



# Annual Report 2012-2013

## Centers for Education and Research on Therapeutics (CERTs)

### Annual Report

September 1, 2012 – August 31, 2013

#### Introduction

In October 2011, six research centers and a scientific coordinating center were funded through cooperative agreements with the Agency for Healthcare Research and Quality (AHRQ), extending the Centers for Education and Research on Therapeutics (CERTs) Program for 5 years. This report summarizes the work of the CERTs Program from October 2012 through August 2013. In addition to describing accomplishments for 2012–2013, this report provides background information about the purpose and components of the ongoing CERTs Program.

#### CERTs Program Purpose

The CERTs Program is a national initiative established in 1999 to conduct research and provide education that advances the optimal use of drugs, medical devices, and biological products, collectively described as “therapeutics.” The CERTs Program has three major aims, as established by Congress:

1. **To increase awareness** of the uses and risks of new drugs and drug combinations, biological products, and devices, as well as of mechanisms to improve their safe and effective use.
2. **To provide objective clinical information** to patients and consumers; health care providers; pharmacists, pharmacy benefit managers, and purchasers; health maintenance organizations (HMOs) and health care delivery systems; insurers; and government agencies.
3. **To improve quality while reducing the cost of care** by increasing the appropriate use of drugs, biological products, and devices and by preventing their adverse effects and consequences of these effects (such as unnecessary hospitalizations).

The CERTs are also authorized to conduct research on the comparative effectiveness, cost-effectiveness, and safety of therapeutics.

## **CERTs Program Components**

In addition to the AHRQ-funded research centers and a scientific coordinating center (the **Scientific Forum**), the CERTs network includes a national steering committee and numerous partnerships with public and private organizations dedicated to improving the quality and safety of therapeutics. The **Steering Committee** offers guidance to [the Scientific Forum \(described below\)](#) and research centers, and includes representatives from the drug and device centers of the U.S. Food and Drug Administration (FDA), each research center's principal investigator, an at-large representative of Federal health agencies, and leaders in health care, private industry, and consumer and patient advocacy. The diversity of committee member perspectives ensures that the CERTs remain well informed and on the cutting edge of significant and emerging health care issues.

## CERTs Steering Committee, 2012–2013

### Chair

**David Ballard, M.D.**

Chair, CERTs Steering Committee, Baylor Health Care System

### CERTs Principal Investigators

**David Bates, M.D., M.Sc.**

Principal Investigator, Brigham and Women's Hospital CERT

**Stephen Crystal, Ph.D.**

Principal Investigator, Rutgers, The State University of New Jersey CERT

**Stephen P. Fortmann, M.D. &**

**Mark C. Hornbrook, Ph.D.**

Principal Investigators, CERTs Scientific Forum

**Bruce Lambert, Ph.D.**

Principal Investigator, Northwestern University CERT

**Carole Lannon, M.D., M.P.H.**

Principal Investigator, Cincinnati Children's Hospital Medical Center CERT

**Eric Peterson, M.D., M.P.H.**

Principal Investigator, Duke University Medical Center CERT

**Kenneth G. Saag, M.D., M.Sc.**

Principal Investigator, University of Alabama at Birmingham CERT

### AHRQ, FDA, and At-Large Government Members

**Tom Gross, M.D., M.P.H.**

Director, Office of Surveillance and Biometrics, Center for Devices and Radiologic Health, Food and Drug Administration

**Michael S. Lauer, M.D. (Government At-Large Member)**

Director, Division of Cardiovascular Sciences, National Heart, Lung, and Blood Institute, National Institutes of Health

**Scott Smith, Ph.D.**

Director, Pharmaceutical Outcomes Research, Center for Outcomes and Evidence, Agency for Healthcare Research and Quality

**Anne Trontell, M.D., M.P.H.**

Program Director, Centers for Education and Research on Therapeutics, Agency for Healthcare Research and Quality

**Gwen Zornberg, M.D., Sc.D.**

Team Leader, Regulatory Science, Office of Surveillance and Epidemiology, Center for Drug Evaluation and Research, Food and Drug Administration

