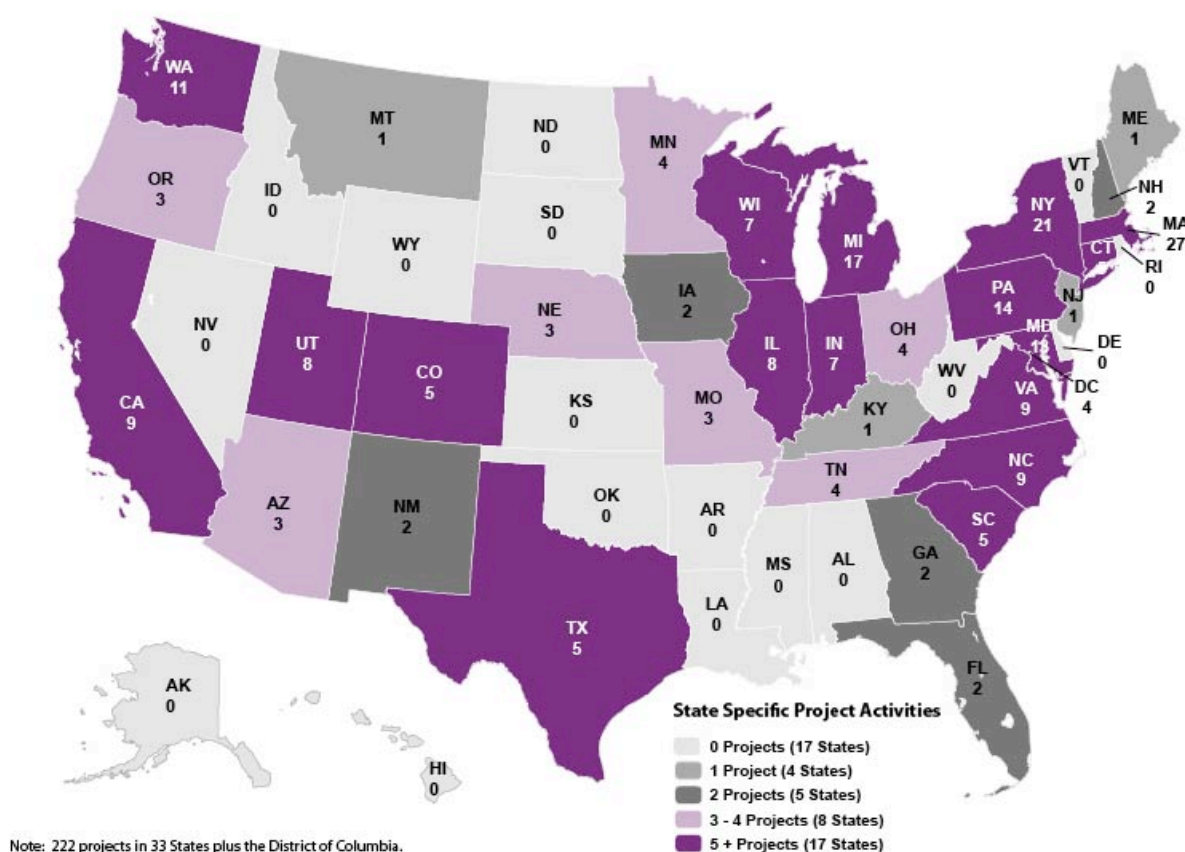
C. Characteristics of Health IT Projects

AHRQ funds diverse projects that focus on a range of health IT technologies, interventions, populations, medical conditions, settings, and type of care. Once a project is awarded, projects are reviewed and categorized using a detailed taxonomy. Projects may include one or more of any of these taxonomy categories.[1]

Technologies

Projects are categorized by the health IT application or intervention being studied (Table 1) and can be tagged on more than one technology. The most common health IT category was EHRs/electronic medical records (EMRs) (76), followed by CDS (54), and consumer health informatics (30).

The *Decision Support to Improve Dental Care for Medically Compromised Patients* (Grant # R18 HS 020846) project is one example of a project categorized by more than one technology: electronic dental records and CDS. This particular project, led by Dr. James Fricton, evaluated the impact of evidence-based CDS integrated into an electronic dental record on the quality of care provided to patients with chronic medical needs.

Table 1: Technologies Studied

Technologies	Total
Electronic Health Record/Electronic Medical Record	76
Clinical Decision Support System	54
Consumer Health Informatics	30
Mobile Device	22
Patient Portal	22
Personal Health Record	13
Health Information Exchange	12
Mobile Phone	12
Internet	10
Natural Language Processing System	10
Dashboard	9
Registry	9
Voice Recognition	9
Clinical Documentation	8
Secure Messaging	8
Telemedicine System	8
Clinical Informatics	8
Text Messaging	7
Electronic Prescribing	6
Patient-Generated Health Data	5
Virtual Reality	5
Computerized Provider Order Entry System	4
Data	4

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[1] Project categories are up to date as of August 7, 2017. Projects categories may be updated when a project changes its approach and methodologies

Technologies	Total
Remote Patient Monitoring	4
Machine Learning	3
Bioinformatics and Genomics	2
Clinical Messaging	2
Data Warehouse	2
Kiosk	2
Knowledge System	2
Public Health Informatics	2
Social Media	2
Standards and Classification System	2
Architecture	1
Database	1
Electronic Dental Record	1
Geographic Information System	1
Imaging System	1
Medication Management System	1
Picture Archiving and Communication System	1
Practice Management System	1
Public Health Reporting System	1
Radio Frequency Identification Device	1
Total	**385**

Medical Conditions Studied

The AHRQ Health IT Division funds projects that study a variety of medical and health conditions, including cardiovascular disease, cancer, and substance abuse. Many of the projects evaluated the impact of an intervention on multiple health conditions or examined patients with co-morbid conditions.

For example, in the *Effect of Electronic Health Record Use on Preventive Screening for Comorbid Medicaid Adult* project (Grant # R03 HS 022559), led by Dr. William Corser at Michigan State University, the team examined the relationship between EHR adoption on completion of preventive and screening services: screening for hyperlipidemia, diabetes, colorectal, or cervical cancer; and administration of influenza and pneumococcal vaccines.

The most common medical conditions studied were chronic conditions (21), followed by diabetes (13), and mental/behavioral health (12). See Table 2 below.

