

FACT SHEET

Health Information Technology in Children's Health Care—AHRQ-Supported Activities

The mission of AHRQ is to improve the quality, safety, efficiency, and effectiveness of health care by:

- Using evidence to improve health care.
- Improving health care outcomes through research.
- Transforming research into practice.

Introduction

Health information technology (health IT) holds great promise for improving the quality, safety, efficiency, and effectiveness of health care for all patients, including children and adolescents. In addition to improving care for patients and giving providers and health systems a powerful tool for reducing errors, health IT has the potential to produce savings of up to 10 percent of the country's total annual spending on health care.

Researchers and policymakers are just beginning to explore and understand the very important role that health IT will play in the Nation's health care system in the coming years. For example, we already know that health IT has the potential to improve patient safety, enhance communication between providers and patients, and reduce inappropriate care. We need to know much more about using health IT to its fullest potential to improve health care in America. In order to do this, we also have to understand the barriers and

challenges that are impediments to implementation of health IT so that we can identify ways to overcome them.

AHRQ's Focus on Child and Adolescent Health

The Agency for Healthcare Research and Quality provides support for a broad portfolio of research projects focused on health care—including the use of health IT—for America's 70 million children and adolescents. Findings from AHRQ-supported research on children's health help to guide clinical decisionmaking, provide essential information for health care policymakers, and fill the gaps that exist in evidence-based information on the health care needs of children and adolescents.

The rapidly growing and changing field of health IT is no exception. Health IT is emerging as a key element to better, safer, and more effective health care for all patients. AHRQ has a long-standing commitment to support research on the development, testing, use, and



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impediments to implementation of health IT, as well as the effects of health IT on quality and safety.

This program brief summarizes the Agency's efforts in support of using health IT in children's health care, including findings from AHRQ-funded research, conferences, and ongoing and recently completed research projects. Projects identified with an asterisk (*) include children or children's health care issues but do not focus exclusively on children.

See page 8 of this program brief to find out how you can get more detailed information about AHRQ's research on child and adolescent, health and health information technology, and other topics.

Research Findings

- **Five technologies are expected to improve patient safety for children.** For an AHRQ-supported conference on pediatric patient safety research, investigators reviewed the use of information technology in children's health care and concluded that five technologies have the greatest potential to improve patient safety: (1) care provider order entry with decision support; (2) guideline-based documentation tools; (3) Internet-based disease management resources; (4) teleconsultation; and (5) electronic health records other than order entry or documentation tools. Johnson KB, Davison CL. *Ambul Pediatr* 4(1):64-72, 2004 (AHRQ grant HS11868).
- **Use of a computer-based documentation (CBD) tool does not change parent and physician communication.** Researchers investigated the impact of a CBD tool on parent and physician satisfaction with a pediatric health maintenance encounter. There was no change in overall parent or physician satisfaction in the areas of communication and physician helpfulness. There was no correlation between physician and parent satisfaction or between physician satisfaction and pattern of CBD use. However, there was a strong correlation between physicians' satisfaction and the extent to which they found CBD helpful. Johnson, Serwint, Fagan, et al. *Arch Pediatr Adolesc Med* 159(3):250-254, 2005 (AHRQ grant HS10363).
- **Telemedicine reduces absence from child care due to illness.** A telemedicine model for diagnosis and treatment of common acute problems used both real-time and store-and-forward information exchange between a child and telemedicine assistant in child care and an office-based telemedicine clinician. Absences due to acute illness during weeks with telemedicine were less than half those that occurred during weeks without telemedicine. Researchers concluded that telemedicine holds substantial potential to reduce the impact of illness on the health and education of children, time lost from work by parents, and absenteeism in the economy. McConnochie, Wood, Kitzman, et al. *Pediatrics* 115(5):1273-1282, 2005 (AHRQ grant HS10753).
- **Telephone-linked communication (TLC) system supports care of children with persistent asthma.** These researchers developed and tested an information system designed to integrate patient health information across multiple domains to support the monitoring and care of children with persistent asthma. Used in a multispecialty group practice, this system includes three primary components: (1) a patient-centered, telephone-linked communication system, (2) a Web-based alert reporting and nurse case-

management system, and (3) electronic medical record-based provider communication to support clinical decisionmaking at the point of care. According to the authors, this system offers a new level of connectivity for health information, IT-enabled nurse case managers, and the delivery of longitudinal data to clinicians to support the care of children with persistent asthma. Adams, Fuhlbrigge, Miller, et al. *Proc AMIA Symp* 1-5, 2003 (AHRQ grant HS10630).