### Healthcare Sector, Consumer, and Industry At-Large Members

**George Bo-Linn, M.D., M.H.A.**

Chief Program Officer, Gordon and Betty Moore Foundation

**Trent Haywood, M.D., JD**

Chief Medical Officer, Blue Cross Blue Shield Association

**Arthur Levin, M.P.H.**

Director, Center for Medical Consumers

**Gilbert J. L'Italien, Sc.D.**

Executive Director, Global Health Outcomes & Epidemiology, Bristol-Myers Squibb

**Robert Reynolds, D.Sc., M.Sc., FISPE**

Vice President & Global Head, Epidemiology, World Safety Strategy, Pfizer, Inc.

**The CERTs Scientific Forum** is the scientific coordinating center for the CERTs Program and through April 2013 was led by Principal Investigator Mark Hornbrook, Ph.D., of the Kaiser Permanente Center for Health Research in Portland, Oregon; after May 2013 the Scientific Forum was led by Principal Investigator Stephen P. Fortmann, M.D., also of the Kaiser Permanente Center for Health Research. The Scientific Forum catalyzes and supports collaborative research and translational activities in therapeutics, supports the CERTs Steering Committee, and serves as the program’s communications and translation hub. The SF also cultivates **partnerships** with public and private entities to help the research centers leverage their funded research into additional projects and to extend their impact. All public–private partnerships are reviewed for potential conflicts of interest using established CERTs principles and practices.

Each **CERTs research center** organizes its research and educational activities within a defined thematic area of therapeutics, which may represent a vulnerable population, a group of related medical conditions, or a specific methodological approach, such as health information technology. The six research centers are listed in Table 1, with their thematic focus and principal investigator.

**Table 1. CERTs Program, Research Centers 2012–2013**

<b>CERTs</b>	<b>Thematic Focus</b>	<b>Principal Investigator</b>
<b>Brigham and Women’s Hospital (BWH)</b>	Health Information Technology	David Bates, M.D., M.Sc.
<b>Cincinnati Children’s Hospital Medical Center (CCHMC)</b>	Pediatrics	Carole Lannon, M.D., M.P.H.
<b>Duke University Medical Center (Duke)</b>	Cardiovascular Diseases	Eric Peterson, MD, M.P.H.
<b>Northwestern University</b>	Tools for Optimizing Medication Safety	Bruce Lambert, Ph.D.
<b>Rutgers, The State University of New Jersey (Rutgers)</b>	Mental Health	Stephen Crystal, Ph.D.
<b>University of Alabama at Birmingham (UAB)</b>	Musculoskeletal Disorders	Kenneth Saag, M.D., M.Sc.

## Highlights

In 2012–2013, the six CERT research centers across the United States worked to improve the safety and effectiveness of therapeutics. The CERTs Program produced research that refined health information technology, documented health literacy, and advanced the quality of pediatric care. Work by CERTs researchers also suggested new approaches to treatments for atrial

fibrillation, documented the use of antipsychotic medications among nursing home residents, and explored nondrug approaches to managing pain after joint replacement.

**Refining Automated Systems to Improve Care.** Computerized systems used in patient care often include alerts to warn health care providers about potential mistakes as they are entering orders. In 2012, researchers from the BWH CERT measured how often providers override alerts and determined whether or not the overrides were appropriate. They found that most drug allergy, drug-class, duplicate drug, and drug formulary alerts were appropriately overridden, suggesting potential for refinement of these types of alerts. They found high rates of inappropriate overrides for drug–drug interaction alerts, however, underscoring the need to educate providers.

**Documenting Health Literacy to Improve Communication.** Health literacy refers to a person’s ability to understand the information they receive about their health care. Researchers at the Northwestern University CERT found that nurses may overestimate health literacy and incorrectly identify patients with low health literacy, meaning that patients may not understand the health information they are receiving. The findings support health literacy education for nurses and other health care professionals.