Table 2: Medical Conditions Studied of Project Research

Medical Conditions	Total
Chronic Conditions	21
Diabetes Mellitus	13
Mental/Behavioral Health	12
Cardiovascular Disease	11
Hypertension	10

Medical Conditions	Total
Asthma	9
Infectious Disease*	9
Obesity	6
Cancer	5
Breast Cancer	4
Colorectal Cancer	4
Gastrointestinal Disease	4
Pregnancy	4
Substance Abuse	4
Tobacco Use	4
Cervical Cancer	3
Congestive Heart Failure (CHF)	3
Prostate Cancer	3
Stroke	3
Coronary Artery Disease (CAD)	2
HIV/AIDS	2
Respiratory (Lung) Disease	2
Sickle Cell Anemia	2
Chronic Obstructive Pulmonary Disease (COPD)	1
Dermatologic (Skin) Disease	1
Hemoglobin (Blood) Disorder	1
Hepatitis	1
Hyperlipidemia (HL)	1
Neurologic Disease	1
Ophthalmologic (Eye) Disease	1
Osteoporosis	1
Renal (Kidney) Disease	1
Xerostomia	1
Total	**150**

Infectious Disease includes viral, bacterial, and respiratory infection.

Care Setting and Type of Care

Projects are categorized on the care setting (Table 3) and type of care (Table 4) of their research. For care setting, one third of projects active in 2013, 2014, and 2015 were conducted in ambulatory settings (n=85). Thirty-nine projects focused on inpatient care in hospitals, and 36 studies were conducted in academic medical centers.

Table 3: Care Setting of Project Research

Care Setting	Total
Ambulatory Setting	85
Hospital*	39
Academic Medical Center	36
Patient Home	34
Emergency Department	17
Community Health Center	10
Federally Qualified Health Center	7

Care Setting	Total
Across the Health Care System	5
Intensive Care Unit	5
Outpatient	5
Veteran Affairs Medical Center	5
Long-Term Care Facility	3
Behavioral Health Clinic	2
Integrated Delivery Network	2
Perioperative/Operative	2
Ambulatory Surgical Center	1
Dental Practice	1
Diagnostic Imaging Center	1
Free Clinic	1
Health Department	1
Hospice Center	1
Rehabilitation Center	1
Total	**264**

Note: Hospital includes projects tagged as inpatient.

For type of care, 75 projects focused on primary care, followed by acute care (36) and specialty care (28). See Table 4.

The *Core Functionality for Pediatric EHRs* project (Contract # 290-2012-00009-I) is one example of a project categorized as both primary care and pediatrics. This project, led by Melissa McPheeters, developed a technical brief on the state of practice and the current literature around core functionalities for pediatric EHRs.

Table 4: Type of Care in Project Research

Type of Care	Total
Primary Care	75
Acute Care	36
Specialty Care	29
Pediatrics	26
Self-Management	23
Ambulatory Care	15
Tertiary Care	10
Preventive Care	7
Behavioral Health	5
Home Health Care	4
Obstetrics and Gynecology	4
Long-Term Care	3
Surgery	3
Dentistry	2
Family Medicine	2
Orthopedics	2
Dermatology	1
Hospice Care	1

Type of Care	Total
Internal Medicine	1
Multi-Specialty Care	1
Ophthalmology	1
Secondary Care	1
Urology	1
Total	**253**

Healthcare Theme

Projects are also categorized by healthcare theme, which are the themes that the project focuses upon (Table 5). Thirty-seven projects active in 2013, 2014, and 2015 were focused on patient-centered care. Twenty-seven projects focused on medication management, and 23 studied interventions to increase chronic disease management.

A Sleep Promotion Toolkit for Hospitalized Patients (Grant # R21 HS 024330), awarded to Dr. Lichuan Ye, is one example of a project that is categorized by patient-centered care. This project is refining and integrating a sleep promotion toolkit into an existing web-based patient portal and testing the effectiveness of the toolkit on patient's self-perceived overall sleep quality during a hospitalization.

Table 5: Healthcare Theme in Project Research

Healthcare Theme	Total
Patient-Centered Care	41
Chronic Disease Management	27
Quality Improvement	25
Preventive Medicine	24
Patient Engagement	22
Patient Safety	21
Technology Usability	21
Human Factors	20
Patient Education	18
Transitions in Care	18
Care Coordination	17
Clinical Workflow	17
Meaningful Use	16
Mobile Health	16
Quality Measurement	15
Sociotechnical Aspects	15
Clinical Decision Making	14
Patient-Reported Outcomes	14
Medication Adherence	11
Interoperability	8
Telehealth	6
Medication*	6
Care Planning	4
Learning Health System	4

Healthcare Theme	Total
Medication Errors	4
Medication Reconciliation	4
Access to Care	3
Medication Safety	3
Personalized Medicine	3
Smoking Cessation	3
Adverse Events	2
Health Literacy	2
Total	**424**

Note: Includes projects tagged as medication or medication management.

Target Populations Studied

The AHRQ Health IT Division funds projects that study various populations, some of which also overlap with AHRQ's priority populations. AHRQ identifies "priority populations" as specified by Congress in the Healthcare Research and Quality Act of 1999 (Public Law 106-129), consisting of groups with unique healthcare needs or issues that require special focus, such as racial and ethnic minorities, low-income populations, and people with special healthcare needs.

Tables 6 through 10 outline the frequencies of projects categorized by each target population; projects can be tagged with more than one category. For example, the *Understanding and Honoring Patients with Multiple Chronic Conditions* project (Grant # R01 HS 022364), led by Dr. James Ralston, is a project that is studying how patients with multiple chronic conditions think about priorities for care and treatment and focuses on individuals with chronic care needs and their caregivers.

Age

The most common age category was adults (52), followed by children (30), and adolescents and young adults (23).

Table 6: Age Studied

Age Studied	Total
Adult	52
Children	30
Adolescent and Young Adult	23
Elderly	17
Infant	5
Total	**127**

Coverage Population

Nineteen projects focused on specific health coverage or individuals that were uninsured (Table 7).

Table 7: Coverage Population Studied

Coverage Population Studied	Total
Medicaid	9
Medicare	6
Uninsured	2
Veterans	2
Total	**19**

OMB Race and Ethnicity Populations

Thirteen projects focused on specific OMB race and ethnicity populations (Table 8).

Table 8: OMB Race and Ethnicity Studied

OMB Race and Ethnicity Studied	Total
Black or African American	8
Hispanic or Latino	4
American Indian or Alaska Native	1
Total	**13**

Vulnerable Populations

The most frequent vulnerable populations studied in the projects were individuals with chronic care needs (16) and minority populations (16), followed by medically underserved (13).