- **Prioritizing computer-based prompts for preventive services.**

These authors describe two approaches to prioritizing prompts for child preventive services: one approach involves a static, global prioritization across all preventive services; the second approach uses influence diagrams to prioritize prompts based on individual patient data. The latter approach is still under development. Both methods are labor-intensive and require a combination of epidemiologic data and expert judgment. Downs and Uner. *Proc AMIA Symp* 215-219, 2002 (AHRQ grant HS09507).

- **Researchers examine user acceptance of a clinical computer system in two pediatric practices.**

Data for this qualitative study were gathered through interviews with staff, clinical observations, and review of system implementation records. Five months after implementation, Practice A continued to use the system, but Practice B had abandoned it because it was unacceptable to the users. Five main themes were identified relative to differences in user acceptance: (1) benefits versus expense of system use varied, (2) organizational cultures differed, (3) staff relationship with practices differed, (4) post-implementation experiences differed,

and (5) transfer of technology from the academic center to private practice proved challenging in Practice B. The findings indicate a need for the development and validation of tools to measure health care organizational climate and readiness for change. Travers and Downs. *Proc AMIA Symp* 853-857, 2000 (AHRQ grant HS09507).

- **Researchers investigate challenges of automating a real-time clinical practice guideline.**

The goal of this study was to describe the types of problems encountered during implementation of a Web-based clinical practice guideline to manage hyperbilirubinemia in newborn infants. The researchers conducted a formative assessment of an automated guideline in a large-scale implementation in primary-care clinics and offices, inpatient clinics, and an emergency department affiliated with an academic children's hospital. They found that many existing guidelines are not amenable to straightforward implementation in automated systems. However, strategies to increase the efficacy of the automated guidelines included guideline modifications, as well as careful consideration of the flow of clinical work. Sun, van Wingerde, and Kohane. *Clin Perform Qual Health Care* 7(1):28-35, 1999 (AHRQ grant HS09390).

- **Mining association rules from a pediatric primary care decision support system.**

For this study, researchers applied an unsupervised data mining algorithm to a database containing data on over 30,000 visits collected at the point of care for clinical decision support. The data set was taken from the Child Health Improvement Program, a preventive services tracking system at the University of North Carolina. Researchers used a previously



described pattern discovery algorithm to extract 2nd and 3rd order association rules from the data and reviewed the literature to see if the associations had been described before. The algorithm discovered 16 2nd order associations and 103 3rd order associations. The 3rd order associations contained no new information, while the 2nd order associations demonstrated a covariance among a range of health risk behaviors. Additionally, use of the algorithm revealed that both exposure to tobacco smoke and chronic cardiopulmonary disease are associated with failure on developmental screens. These relationships were attributed to underlying poverty. This research demonstrated the ability of unsupervised data mining by rule association on sparse clinical data to discover clinically important associations. However, many associations may be previously known or explained by confounding variables. Downs and Wallace. *Proc AMIA Symp* 200-204, 2000 (AHRQ grant HS 9507).

- **Health IT can empower parents and children to make informed health care decisions.** These authors present examples of interactive information technologies that facilitate information sharing and empower children and families: the electronic pediatric personal medical record (PPMR), customized health information systems, and interactive physician offices with e-mail and telemedicine capabilities. The exact form of an electronic PPMR is still evolving, but ultimately it may resemble currently available personal financial management programs. It could reside on an individual's personal computer, commercial Web site, or other commercial system, and part

of the record may exist as smart cards or electronic dogtags. One-half of Internet users say that they would like to e-mail their doctors. E-mail allows continuous access to the health care system for nonurgent matters such as care coordination, augmented screening, symptom monitoring, and disease self-management. Telemedicine also holds great promise for patient care. For example, video conferencing could benefit home care personnel and family caregivers of children with medically complex needs for whom transportation to multiple specialists is costly and burdensome. D'Alessandro and Dosa, *Arch Pediatr Adolesc Med* 155;1131-1136, 2001 (cofunded by AHRQ and the American Academy of Pediatrics).