**Preventing Kidney Injury in Children.** Researchers at the CCHMC CERT found that children discharged from hospitals after an episode of acute medication-related kidney injury were not consistently followed. The researchers recommend comprehensive follow-up assessments for such children to prevent further kidney damage. In related work, CCHMC CERT researchers found that more systematically monitoring serum creatinine in children with cystic fibrosis who underwent aminoglycoside therapy allowed caregivers to detect aminoglycoside-related acute kidney injury earlier and more accurately than traditional approaches.

**Understanding Treatment for Atrial Fibrillation.** The Duke CERT explored treatments for atrial fibrillation (AF), and found that patients who were managed with heart-rate control only were older, had more comorbidity, and were more likely to be cognitively impaired. Patients selected for rhythm control were younger and had less comorbidity. Rhythm-control patients were also more likely to be treated by a heart rhythm specialist (electrophysiologist). Given the potential benefits of rhythm control, greater involvement of electrophysiologists may be warranted for many patients with AF.

**Reducing Inappropriate Use of Medication in Nursing Homes.** Researchers at the Rutgers CERT focused efforts on reducing the use of antipsychotic drugs among nursing home residents with dementia. An analysis of data on antipsychotic use in nursing homes found that Medicaid clients experienced substantially higher antipsychotic use rates. Facilities with lower registered nurse staffing compared with licensed practical nurse or certified nursing assistant staffing also had substantially higher antipsychotic use rates. Finally, nonprofit facilities had lower use rates compared with both government facilities and for-profit facilities.

**Examining Non-Drug Pain Management.** UAB CERT researchers examined nontraditional pain management after total joint replacement and found common usage of nondrug modalities

in primary knee replacement patients at 2 weeks postsurgery: people used cold packs, deep breathing, heat, relaxation, walking, distraction, prayer, and massage, among other approaches. Users of nondrug therapies were significantly younger and more likely to be female, white, to have a college education, and to have a higher household income than patients who did not report using nondrug approaches.

## **CERTs Collaborations**

In 2012-2013, the CERTs collaborated with one another and with a diverse range of public and private entities to advance research, advise Federal and State policymakers, and provide evidence-based, objective information to educate patients, doctors, pharmacists, and others about therapeutics.

### **Collaboration to Improve Medication Management: A Patient-Centered Approach.**

Medications have become a central component of treatment for many diseases; however, 20 to 30 percent of prescriptions are never filled, and of those prescriptions that are filled, roughly one-half are not taken as prescribed.<sup>1</sup> These gaps in medication adherence result in poor health outcomes and an estimated \$100 to \$290 billion annually in avoidable health care costs.<sup>2-5</sup> Despite decades of research to improve how and whether patients take their medication, nonadherence has remained a stubborn problem. Recently, the CERTs program has turned its attention towards efforts to improve medication adherence that incorporate patient perspectives.

In October 2012, building on formative work conducted in the previous year, the CERTs convened a workshop to examine the scientific evidence on medication adherence interventions from the patient-centered perspective and to explore the potential of patient-centered medication management to improve chronic disease treatment. A diverse group of patients, providers, researchers, and other stakeholders identified and prioritized ideas for future research and practice. Through transcription and analysis of workshop proceedings, a number of priorities emerged. They included creating tools and systems to facilitate and evaluate patient-centered medication management plans; developing training for providers on patient-centered prescribing; and increasing patients' knowledge about medication management. Collectively, the priorities and considerations identified in the multistakeholder workshop suggest a roadmap to engage, educate, and support patients in addressing chronic disease management and medication use.

The results of the workshop proceedings are reported in a manuscript, "[Engaging diverse stakeholders to identify patient-centered priorities for improving medication management and adherence](#)," published in the journal *Patient Education and Counseling* in 2014. A companion manuscript containing a literature review used as the basis for the workshop agenda, "[Patient-centered interventions to improve medication management and adherence: a qualitative review of research findings](#)," has also been published.