Table 9: Vulnerable Population Studied

Vulnerable Population Studied	Total
Individuals with Chronic Care Needs	16
Minority Populations	16
Medically Underserved Populations	13
Low-Income Populations	12
Inner City Populations	12
Rural Populations	11
Individuals with Disabilities	2
Individuals with End-of-Life Care Needs	2
Individuals with Low Literacy	1
Individuals with Special Health Care Needs	1
Total	**86**

Roles

The projects were also reviewed on the role of the population studied. The most common population roles were physicians (68), clinical staff (26), and researchers (22).

Table 10: Role Studied

Role Studied	Total
Physician	68
Clinical Staff	26
Researcher	22
Caregiver	21
Nurse	19
Administrator	7
IT staff	5
Stakeholder	4
Physician Assistant	3
Nurse Practitioner	3
C-Suite Officer	2
Dentist	2
Implementer	2
Pharmacist	2
Practice Manager	2
Decision Maker	1
Home Health Worker	1
Office staff	1
Payer	1
Public Health Worker	1
Vendor	1
Total	**194**

III. Project Highlights

A. AHRQ Project Highlights from 2013, 2014, and 2015

Over the course of the 3-year period, there were many projects that helped develop and disseminate information to add to the health IT knowledge base. A sample of projects is highlighted below.

Use of Health IT to Improve Quality and Treatment

Improving Adolescent Primary Care through an Interactive Behavioral Health Module (Grant # R21 HS020997): Dr. Elizabeth Ozer and a team of investigators at the University of California, San Francisco, developed Health e-Check, an iPad screening module covering multiple behavioral risk areas and emotional health for adolescents. Health e-Check, which is integrated into the EHR, takes 5 minutes for adolescents to complete, and includes a customized printout with prompts and cues for providers. The study found that provider rates of behavioral health screening and counseling increased, and that adolescents reported being more comfortable and honest when completing the screening by computer than with a provider.

Improving Transitions in Care

Improving Post-Hospital Transitions and Ambulatory Care for Children with Asthma (*Grant # R18 HS 018678*)   Dr. Flory Nkoy and her colleagues at the University of Utah developed and implemented two IT applications to improve care transitions from the hospital setting to the ambulatory and home settings for children hospitalized with asthma. They found that the interventions—one aimed at the discharging physician and the other for the primary care provider—increased compliance with preventive asthma measures and led to significant reductions in asthma readmission and length of stay. This project supports effective care transitions and continuity post-hospital discharge, and enhances the quality of ambulatory care for children with asthma to reduce the risk of asthma readmissions.

NICU-2-HOME: Using Health IT to Support Parents of NICU Graduates Transitioning Home (Grant # R21 HS020316): Investigators at Northwestern University, led by Dr. Craig Garfield, developed NICU-2-Home, a patient- and caregiver-centered mobile application (app) that provides information to parents of very low-birthweight infants as they transition from the neonatal intensive care unit (NICU) to their homes. The researchers conducted a randomized controlled trial to evaluate the effect of the NICU-2-Home application. At follow-up, the intervention group showed an increase in parental self-efficacy and confidence in caring for their VLBW infants, and greater use of the app was associated with improved preparedness for discharge and length of stay.

Using Health IT to Improve Preventive Care

DEVISE: Data Exchange of Vaccine Information between an IIS and EHR (Grant # R18 HS 022667): New York City's immunization information system (IIS) allows providers to query electronically for patients' immunization records, bringing them directly into EHRs. Dr. Melissa

Stockwell from Columbia University analyzed immunization data for children seen at five community health clinics before and after this capability was implemented and found up-to-date status and immunization completeness increased, while duplicative immunization decreased.

Improving Medication Management and Safety in the United States

***Integration of a Natural-Language Processing-Based Application to Support Medication Management (Grant # R21 HS 021544)*:** Li Zhou, M.D., of Brigham and Women's Hospital, developed a natural-language processing (NLP) system called the Medical Text Extraction, Reasoning and Mapping System (MTERMS) to extract and encode medication information from electronic clinical notes in a structured format (Grant # R03 HS 018288). Based on the success of this work, Dr. Zhou was awarded this followup R21 grant to use NLP to facilitate the medication reconciliation process in the ambulatory setting to improve the accuracy and completeness of medication lists.

Funding the Next Generation of Health IT Researchers

AHRQ continues to fund doctoral candidates to promote and build research capacity in the use of health IT to improve healthcare quality, safety, efficiency, and effectiveness.

***Understanding How Social Influence and Social Networks Influence EMR Implementation (Grant # R36 HS 022201)*:** The dissertation work of Christina T. Yuan examined whether clinicians' social networks influence their beliefs and use of an EHR system. This mixed methods study found that beliefs embedded in clinicians' social networks are positively associated with: 1) changes in individuals' beliefs about the EHR system over time, and 2) individuals' use of the EHR system. They also identified key behaviors that super users, such as nurses who receive additional training on the EHR system, use to influence others and EHR implementation success.

***Patient-Centered Online Care Model for Follow-Up Management of Atopic Dermatitis (Grant # K08 HS 018341)*:** AHRQ funded April Armstrong, M.D., to compare effectiveness of patient-accessed teledermatology with in-person office visits for follow-up management of atopic dermatitis. Dr. Armstrong's study found that improvements in atopic dermatitis clinical outcomes were comparable between the two groups. Thus, this study showed that direct-access online care may represent an effective model of delivering dermatological services to patients with chronic skin diseases.

More information on these and other projects may be found on the AHRQ Health IT Projects' website, where success stories, videos, and podcasts highlighting many of the projects are available.

B. Publicizing Grantee and Contractor Outputs

The Health IT grantees and contractors publicize their research findings in many ways, such as participating in AHRQ's seventh annual conference in 2015, publishing work in peer-reviewed journals, and making presentations to stakeholder groups and at other health- and IT-based conferences. AHRQ has developed an AHRQ Health IT Projects Publication Database to further

disseminate work of the funded projects. This Publication Database is updated on a quarterly basis via literature search and by notification by funded grantees and contractors of published work.

During 2013, 2014, and 2015, there were a total of 327 peer-reviewed publications and final contract project reports published that were identified through the literature search and the notification system.

Publications

Highlights from the Health IT funded projects' publications include the following:

Outcomes from Health Information Exchange: Systematic Review and Future Research Needs. The AHRQ funded Pacific Northwest Evidence-Based Practice Center, led by Dr. William Hersh, conducted a systematic review (Contract # 290-12-00014I-11) to identify the available research on HIE outcomes and analyze future research needs. The manuscript described the review and abstraction process as well as summarized the 34 identified studies that evaluated outcomes of HIE. The major findings described were that, although the existing evidence supports benefits of HIE in reducing the use of specific resources and improving the quality of care, the full impact of it on clinical outcomes and potential harms is inadequately studied. The authors recommended that future studies must address comprehensive questions, use more rigorous designs, and employ a standard for describing types of HIE.