AHRQ-Funded Research Projects

- **Improving the Safety of Blood Product Transfusions in Children.** This project involves a probabilistic risk assessment (PRA) of blood product transfusion practices in children so that opportunities to reduce errors and improve safety for other low-frequency, high-impact processes can be identified. The PRA tool is a hybrid between process analysis and decision support methods used in high-risk industries. Using hospital discharge data from AHRQ's Healthcare Cost and Utilization Project and the Pediatric Health Information System databases, the researchers will determine the proportion of hospitalizations in which blood product transfusions are administered and describe patient characteristics associated with transfusions. Anthony Slonim, Principal Investigator, Children's National Medical Center,

Washington, DC. AHRQ grant K08 HS14009, project period 9/30/03-8/31/06.

- **Valuation of Primary Care-Integrated Telehealth.** Health-e-Access is a commercially available technology that enables clinicians to evaluate and treat ill children at distant child care or school sites. Factors affecting its widespread use include physician acceptance, practice implementation, and insurance reimbursement. These key issues are being investigated in two demonstration projects (Study A and Study B) in 9 schools and 13 child care programs in the Rochester, NY, area. Study A is focusing on the impact of telehealth on use and costs at the facility and child levels. Study B is assessing integration in primary care by measuring impact on continuity of care and adherence to well-child visit schedules and immunization rates. Kenneth McConnochie, Principal Investigator, University of Rochester, Rochester, NY. AHRQ grant HS15165, project period 9/30/04-9/29/07.
- **ParentLink: Better and Safer Emergency Care for Children.** In this study, researchers are: (1) evaluating the completeness and accuracy of information on symptoms, disease/condition, medications, and allergies generated by parents using ParentLink versus information documented by emergency department (ED) physicians and nurses; and (2) measuring the impact of ParentLink on ED patient safety and quality, specifically the error rate for ordering and prescribing medications during ED care and the percent of ED visits that adhere to national evidence-based guidelines. Stephen Porter, Principal Investigator, Children's

Hospital Corporation, Boston, MA. AHRQ grant HS14947, project period 9/30/04-9/29/06.