Following on the October 2012 workshop, the CERTs continued to collaborate in the area of patient-centered medication management. The CERTs program recognized that many national

organizations have mounted initiatives in this area, including the Office of the Surgeon General, the National Council on Patient Information and Education (NCPIE), and the National Consumers League (NCL). The CERTs National Steering Committee decided in March 2013 to convene these groups, as well as other groups dedicated to this shared purpose, along with key stakeholders including patients, providers, researchers, and payers, at a 2-day meeting. The meeting sought to foster a patient-centered perspective on medication use; share perspectives on needed innovations in policy, intervention, research, and available resources; and, identify key priorities for future action. The meeting took place in March 2014; a full report on the development and outcomes of the meeting will be included in the CERTs Annual Report for 2013–2014. A [brief summary of the meeting](#) can be found at CHAINOnline.org.

1. Peterson AM, Takiya L, Finley R. Meta-analysis of trials of interventions to improve medication adherence. *Am J Health Syst Pharm* 2003 Apr 1;60(7):657-65. Select to access the [abstract](#).
2. DiMatteo MR, Giordani PJ, Lepper HS, Croghan TW. Patient adherence and medical treatment outcomes: a meta-analysis. *Med Care* 2002 Sep; 40(9):794-811. Select to access the [abstract](#).
3. Roebuck MC, Liberman JN, Gemmill-Toyama M, Brennan TA. Medication adherence leads to lower health care use and costs despite increased drug spending. *Health Aff* 2011 Jan; 30(1):91-9. Select to access the [abstract](#).
4. New England Healthcare Institute. Thinking Outside the Pillbox. Available at:[http://www.nehi.net/publications/44/thinking\\_outside\\_the\\_pillbox\\_a\\_systemwide\\_approach\\_to\\_improving\\_patient\\_medication\\_adherence\\_for\\_chronic\\_disease..](http://www.nehi.net/publications/44/thinking_outside_the_pillbox_a_systemwide_approach_to_improving_patient_medication_adherence_for_chronic_disease..)
5. Sokol MC, McGuigan KA, Verbrugge RR, Epstein RS. Impact of medication adherence on hospitalization risk and healthcare cost. *Med Care* 2005 Jun;43(6):521-30. Select to access the [abstract](#).

**Collaborating to Prevent Medical Errors—The CPOEMs Project.** In 2012, the Food and Drug Administration funded an effort, led by members of the Brigham and Women’s Hospital (BWH) CERT and Center for Patient Safety Research and Practice, to evaluate the extent to which Computerized Provider Order Entry (CPOE) in electronic health records is both preventing and contributing to medication errors. This project is an assessment of inpatient and outpatient EHRs at BWH and other participating sites: University of Pennsylvania, Kaiser Permanente Northwest, University of Illinois Chicago, Harvard Vanguard Medical Associates, and Montefiore Medical Center.

Working closely with staff at the FDA and the research sites, BWH has led the evaluation of screen design and workflow for medication ordering in 10 CPOE systems and identified risk errors relating to drug name confusion, ordering inconsistencies, and variations in decision support. Researchers gave several presentations on this work at the Society for General Internal Medicine’s Annual National Meeting in April 2014:

- Quist A, Robertson A, Thach T, et al. Examining the potential for CPOE system design and functionality to contribute to medication errors. Society for General Internal Medicine (SGIM) National 36th Annual National Meeting; 2014 April 23–26; San Diego.
- Robertson A, Quist A, Thach T, et al. A qualitative assessment of CPOE and variation in drug name display. Society for General Internal Medicine (SGIM) National 36th Annual National Meeting; 2014 April 23–26; San Diego.
- Slight S, Amato MG, Seger A, et al. A qualitative study exploring the vulnerabilities of computerized physician order entry systems. Society for General Internal Medicine (SGIM) National 36th Annual National Meeting; 2014 April 23–26; San Diego.
- Egualé T, Amato MG, Seger A, et al. Where do current computerized physician order entries (CPOEs) stand in averting/facilitating medication errors? Society for General Internal Medicine (SGIM) National 36th Annual National Meeting; 2014 April 23–26; San Diego.