Conceptualizing Smartphone Use in Outpatient Wound Assessment: Patients' and Caregivers' Willingness to Use Technology. Dr. K. Craig Kent and his team from the University of Wisconsin are developing a patient-centered smartphone application called the Outpatient Wound Surveillance Program (Grant # R21 HS 023395). Patients submit photos of their surgical site daily via their smartphone for review by the surgical service in an effort to reduce surgical site infections, once at home. At the start of the project, they surveyed patients who had undergone vascular surgery to evaluate smartphone capability and willingness to adopt this technology. They found that the majority of patients with significant comorbidity had cell phones and were able and willing to adopt the monitoring program. However, the researchers feel that patient training and caregiver participation will be essential to the success of the intervention.

Presentations

Grantees and contractors presented project-related findings and activities at AHRQ's Annual Conference, which took place on October 4-6, 2015, in Crystal City, Virginia. This conference, titled "Producing Evidence and Engaging Partners to Improve Healthcare," was co-hosted by AcademyHealth and brought together authorities in healthcare research and policy to participate in sessions focused on addressing the challenges in improving quality, safety, access, and value in healthcare. This conference was designed to showcase the best of the Agency's research and provide examples of how that research is being implemented at all levels of healthcare delivery. These presentations and many others allowed AHRQ staff, grantees, and contractors to disseminate project results, share lessons learned, and build on each other's work. More information on conference is available at
https://www.ahrq.gov/news/events/conference/index.html.

IV. Conclusion

The work funded by the AHRQ Health IT Division has helped to identify challenges to health IT adoption and use, solutions and best practices for making IT work in real world healthcare delivery settings, and tools that will help providers incorporate new IT successfully. In addition, many of the active projects are focusing on the design of consumer health IT applications to help patients manage their personal health information, chronic care conditions, and medication management. These projects have made important contributions to the field of health IT and further the evidence base regarding the impact of health IT on healthcare quality. Ultimately, the work produces field-leading research and summarizes evidence synthesis to inform future decisions about health IT by healthcare stakeholders and policymakers.

Findings and lessons learned are shared through the AHRQ Health IT website. Readers are invited to visit the website to learn more about all of the AHRQ resources, initiatives, and funded projects.

V. List of Projects Active in 2013, 2014, and 2015

Table 11: Ambulatory Safety and Quality Grants

Improving Management of Individuals with Complex Healthcare Needs Through Health IT (MCP)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Baker, Wende	Chronic Mental Health: Improving Outcomes through Ambulatory Care Coordination	RFA-HS-08-002
Friedman, Robert	A Longitudinal Telephone and Multiple Disease Management System to Improve Ambulatory Care	RFA-HS-08-002
Singh, Hardeep	Using Electronic Data to Improve Care of Patients with Known or Suspected Cancer	RFA-HS-08-002

Table 12: Health Information Technology PA Grants

Small Research Grant to Improve Health Care Quality Through Health IT (R03)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Basco, William	Assessment of Pediatric Look-Alike, Sound-Alike Substitution Errors	PAR-HS-08-268
Corser, William	Effect of Electronic Health Record Use on Preventive Screening for Comorbid Medicaid Adults	PAR-HS-08-268
Koru, Gunes	Towards Effective and Efficient Adoption of Health Information Technology in Home Health Care	PAR-HS-08-268
Levy, Douglas	Economic Analysis of an Information Technology -Assisted Population-Based Cancer Screening Program	PAR-HS-08-268
Nemeth, Lynne	Synthesizing Lessons Learned Using Health Information Technology	PAR-HS-08-268
Stablein, Timothy	The Role of Privacy in Practice: Electronic Health Records in Pediatrician Interactions with Patients	PAR-HS-08-268
Valdez, Rupa	Informing Consumer Health Information Technology Design: How Patients Use Social Networking Sites	PAR-HS-08-268
Vest, Joshua Ryan	How Do You Define Regional? The Geography of Health Information Exchange	PAR-HS-08-268
Exploratory and Developmental Grant to Improve Health Care Quality Through Health IT (R21)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Adelman, Jason Stuart	Assess Risk of Wrong Patient Errors in an Electronic Medical Record that Allows Multiple Records Open	PA-14-001
Anderson, Heather	Integrating Patient-Reported Outcomes and Electronic Health Record Data to Improve Clinical Decision Support for Depression Treatment	PAR-HS-08-269
Artinian, Nancy	Text Messaging to Improve Hypertension Medication Adherence in African Americans	PAR-HS-08-269
Asan, Onur	Perception and Use of a Patient Care Window to Improve Care and Family Engagement	PA-14-001
Ballard, David J.	Impact of Health Information Technology Implementation on Diabetes Process and Outcome Measures	PAR-HS-08-269
Baptist, Alan	An Interactive Health Communication Program for Young Urban Adults with Asthma	PAR-HS-08-269
Bauer, Nerissa San Luis	Improving Anxiety Detection in Pediatrics Using Health Information Technology	PA-14-001

Exploratory and Developmental Grant to Improve Health Care Quality Through Health IT (R21)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Beebe, Lora	The Long-Term Effectiveness of Telephone Intervention Problem Solving (TIPS)	PAR-HS-08-269
Cartmell, Kathleen Buford	Reducing Hospital Readmission Rates by Implementing an Inpatient Tobacco Cessation Service Driven by Interactive-Voice Recognition Technology	PA-14-001
Casarett, David	CHOICE: Coalition of Hospices Organized to Investigate Comparative Effectiveness	PAR-HS-08-269
Chaudhry, Rajeev	Natural Language Processing-Enabled Decision Support for Cervical Cancer Screening and Surveillance	PAR-HS-08-269
Choi, Sung	Personalized Engagement Tool for Pediatric Blood and Marrow Transplantation Patients and Caregivers	PA-14-001
Cohen, Lindsey	Relieving Anxiety in Children Undergoing Radiation Therapy through Virtual Preparation	PAR-HS-08-269
Cummins, Mollie Rebecca	Supporting Continuity of Care for Poisonings with Electronic Information Exchange	PAR-HS-08-269
Cutrona, Sarah Leleiko	Open & Act: Tracking Healthcare Team Response to Electronic Health Record Asynchronous Alerts	PA-14-001
Czaja, Sara	Improving Meaningful Access of Internet Health Information for Older Adults	PAR-HS-08-269
Farris, Karen	Improving Adherence and Outcomes by Artificial Intelligence-Adapted Text Messages	PAR-HS-08-269
Federman, Alex D.	Development of an Electronic Medical Record-Integrated Enhanced After Visit Summary	PA-14-001
Dowding, Dawn	Development of Dashboards to Provide Feedback to Home Care Nurses	PA-14-001
Garfield, Craig F.	NICU-2-HOME: Using Health Information Technology to Support Parents of Neonatal Intensive Care Unit Graduates Transitioning Home	PAR-HS-08-269
Glanz, Jason	An Evaluation of an Interactive Social Media Website for Parents who are Concerned about Immunizing their Children	PAR-HS-08-269
Gillespie, Theresa	eCoach: Development and Pilot Testing of a Decision Aid for Prostate Cancer	PAR-HS-08-269
Goodney, Philip P.	Leveraging Health Information Technology to Avoid Unnecessary Asymptomatic Carotid Revascularization	PAR-HS-08-269
Hewner, Sharon	Coordinating Transitions: Health Information Technology Role in Improving Multiple Chronic Disease Outcomes	PAR-HS-08-269
Joshi, Ashish	Feasibility of a Touch Screen Computer Based Breast-Feeding Educational Support	PAR-HS-08-269