- **Improving Pediatric Safety and Quality with Health Care IT.** In this study, researchers are assessing changes in patient experience of care using a modified CAHPS® survey to evaluate the influence of: (1) weight-based dosing on pediatric adverse drug events; (2) a test result tracking system on appropriate followup of ordered tests; and (3) automated reminders on symptom monitoring and medications for children with asthma and attention deficit disorder. This study includes inner-city minority communities, especially Hispanic and African-American populations. Timothy Ferris, Principal Investigator, Massachusetts General Hospital, Boston. AHRQ grant HS15002, project period 9/30/04-9/29/07.
- ***Showing Health Information Value in a Community Network.** The goal of this 3-year project is to assess the costs and benefits of health IT in an established community-wide network of academic, private, and public health care facilities. The network was created to share clinical information for the purpose of population-based care management of over 16,000 Medicaid beneficiaries in Durham County, NC. Researchers are evaluating the impact of information-driven interventions on care quality, patient safety, and costs. The majority of patients in this study are minority children (African-American, Hispanic, and other ethnicities) and women. David Lobach, Principal Investigator, Duke University, Durham, NC. AHRQ grant HS15057, project period 9/30/04-8/31/07.
- ***Improving Safety and Quality with Integrated Technology.** The aims of this project are to: (1) demonstrate the value of an integrated outpatient and inpatient health IT system to improve quality of care and safety for women and infants, using group B streptococcus (GBS) prevention as the test case; (2) demonstrate the value of an outpatient alert system to increase GBS screening; and (3) perform a cost-benefit analysis to assess the economic impact of implementing the integrated health IT system. Jeanne-Marie Guise, Principal Investigator, Oregon Health and Science University, Portland. AHRQ grant HS15321, project period 9/30/04-8/31/07.
- ***Impact of Health Information Technology on Clinical Care.** This study has two principal aims. The first is to determine the impact on quality and safety of ambulatory health IT for patients with one or more of five chronic diseases (asthma, coronary artery disease, congestive heart failure, diabetes mellitus, and hypertension). This is being done by evaluating measures of drug use, laboratory monitoring, and physiologic disease control. The second goal is to determine the impact of ambulatory health IT on resource use for the same patients by estimating the rates of office visits, ED visits, and hospitalizations. A large number of children with asthma and fewer children with diabetes are included in this study, as well as women and minorities. John Hsu, Principal Investigator, Kaiser Foundation Research Institute, Oakland, CA. AHRQ grant HS15280, project period 9/30/04-9/29/07.
- **Can hand-held technology reduce errors in ADHD care?** This randomized controlled trial was conducted in three primary care practices. The researchers developed and evaluated a computerized system for laptop use in the examining room as an extension of an existing in-house prescribing system. The goal was to improve the care of children with attention-deficit/hyperactivity disorder. Paula Lozano, Principal Investigator, University of Washington, Seattle. AHRQ grant HS11859, project period 9/26/01-8/31/04.
- **Improving Quality of Care for Children with Special Needs.** The goal of this study was development of a database to include diagnosis, health records, and educational information on children with special health care needs in the Tennessee Child Health Profile. The project included low-income, minority children. Carmen Lozzio, Principal Investigator, University of Tennessee Health Science Center, Knoxville. AHRQ grant HS15426, project period 9/30/04-9/29/05.
- **Creating Online NICU Networks to Educate, Consult and Team.** The goal of this study was to develop, implement, and evaluate a cooperative effort using health IT to facilitate a continuum of appropriate medical and developmental care for infants most at risk for long-term neurodevelopmental problems. High-risk infants, including Asians and African Americans from birth to 24 months, were represented in this study. Valerie Rachal, Principal Investigator, University of Southern Mississippi, Hattiesburg. AHRQ grant HS14996, project period 9/30/04-9/29/05.



- ***El Dorado County Safety Network Technology Project.** The goal of this study was to integrate the Network's "Access Product" to improve care for indigent and low-income children and families. Three approaches were used: one, outreach and study enrollment for children eligible for public insurance; two, access to quality health care services for children not eligible for public insurance up to 300 percent of the poverty level; and three, access to health care for families employed by local small businesses unable to provide coverage for their workers. The safety net population included in this study was rural indigent, low-income, uninsured, and underinsured minorities, women, and children. Greg Bergner, Principal Investigator, Marshall Medical, Placerville, CA. AHRQ grant HS14908, project period 9/30/04-9/29/05.
- **Electronic Records to Improve Care for Children.** The aims of this project are to (1) implement a shared, electronic health record for health care providers in pediatric primary care, school health, specialty care, and emergency medicine; (2) demonstrate improvements in quality of care for children with asthma; (3) clarify organizational barriers and factors that enhance IT acceptance; and (4) provide administrative and technical elements of a community-wide health network infrastructure that can be further extended to additional health partners, including academic health center clinics, community health centers, hospital emergency departments, and inpatient facilities. This study involves an inner-city, multiethnic group of children and women and includes minority physicians and nurse practitioners who practice at partner sites. Richard Shiffman, Principal Investigator, Yale University, New Haven, CT. AHRQ grant HS15420, project period 9/30/04-9/29/07.
- **Comprehensive IT Solutions for Quality and Patient Safety.** This pediatric health care system is implementing a series of health information technologies to improve patient safety and quality, as well as increase efficiency of all operations. Four related technologies focusing on pharmacy are involved: an inpatient pharmacy system, an electronic medication administration record, a bar coding system, and a computerized provider order entry system. Study participants include women, minorities, and inner-city children using Medicaid. Jame Jose, Principal Investigator, Children's Healthcare of Atlanta, Inc., Atlanta, GA. AHRQ grant HS15236, project period 9/30/04-9/29/07.
- ***Creating an Evidence Base for Vision Rehabilitation.** The goals of this study are to (1) train staff in using best-practice protocols; (2) install electronic vision rehabilitation records at three nonprofit vision rehabilitation agencies; (3) determine, build, and pilot the electronic interface between government agencies, private rehabilitation agencies, and primary care providers; (4) validate the system's logic and predictive ability; and (5) construct and populate a national benchmarking database with outcome-measurement data from pilot sites. This will result in the first vision rehabilitation evidence base for best treatment practice. This study includes patients aged 6 months and older. Betty Bird, Principal Investigator, Lighthouse International, New York, NY. AHRQ grant HS15052, project period 9/30/04-8/31/07.