**Collaborating to Improve Hypertension.** In 2012, the Duke CERT conducted a study that found that up to one-third of patients under cardiologists' care have higher blood pressures than they should, with wide variability in performance across individual clinicians. To ensure that the information reached patients as well as clinicians, the Duke CERT and Baylor College of Medicine developed a handout, "[If You Have High Blood Pressure \(Hypertension\).](#)" that was published on CHAIN Online in January 2013. The handout shares basic facts about high blood pressure and suggests questions patients can ask their doctors, along with space to record answers. The handout also recommends a [page on CERTs' CHAINOnline Web site](#) that offers information on controlling blood pressure as well as other helpful Web sites. As of May 2013, the handout had been downloaded 76 times, and the Web site had recorded 200 visits.

In conjunction with the handout, the Duke CERT worked with the Baylor College of Medicine to develop a continuing medical education (CME) activity that described the consequences of poor blood pressure control, prompted physicians to document actions when blood pressure was out of range, described methods of treatment, and suggested how they might implement such techniques. In the year the CME activity was posted (ending Dec. 31, 2013), it received 1,940 visits, had been downloaded 751 times, and 556 CME certificates had been issued.

Navar-Boggan AM, Boggan JC, Stafford JA, et al. Hypertension control among patients followed by cardiologists. *Circ Cardiovasc Qual Outcomes* 2012 May;5(3):352-7. Select to access the [abstract](#).

**Collaborating to Improve Pediatric Care.** Learning networks are essential to translating evidence into practice, building the scientific foundation for discovery, and, in pediatrics, improving child health. Within a learning network, physicians work collaboratively, learn from combined data, and together develop and test best practices. They collect data on patient care processes and on patient outcomes, and share the results with all network members to enhance and accelerate improvements in care.

In June 2013, the CCHMC CERT, the American Board of Pediatrics, the Children's Hospital Association, and Cincinnati Children's Hospital Medical Center Learning Networks Core co-sponsored an invitational meeting, "Promoting and Sustaining the Collaborative Network Model in Pediatrics." The June 2013 meeting engaged experts to address how to sustain multisite networks that are essential to translating evidence into practice. A nine-manuscript supplement introduced topics covered during the meeting.

- Lannon CM, Miles PV. Pediatric collaborative improvement networks: bridging quality gaps to improve health outcomes. *Pediatrics* 2013 Jun; 131 Suppl 4:S187-8. Select to access the [abstract](#).
- Lannon CM, Peterson LE. Pediatric collaborative improvement networks: background and overview. *Pediatrics* 2013 Jun;131 Suppl 4:S189-95. Select to access the [abstract](#).
- Billett AL, Colletti RB, Mandel KE, et al. Exemplar pediatric collaborative improvement networks: achieving results. *Pediatrics* 2013 Jun;131 Suppl 4:S196-203. Select to access the [abstract](#).
- Miles PV, Conway PH, Pawlson LG. Physician professionalism and accountability: the role of collaborative improvement networks. *Pediatrics* 2013 Jun;131 Suppl 4:S204-9. Select to access the [abstract](#).
- Clancy CM, Margolis PA, Miller M. Collaborative networks for both improvement and research. *Pediatrics* 2013 Jun;131 Suppl 4:S210-4. Select to access the [abstract](#).
- Miller M. Roles for children's hospitals in pediatric collaborative improvement networks. *Pediatrics* 2013 Jun;131 Suppl 4:S215-8. Select to access the [abstract](#).
- Margolis PA, Peterson LE, Seid M. Collaborative Chronic Care Networks (C3Ns) to transform chronic illness care. *Pediatrics* 2013 Jun;131 Suppl 4:S219-23. Select to access the [abstract](#).
- Fox S. After Dr Google: Peer-to-Peer Health Care. *Pediatrics* 2013 Jun; 131 Suppl 4:S224-S225. Select to access the [abstract](#).
- Lannon CM, Miles PV, Stockman JA 3rd. The path forward: collaborative networks and the future for children's health care. *Pediatrics* 2013 Jun;131 Suppl 4:S226-7. Select to access the [abstract](#).