Exploratory and Developmental Grant to Improve Health Care Quality Through Health IT (R21)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Juckett, David	Phenotype Modeling and Outcome Mapping for Pain Management	PAR-HS-08-269
Kahn, Michael	Enhancing Fulfillment Data in Community Practices for Clinical	PAR-HS-08-269
Kazemi, Donna	mHealth Delivery of a Motivational Intervention to Address Heavy Drinking Among College Freshmen	PA-14-001
Kent, K Craig	Patient-Centered Postoperative Wound Surveillance Using	PAR-HS-08-269
Kharrazi, Hadi	A Community Health Information Exchange-Based Hospital Readmission Risk Prediction and Notification System	PAR-HS-08-269
Kelchner, Lisa Nelson	Access to Pediatric Voice Therapy: A Telehealth Solution	PAR-HS-08-269
Lacson, Ronilda	Automated Notification for Follow-Up Testing Recommendations Across Care Settings	PAR-HS-08-269
Lai, Jin-Shei	Symptom Monitoring and Reporting System for Pediatric Chronic	PAR-HS-08-269
Lakshminarayan, Kamakshi	Promoting Self-Management in Stroke Survivors Using Health Information Technology	PAR-HS-08-269
Lee, Joyce	Patient-Centered Data Visualizations for Diabetes	PA-14-001
Levin, Scott Ryan	HopScore: An Electronic Outcomes-Based Emergency Triage System	PA-14-001
Li, Baoxin	Exploring Clinically-Relevant Image Retrieval for Diabetic Retinopathy Diagnosis	PAR-HS-08-269
Lindquist, Lee A.	Improving Outpatient Safety of Older Adults through Electronic Patient Portals	PA-14-001
Malone, Daniel C.	Individualized Drug Interaction Alerts	PA-14-001
Mane, Ketan	VisualDecisionLinc: Real-Time Decision Support for Behavioral Health	PAR-HS-08-269
Mazur, Lukasz	Enhancing Providers Ability to Follow-up on Abnormal Test Results	PA-14-001
McAlearney, Ann Scheck	Portals in Inpatient Care (PIC): Evaluating the Usability, Use and Patient Experience Associated with Patient Portal Technology at the Bedside	PA-14-001
Meguid, Robert A.	Surgical Risk Preoperative Assessment System (SURPAS)	PA-14-001

Exploratory and Developmental Grant to Improve Health Care Quality Through Health IT (R21)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Miller, Amalia	Health Information Technology in Ambulatory Care Settings:	PAR-HS-08-269
Mitchell, Suzanne	Treating Comorbid Depression During Care Transitions with Relational Agents	PA-14-001
Molfenter, Todd David	Payer Readiness for Technology Implementation (P-RTI) Tool Application and Assessment	PA-14-001
Mollica, Richard	The Virtual Patient for Improving Quality of Care in Primary Healthcare	PAR-HS-08-269
Morrow, Daniel	Collaborative Patient Portals: Computer-Based Agents and Patients	PAR-HS-08-269
Munson, Sean	Sharing Patient Lifelog Data with the Primary Care Team for Two Patient Populations: Preventative Care and Chronic Disease Management	PA-14-001
Nease, Donald	Health Information Exchange and Ambulatory Test Utilization	PAR-HS-08-269
Overby, Casey Lynnette	Electronic Health Record-linked Decision Support for Communicating Genomic Data	PAR-HS-08-269
Ozer, Elizabeth	Improving Adolescent Primary Care Through an Interactive Behavioral Health Module	PAR-HS-08-269
Patel, Minal R.	Feasibility of a Clinician Training Program to Improve Patient-Provider Communication in the Presence of Health Information Technology Systems in the Exam Room	PA-14-001
Payne, Thomas H.	Improving Accuracy of Electronic Notes Using a Faster, Simpler Approach	PA-14-001
Phillips, Robert	Trial of Aggregate Data Extraction for Maintenance of Certification and Raising Quality	PAR-HS-08-269
Primack, Brian A.	Sponsored Health Information Technology and Evidence-Based Prescribing among Medical Residents	PAR-HS-08-269
Rao, Goutham	Improving Diagnosis of Hypertension in Children (IDHC)	PA-14-001
Sarkar, Urmimala	Measuring and Improving Ambulatory Patient Safety with an Electronic Dashboard	PAR-HS-08-269
Schoenthaler, Antoinette	Insights for Community Health	PAR-HS-08-269
Sheehan, Florence	Patient Self-Monitoring to Transfer Physical Therapy Exercise from Clinic to Home	PAR-HS-08-269
Shelley, Donna	Testing Clinical Decision Support for Treating Tobacco Use in Dental Clinics	PAR-HS-08-269

Exploratory and Developmental Grant to Improve Health Care Quality Through Health IT (R21)

Principal Investigator	Project Title	Funding Opportunity Announcement
Shorten, Allison	Using Interactive Health Information Technology to Support Women's Choices for Birth After Cesarean	PAR-HS-08-269
Singh, Hardeep	Improving Direct Notification of Abnormal Test Results via Patient Portals	PA-14-001
Sockolow, Paulina	Barriers and Facilitators to Implementation and Adoption of Electronic Health Record in Home Care	PAR-HS-08-269
Sorondo, Barbara	Evaluating the Effectiveness of a Health Information Technology Self-Management Program for Chronic Disease	PAR-HS-08-269
Valdez, Rupa	Accessibility and Beyond: Designing Consumer Health Information Technology for Disabled Individuals	PA-14-001
Wexler, Randell	Use of Health Information Technology to Increase Primary Care Access in Medicaid Patients	PAR-HS-08-269
Ye, Lichuan	A Sleep Promotion Toolkit for Hospitalized Patients	PA-14-001
Zhou, Li	Integration of a Natural Language Processing-Based Application to Support Medication Management	PAR-HS-08-269