- **Colorado Connecting Communities—Health Information Collaborative (C3-HIC).** The purpose of this project is to implement State-wide information and communications technologies that will allow clinicians at the point of care to access patient information from other clinical data repositories. Arthur J. Davidson, Principal Investigator, University of Colorado Health Sciences Center, Aurora. AHRQ contract 290-04-0014, project period 9/30/04-9/29/09.

Conferences, Expert Meetings, and Editorials

- **National Child Health Data Standards Workgroup Meeting.** AHRQ, the Florida Initiative for Children’s Healthcare Quality (FLICHQ), and the National Initiative for Children’s Health Quality (NICHQ) sponsored an expert meeting on April 5, 2005, to kick off the Child Health Information Technology Standards Project. The goal of this 2-year initiative is to further the development, testing, and advancement of data standards specific to children’s health care. The project components are: (1) the establishment of a National Child Data Standards Workgroup; (2) the commissioning of four papers that discuss the issues of using health IT for children’s health; (3) hosting a national expert meeting; and (4) establishing a technical expert panel charged with developing a draft set of data standards for one child health topic within 18 months. The All Children’s Hospital Foundation of Pinellas County, FL, provided a grant in support of this project.

- **Information Technology for Children’s Health and Health Care: Beginning to Ask the Needed Questions.** AHRQ and the American Academy of Pediatrics’ Center for Child Health Research sponsored a meeting held September 21-22, 2000, of experts and stakeholders to identify the special information needs of pediatric care and health services research questions related to the use of health IT in children’s health care. Several articles summarized here facilitated discussions at the meeting and were subsequently published. They are:

Research and implementation agenda recommendations. The group proposed a research agenda to address both effectiveness and costs of information technology, with special consideration for the needs of children; the development and evaluation of clinical decision support in pediatric settings; supplementation of vocabulary standards with pediatrics-specific terminology; and improvement in health care access for children using telemedicine. Recommendations included rapid implementation of features in electronic health information systems that support pediatric patient care. Shiffman, Spooner, Kwiatkowski, et al. *J Am Med Inform Assoc* 8:546-551, 2001.

Barriers that impede the adoption of pediatric information technology. These authors reviewed the literature to summarize barriers that are likely to affect the adoption of health IT by pediatric professionals. They conclude that some barriers may represent a challenge and others—such as the lack of knowledge about the uses of health IT—are more easily resolved. Efforts to overcome these barriers should begin in earnest and should include educating stakeholders in the



care of children and adolescents, as well as improving the knowledge about various technologies available to support pediatric and adolescent health care. Johnson. *Arch Pediatr Adolesc Med* 155:1374-1379, 2001.

Information Technology and the Future of Child Health Care — A Revolution is Occurring. In this editorial, the author discusses the revolution in communications and information technology both inside and outside homes and workplaces. This revolution will have broad influence on the practice of pediatrics, and it holds great promise to improve the quality of health care, reduce medical errors, enhance the knowledge of parents and their effective involvement in their children's health care, and improve child and adolescent health. Weitzman. *Arch Pediatr Adolesc Med* 155:990-991, 2001.

For More Information

Please visit AHRQ's Web site at www.ahrq.gov for more information on the Agency's health services research agendas on child health and health information technology, including information about funding opportunities. Or, you may contact the following AHRQ staff members:

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