**Collaborating to Improve Opioid Prescribing and Monitoring.** The Northwestern CERT, which focuses on patient safety, has established an ongoing partnership with the National Patient Safety Foundation (NPSF), a Boston-based nonprofit advocacy organization, to disseminate the results of its research through outlets such as newsletters, Webinars, and professional meetings.

As part of this continued collaboration, in February 2013, NPSF's P.S. Blog featured the Northwestern CERT's work related to opioid prescribing and pain control in inpatient care, with a focus on the use of an "opioid simulator" as part of resident training (access at "[Adding Simulation to Resident Training in the Use of Opioids to Control Pain](#)"). The opioid simulator teaches resident physicians how to safely and effectively dose opioids in an inpatient setting, and it does so with simulated patients, so no real patients can be harmed when learners make mistakes. The program enables practitioners to see how a medication will affect a patient's pain score up to 96 hours after administration, while incorporating patients' responses to medications. Initial tests of the simulator showed a benefit in that pain scores improved among a group of real-life patients who were treated for pain after residents were trained with the simulator, compared with pain scores among a group of patients who were treated prior to the simulation training. The Northwestern CERT has now completed the development of a mobile version of the simulator and is beginning a larger scale trial of effectiveness with medicine residents at the University of Illinois at Chicago. In addition, Northwestern and the NSPF sponsored a Twitter chat session on opioid prescribing and safety in March 2013.

Harting B, Abrams R, Hasler S, et al. Effects of training on a simulator of pain care on the quality of pain care for patients with cancer-related pain. *Qual Manag Health Care* 2008 Jul-Sep;17(3):200-3. Select to access the [abstract](#).

**Collaborating to Promote Evidence-Based Medication Use for Foster Children.** The Rutgers CERT collaborated with State policymakers and other academic partners to promote adoption of evidence based mental health treatments. The CERT produced a Webinar in April 2013 for State and child welfare health policy leaders that drew on the expertise of academicians, health researchers, and policymakers to present the types of data State officials can use when overseeing psychotropic medication use. The Webinar explained the various uses of these kinds of data, from synthesis to analysis to policy development, as well as strategies for using data to inform mental health practice. The Rutgers CERT also addressed the National Association of Medicaid Directors on the topic of safe and judicious use of antipsychotic medications. Finally, the Rutgers CERT convened a team of experts to formally review the current parameters used by States to regulate psychotropic medication use among children and youth in foster care. The expert panel recommended several important changes that were adopted in the 2013 revision of the parameters.

Crystal S, et al. Data Speaks: Integrated Data Systems to Facilitate Cross-System Collaboration. Webinar. April 23, 2013. Select to [access recording](#).

Crystal S. Implementing Metric-Based Continuous Quality Improvement Initiatives for Safe, Effective, and Appropriate Psychotropic Use for Medicaid Beneficiaries. Invited presentation for session on The Future of Medicaid Drug Policy. Annual Meeting of the National Association of Medicaid Directors; 2012 October 28–30; Arlington.

Psychotropic Medication Utilization Parameters for Children and Youth in Foster Care, September 2013. Select to access [document](#).

**Collaborating With UMASS to Develop a Patient Pain Survey.** UAB CERT researchers collaborated with the University of Massachusetts (UMass) to better understand pain medication use and pain outcomes after joint replacement surgery and its relation to long-term outcomes including function. The collaboration utilized the FORCE-TJR registry, which includes participation from 136 surgeons and 43 practices in 23 States. To assess pain medication use and outcomes, 2245 patients have completed the 2-week pain survey and 2280 patients have completed the 8-week pain survey. These efforts continue, and in August 2013, the UAB project team visited UMass for an in-person meeting to review progress on the survey implementation, the protocol for contacting study nonresponders, refinement of the 2-week survey mailing strategy and review of the publications planned for the study.