Disseminating and Implementing Evidence from Patient-Centered Outcomes Research in Clinical Practice Using Mobile Health Technology (R21)

Principal Investigator	Project Title	Funding Opportunity Announcement
Abujarad, Fuad	Patient Centered Virtual Multimedia Interactive Informed Consent (VIC)	RFA-HS-14-010
Bajaj, Jasmohan S.	Use of Patient Buddy Application to Disseminate Knowledge & Prevent Readmission	RFA-HS-14-010
Chrischilles, Elizabeth	Design and Testing of a Mobile Cardiovascular Risk Service with Patient Partners	RFA-HS-14-010
Connelly, Mark Andrew	Registry-Assisted Dissemination of Mobile Pain Management for Youth with Arthritis	RFA-HS-14-010
Oreskovic, Nicolas M	An Integrated Closed-Loop Feedback System for Pediatric Cardiometabolic Disease	RFA-HS-14-010
Rudin, Robert Samuel	Using mHealth and Patient-reported Outcomes to Deliver Evidence-Based Asthma Care	RFA-HS-14-010
Schnall, Rebecca	Use of mHealth Technology for Supporting Symptom Management in Underserved Persons Living with HIV	RFA-HS-14-010
Shah, Nirmish R.	Use of Mobile Technology to Improve Acute Care Utilization in Sickle Cell Disease	RFA-HS-14-010

Disseminating and Implementing Evidence from Patient-Centered Outcomes Research in Clinical Practice Using Mobile Health Technology (R21)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Tubb, Matthew Robert	A Mobile App to Enhance Smoking Cessation Shared Decision Making in Primary Care	RFA-HS-14-010
Tulu, Bengisu	TJR Guru a Mobile App for Shared Informed Decision Making in Total Joint Replacement Surgery	RFA-HS-14-010
Utilizing Health IT to Improve Health Care Quality (R18)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Arora, Sanjeev, M.D.	Project ECHO Hepatitis C Ambulatory Care Quality Improvement in New Mexico through Health Information Technology	PAR-HS-08-270
Atlas, Steven J.	The Medication Metronome Project	PAR-HS-08-270
Atlas, Steven J.	Technology for Optimizing Population Care in a Resource-Limited Environment	PAR-HS-08-270
Bates, David W.	Improving Uptake and Use of Personal Health Records	PAR-HS-08-270
Fricton, James	Decision Support to Improve Dental Care for Medically Compromised Patients	PAR-HS-08-270
Gance-Cleveland, Bonnie	Health Information Technology to Support Clinical Decision Making in Obesity Care	PAR-HS-08-270
Green, Lee A.	Information Technology Implementation by Cognitive Engineering of Organizational Routines	PAR-HS-08-270
Haas, Jennifer	Health Information Technology Enhanced Family Health History Documentation & Management in Primary Care	PAR-HS-08-270
Hazlehurst, Brian L.	Automating Assessment of Obesity Care Quality	PAR-HS-08-270
Hess, Rachel	Functional Assessment Screening Patient Reported Information: FAST-PRI	PAR-HS-08-270
Johnson, Kevin B.	MyMediHealth: A Paradigm for Children-Centered Medication Management	PAR-HS-08-270
Levick, Donald	Data Flow and Clinical Outcomes in a Perinatal Continuum of Care System	PAR-HS-08-270
McConnochie, Kenneth	Facilitators and Barriers to Adoption of a Successful Urban Telemedicine Model	PAR-HS-08-270
McTigue, Kathleen M.	Online Counseling to Enable Lifestyle-Focused Obesity Treatment in Primary Care	PAR-HS-08-270
Nkoy, Flory	Improving Post-Hospital Transitions and Ambulatory Care for Children with Asthma	PAR-HS-08-270

Utilizing Health IT to Improve Health Care Quality (R18)

Principal Investigator	Project Title	Funding Opportunity Announcement
Parsons, Amanda	Bringing High Performing Systems to Small Practices	PAR-HS-08-270
Piette, John D.	Trial of the CarePartner Program for Improving the Quality of Transition Support	PAR-HS-08-270
Roberts, Mark Stenius	Self-Management and Reminders with Technology: SMART Appraisal of an Integrated Personal Health Record	PAR-HS-08-270
Sequist, Thomas D.	A Risk Based Approach to Improving Management of Chronic Kidney Disease	PAR-HS-08-270
Smith, Kenneth J.	Virtual Continuity and its Impact on Complex Hospitalized Patients' Care	PAR-HS-08-270
Stockwell, Melissa S.	Flu Alert: Influenza Vaccine Alerts for Providers in the Electronic Health Record	PAR-HS-08-270
Storch, Eric	Utilizing Health Information Technology to Improve Health Care Quality	PAR-HS-08-270
Weiner, Michael	Medication Reconciliation to Improve Quality of Transitional Care	PAR-HS-08-270

Policy Relevant Evaluations to Inform Development of Health IT Meaningful Use Objectives (R18)

Principal Investigator	Project Title	Funding Opportunity Announcement
Adler-Milstein, Julia Rose	Assessing Readiness, Achievement & Impact of Stage 3 Care Coordination Criteria	NOT-HS-13-006
Fiks, Alexander	Pediatric Patient Engagement as a Criteria for Meaningful Use Stage 3	NOT-HS-13-006
Jean-Jacques, Muriel	Best Practices for Integrating Clinical Decision Support Into Clinical Workflow	NOT-HS-13-006
Neale, Anne Victoria	Impact of Meaningful Use Patient Engagement Objectives in a Multicultural Practice-Based Research Network	NOT-HS-13-006
Ornstein, Steven	Learning from Primary Care Meaningful Use Exemplars	NOT-HS-13-006
Scholle, Sarah H.	Care Coordination Enabled by Health Information Technology: What Will It Take?	NOT-HS-13-006
Stockwell, Melissa S.	DEVISE: Data Exchange of Vaccine Information between an Immunization Information System and Electronic Health Record	NOT-HS-13-006
Weckmann, Michelle	Using the Electronic Medical Record to Identify and Screen Patients at Risk for Delirium	NOT-HS-13-006