## **Program Activities 2012–2013**

The six research centers covered a broad range of pressing issues in health care, from evaluating health information technology systems to investigating medication practices for some of the Nation's most vulnerable patients—including elderly nursing home residents and children in foster care.

The following sections present a selection of the research and educational projects completed between October 2012 and August 2013, the second year of the current CERTs 5-year funding period. The content is organized by center and each project description is followed by a published paper citation, or, in some cases, a link to another type of product. In addition, we provide a full list of CERTs publications for the year at the end of this report.

### **Brigham and Women's Hospital CERT**

The Brigham and Women's Hospital (BWH) CERT continued its focus on health information technology (IT). As the United States makes substantial investments in technologies such as electronic medical records, systems that enable doctors to enter their orders into computers (computerized provider order entry or CPOE), and systems designed to help physicians and other health professionals make better informed decisions (clinical decision support or CDS), there is a pressing need to evaluate how well these systems are working for patients. Researchers at the BWH CERT worked to ensure that health IT interventions improve safety and avoid the inadvertent introduction of other errors for patients, whether they are outpatients, inpatients, or transitioning out of the hospital.

#### **Overrides of Medication-Related Alerts**

E-prescribing and CPOE systems use automated alerts to tell physicians when they may be making an error. Alerts are designed to keep patients safe, but they can be too numerous, disruptive, or irrelevant, causing physicians to override or ignore them. If overrides are inappropriate—for example, if a prescriber overrides an alert and prescribes an antibiotic to a patient with a documented allergy to that antibiotic, the patient's safety can be endangered. Understanding how physicians respond to alerts may be a key to improving how they are

delivered. But until now, researchers have understood little about how often health care providers override alerts, what alerts they tend to override, and why.

In 2012, researchers from the BWH CERT conducted a project to understand how medication alerts affect provider behavior. They sought to describe frequency and patterns of alert overrides, reasons for overrides, and to evaluate the appropriateness of overrides. They examined 3 years of alert override data for providers at outpatient clinics and ambulatory hospital-based practices at a large academic health care center (2009–2011). Providers included physicians and nonphysicians (nurse practitioners and physicians' assistants) with prescribing authority. For a subset of 600 alert overrides, the research team conducted detailed chart reviews to determine appropriateness of alert overrides.

The team reviewed 157,483 alerts on a total of 2,004,069 medication orders during the study period—resulting in an alert rate of 7.9 percent. Providers overrode about half of the alerts. The rate of overrides varied substantially by alert type. The most likely alerts to be overridden were formulary substitutions (85 percent), age-based recommendations (79 percent), renal recommendations (78 percent), and patient allergies (77 percent).

About half of alert overrides (53 percent) were found to be appropriate, and the appropriateness varied dramatically by alert type. Few overrides of renal dosage recommendations, drug–drug interactions, or age-related dosage recommendations were appropriate. In contrast, most drug allergy, drug-class, duplicate drug, and drug formulary alerts were appropriately overridden, suggesting these areas might be ripe for refinement. Refining and reducing the number of these alerts could improve their relevance for prescribers. The authors suggested that high rates of inappropriate overrides for individual drug-drug interaction alerts pointed to the need for provider education and intervention.

Nanji KC, Slight SP, Seger DL, et al. Overrides of medication-related clinical decision support alerts in outpatients. *J Am Med Inform Assoc* 2014;21:487–91. Select to access the [abstract](#).

### **A Closer Look at Drug-Drug Interaction Alerts**

Following on the conclusions of Nanji et al., above, BWH researchers examined the appropriateness of prescribers' decisions to override drug-drug interaction (DDI) alerts in more depth, using the same data sources. A DDI alert warns prescribers that the medication they are ordering for a patient is known to interact with another drug the patient is taking. DDI alerts use data from patients' active medication lists and from a database of known drug reactions and interactions, and are generated as providers enter medication orders into e-prescribing or CPOE systems. DDI alerts warn providers about possible reactions that run the gamut from undesirable to serious and life-threatening.