Understanding Clinical Information Needs and Health Care Decisionmaking Processes in the Context of Health IT (R01)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Agha, Zia	Quantifying Electronic Medical Record Usability to Improve Clinical Workflow	PA-11-198
Butler, Keith	Modeling and Analysis of Clinical Care for Health Information Technology Improvement	PA-11-198
Carayon, Pascale	Health Information Technology-Supported Process for Preventing and Managing Venous Thromboembolism	PA-11-198
Cohen, Deborah Jill	Clinical Information Needs of Community Health Centers for Health Information Technology (CLINCH-IT)	PA-11-198
Fairbanks, Rollin	Cognitive Engineering for Complex Decision Making and Problem Solving in Acute Care	PA-11-198
Flum, David R.	Developing Design Principles to Integrate Patient-Reported Outcomes (PROs) into Clinical Practice through Health Information Technology: Data, User Experience, and Workflow Requirements for PRO Dashboards	PA-11-198
Franklin, Amy	Opportunistic Decision Making Information Needs and Workflow in Emergency Care	PA-11-198
Harle, Christopher Albert	Designing User-Centered Decision Support Tools for Chronic Pain in Primary Care	PA-11-198
Gold, Jeffrey Allen	Electronic Health Record Solutions for Accurate Reporting of Data on Interprofessional Intensive Care Unit Rounds	PA-11-198
Gurses, Ayse Pinar	Care Transitions and Teamwork in Pediatric Trauma: Implications for Health Information Technology Design	PA-11-198
Koopman, Richelle J.	Optimizing Display of Blood Pressure Data to Support Clinical Decision Making	PA-11-198
Manojlovich, Milisa	The Effect of Health Information Technology on Healthcare Provider Communication	PA-11-198
Melton-Meaux, Genevieve	Discovery and Visualization of New Information from Clinical Reports in the Electronic Health Record	PA-11-198
Singh, Hardeep	Decision Making and Clinical Work of Test Result Follow-up in Health Information Technology Settings	PA-11-198
Wetterneck, Tosha Beth	Understanding Primary Care Teamwork in Context: Implications for Health Information Technology Design	PA-11-198
Windle, John	Optimizing the Electronic Health Record for Cardiac Care	PA-11-198

Understanding User Needs and Context to Inform Consumer Health IT Design (R01)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Arcury, Thomas	Maximizing the Impact of Electronic Personal Health Information Management (ePHIM) in Low-Income, Multiethnic Populations	PA-11-199
Jackson, Gretchen P.	Personal Health Information Needs and Practices for Maternal Fetal Care	PA-11-199
Matthews, Judith T.	Self-Management via Health Kiosk by Community-Residing Older Adults	PA-11-199
Ponto, Kevin	vizHOME: A Context-Based Health Information Needs Assessment Strategy	PA-11-199
Pratt, Wanda	Patients as Safeguards: Understanding the Information Needs of Hospitalized Patients	PA-11-199
Ralston, James	Patient Reminders and Notifications	PA-11-199
Ralston, James	Understanding and Honoring Patients with Multiple Chronic Conditions	PA-11-199
Safran, Charles	InfoSage: Information Sharing Across Generation and Environments	PA-11-199
Thompson, Haley S.	eHealth Activity among African American and White Cancer Survivors	PA-11-199
Turner, Anne M.	Addressing the Personal Health Information Management Needs of Older Adults	PA-11-199
Vawdrey, David Kent	Addressing Hospital Patient Information Needs Using a Personal Health Record Portal	PA-11-199
Zikmund-Fisher, Brian	Systematic Design of Meaningful Presentations of Medical Test Data for Patients	PA-11-199

Table 13: Career, Dissertation, and Other Grants

Grant Program for Small and Large Conference Support		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Agarwal, Ritu	Workshop on Health Information Technology and Economics	PAR-09-257
Chen, Yunan	Workshop on Interactive Systems in Healthcare 2013: Bridging Communities	PA-13-017
Chu, Lawrence	Stanford Medicine X-Health Care and Emerging Technologies	PAR-09-257
Fridsma, Douglas Brian	AMIA Health Policy Conference	PA-13-017
Kuperman, Gilad	AMIA Health Policy Conference Series	PAR-09-257
Pratt, Wanda	Workshop on Interactive Systems in Healthcare 2012	PAR-09-231
Schumann, Mary Jean	Symposium on Patient Engagement	PAR-09-231
Career Development (K01, K08) and Dissertation (R36) Grants Focused on Health IT		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Anker, Jessica	Improving Healthcare Quality with User-Centric Patient Portals	PAR-09-087
Armstrong, April	Patient-Centered Online Care Model for Follow-Up Management of Atopic Dermatitis	PAR-09-085
Baer, Heather	Use of Electronic Health Records for Addressing Overweight and Obesity in Primary Care	PAR-09-087
Blaz, Jaquelyn	Exploring the Creation of Nurses Information Documentation and Use in Clinic Work	PAR-09-212
Blecker, Saul B.	Health Information Technology in Heart Failure Care	PA-13-039
Cohen, Genna Rebecca	Physician Practice Variation in Electronic Health Record Use	PA-12-256
Del Fiol, Guilherme	Context-Aware Knowledge Delivery into Electronic Health Records	PAR-09-087
Gatwood, Justin	Targeting Medication Nonadherence Using Mobile Phone Based Tailored Messaging	PAR-09-212
Gephart, Sheila Maria	Clinical Decision Support Optimizing Necrotizing Enterocolitis Prevention Implementation in Neonatal Intensive Care Unit	PA-13-039

Career Development (K01, K08) and Dissertation (R36) Grants Focused on Health IT		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Gesteland, Per	Using Health Information Technology to Support Population-Based Clinical Practice	PAR-09-085
Hessels, Amanda	Impact of Heath Information Technology on Delivery and Quality of Patient Care	PAR-09-212
Islam, Roosan	Understanding Complex Clinical Decision Tasks for Better Health Information Technology System Design	PA-12-256
Jackman, Kevon-Mark Phillip	Use of Electronic Personal Health Records as a Health Risk-Reduction Discussion Tool	PA-12-256
Koopman, Richelle	Patient Readiness to Use Internet Health Resources	PAR-09-085
Lafleur, Joanne	Knowledge Engineering for Decision Support in Osteoporosis	PAR-09-085
Melnick, Edward	Clinical Decision Support for Mild Traumatic Brain Injury	PAR-09-085
Rand, Cynthia M.	Using Health Information Technology to Improve Delivery of HPV Vaccine	PAR-09-085
Wen, Kuang-Yi	MyHealthPortal: Using an Electronic Portal to Empower Patients with Breast Cancer	PAR-09-087
Were, Martin	Improving Management of Test Results that Return After Hospital Discharge	PAR-09-085
Yuan, Christina	Understanding How Social Influence and Social Networks Affect Electronic Medical Record Implementation	PA-12-256
Patient-Centered Outcomes Research (PCOR) Pathway to Independence Award (K99/R00)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Lyles, Courtney	Engaging Diverse Patients in Using an Online Patient Portal	RFA-HS-13-002
Centers for Education and Research on Therapeutics (CERTs) (U19)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Bates, David	Health Information Technology Center for Education and Research on Therapeutics	RFA-HS-11-004
Lambert, Bruce	Tools for Optimizing Medication Safety (TOP-MEDS)	RFA-HS-11-004

AHRQ Health Services Research Projects (R01)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Alpern, Elizabeth	Improving the Quality of Pediatric Emergency Care Using an Electronic Medical Record Registry and Clinician Feedback	PA-09-070
Bates, David	Ensuring Safe Performance of Electronic Health Records	PA-13-045
Carroll, Aaron	Computer Automated Developmental Surveillance and Screening	PA-07-243
Cummins, Mollie Rebecca	Electronic Exchange of Poisoning Information	PA-09-070
Dixon, Brian	Improving Population Health Through Enhanced Targeted Regional Decision Support	PA-09-070
Gilbert, Amy	Computer-Supported Management of Medical-Legal Issues Impacting Child Health	PA-09-070
McCarty, Carolyn A.	Improving Teen Care with Health Information Technology	PA-13-045
Patel, Vimla L.	Impact of Meaningful Use on Clinical Workflow in Emergency Departments	PA-13-045
Post, Lori	Emergency Department Disability Diagnostic Tool: A Health Information Technology Feasibility Study	PA-09-070
Ratwani, Raj M.	Developing Evidence-based User Centered Design and Implementation Guidelines to Improve Health Information Technology Usability	PA-14-291
Schiff, Gordon David	Enhancing Medication Computerized Provider Order Entry Safety and Quality by Indications Based Prescribing	PA-13-045
Senathirajah, Yalini	Finding the Safer Way: Novel Interaction Design Approaches to Health Information Technology Safety	PA-14-291
Shapiro, Jason S.	Advancing Quality Measurement and Care Improvement with Health Information Exchange	PA-09-070
Siegel, Corey	Evaluating a Prediction Tool and Decision Aid for Patients with Crohn's Disease	PA-09-070
Stockwell, Melissa	PRSIM: Personalized Reminders for Immunizations using Short Messaging Systems	PA-13-045
Stockwell, Melissa	SINC: Synchronized Immunization Notifications	PA-14-291
Zhou, Li	Natural Language Processing to Improve Accuracy and Quality of Dictated Medical Documents	PA-14-291
Zhou, Li	Encoding and Processing Patient Allergy Information in Electronic Health Records	PA-13-045

AHRQ Health Services Research Demonstration and Dissemination (R18)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Conroy, Margaret	Maintaining Activity and Nutrition through Technology-Assisted Innovation in Primary Care	PA-09-071
Kroth, Philip	Minimizing Stress, Maximizing Success of Physician's Use of Health Information	PA-13-046
Wood, Kenneth	Improving Rural Healthcare Transitions Through Health Information Exchange	PA-09-071
Research Centers in Primary Care Practice-Based Research and Learning (P30)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Ornstein, Steven	Research Centers in Primary Care Practice Based Research and Learning	RFA-HS-12-002
Wasserman, Richard	National Center for Pediatric Practice Based Research and Learning	RFA-HS-12-002
Active Aging: Supporting Individuals and Enhancing Community-based Care Through Health IT (P50)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Gustafson, David H.	Bringing Communities and Technology Together for Healthy Aging	RFA-HS-10-016
Electronic Data Methods Forum for Comparative Effectiveness Research (U13)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Holve, Erin	AcademyHealth Electronic Data Methods Forum for Comparative Effectiveness Research	RFA-HS-10-006
Electronic Data Methods Forum: Second Phase (U18)		
Principal Investigator	**Project Title**	**Funding Opportunity Announcement**
Edmunds, Margaret	AcademyHealth Electronic Data Methods Forum Second Phase	RFA-HS-13-004

Table 14: Contracts

Accelerating Change and Transformation in Organizations and Networks (ACTION) I and II		
Principal Investigator	**Project Title**	**Contract Number**
Carayon, Pascale	Using Health Information Technology in Practice Redesign: Impact of Health Information Technology on Workflow	290-2010-00031I-2
Ciemins, Elizabeth	Using Health Information Technology in Practice Redesign: Impact of Health Information Technology on Workflow	290-2010-0019I-1
Galantowictz, Sara	Evaluation of Stage 3 Meaningful Use Objectives: Analysis in Pennsylvania and Utah	290-10-00031I-5
Jain, Anjali	Improving Sickle Cell Transitions of Care Through Health Information Technology	290-10-00033I-1
Jain, Anjali	Evaluation of Stage 3 Meaningful Use Objectives: Analysis in Oklahoma and the District of Columbia	290-10-00033I-2
Kharrazi, Hadi	Evaluation of Stage 3 Meaningful Use Objectives: Analysis in Maryland and Arkansas	290-10-00027I-5
Wald, Jonathan S.	Evaluation of Stage 3 Meaningful Use Objectives: Analysis in North Carolina and Tennessee	290-10-00024I-5
Wald, Jonathan S.	Using Health Information Technology in Practice Redesign: Impact of Health Information Technology on Workflow	290-2010-00024I-4
Clinical Decision Support Services		
Principal Investigator	**Project Title**	**Contract Number**
Middleton, Blackford	Clinical Decision Support Consortium	290-08-10010
Evidence-Based Practice Center (EPC)		
Principal Investigator	**Project Title**	**Contract Number**
Hersh, William	Topic Refinement and Systematic Review for Health Information Exchange	290-12-00014I-11
McPheeters, Melissa	Core Functionality for Pediatric Electronic Health Records	290-2012-00009-I

Interagency Agreement		
Principal Investigator	**Project Title**	**Contract Number**
MITRE Corporation	A Robust Health Data Infrastructure	13-717F-13
MITRE Corporation	Data for Individual Health	14-721F-14
National Science Foundation	Advancing Health Services through System Modeling Research	12-689F-12
National Resource Center Task Order		
Principal Investigator	**Project Title**	**Contract Number**
Dimitropoulos, Linda	Health Information Technology Horizon Scanning	290-2009-00021I
Flemming, Anjanette	Pathways to Quality through Health Information Technology	290-2009-000241
Penoza, Chuck	Support for the United States Health Information Knowledgebase (USHIK)	290-09-00002I-3
Shoemaker, Sarah	Improving Electronic Health Record Patient Education Materials	290-09-00012I-4
Wald, Jonathan S.	Children's EHR Format Enhancement	290-09-00021I-9