This study of DDI alerts generated over a 3-year period (2009–2011) gathered data from 36 primary care practices affiliated with Brigham and Women's Hospital and Massachusetts General Hospital. Studying 496 alert overrides, researchers found that just over two-thirds of DDI alert overrides (68.2 percent) were appropriate.

However, providers overrode important DDI alerts, in situations that were likely to cause serious patient injuries. Eight specific drugs accounted for about three-quarters of the DDI alerts—simvastatin, sildenafil, tramadol, citalopram, amlodipine, tamsulosin, azithromycin, and warfarin. Even among appropriate overrides when providers indicated that they would “monitor as recommended,” chart review showed that only 35 percent of providers monitored patients. Researchers called for efforts aimed at prescribers with high inappropriate override rates to improve their prescribing and patient safety.

Slight SP, Seger DL, Nanji KC, et al. Are we heeding the warning signs? Examining providers' overrides of computerized drug-drug interaction alerts in primary care. PLoS One. 2013 Dec 26;8(12):e85071. Select to access the [abstract](#).

### **Cincinnati Children's Hospital Medical Center CERT**

The Cincinnati Children's Hospital Medical Center (CCHMC) CERT focused on the safe and effective use of medications in children. Under that broad umbrella, two specific themes were patient safety and improving outcomes through multisite clinical specialty networks. Since 2007, the CCHMC CERT has supported a collaborative project to improve care for children with inflammatory bowel disease. This network of collaborating clinical practices, called ImproveCareNow, is helping children feel better and move into remission. Building on the lessons learned from this work, the CCHMC CERT also supported research and quality improvement networks for infants with complex congenital heart disease and for children with juvenile idiopathic arthritis. Many of the networks have already shown improvements in care delivery and outcomes for children.

In 2012–13, the CCHMC CERT conducted two studies on acute kidney injury (AKI) in children, one examining nephrotoxic medication-associated AKI and chronic kidney disease, and the other focusing on earlier detection of AKI in young patients with cystic fibrosis. Of note, CCHMC is now starting to spread this nephrotoxic medication-associated AKI reduction project to nine other pediatric hospitals that are part of the Prospective Pediatric AKI Research Group.

#### **Medication-Related Acute Kidney Injury Leads to Chronic Kidney Disease**

Acute kidney injury, defined as an abrupt decrease in kidney function, is increasingly common in hospitalized children. Nephrotoxic medications (NTMx), which are medications that can harm the kidneys, are prescribed in > 80 percent of hospitalized children and are common causes of AKI.

CCHMC researchers studied 100 patients with NTMx-AKI to assess the development of chronic kidney disease (CKD) in hospitalized children after they had been treated with three or more nephrotoxic medications at once or an IV aminoglycoside for  $\geq 3$  days. The majority of children were hospitalized for bone marrow transplants/oncology (59 percent), followed by liver transplants (13 percent) and pulmonary services (13 percent). In this study, patients with NTMx-AKI had an almost four-fold higher risk of developing CKD in the next 6 months, when

compared with patients without NTMx-AKI. Overall, 70 percent of patients with NTMx-AKI showed evidence of residual kidney damage.

Importantly, CCHMC CERT researchers found that discharged patients did not have the complete evaluation for CKD after an NTMx-AKI episode. Most were seen in a hospital clinic 6 months later, although very few were seen by a nephrologist. While follow-up visits related to NTMx-AKI are not standard, the opportunity to assess for CKD is available because children often visit clinicians for other reasons. The researchers recommend comprehensive follow-ups for children with NTMx-AKI in order to detect and mitigate CKD.

Menon S, Kirkendall ES, Nguyen H, Goldstein SL. Acute kidney injury associated with high nephrotoxic medication exposure leads to chronic kidney disease after 6 months. *J Pediatr* 2014 Sep;165:522-7. Select to access the [abstract](#).

### **Earlier AKI Detection May Help Young Patients With Cystic Fibrosis**

Aminoglycoside antibiotics, a drug class commonly prescribed for patients with cystic fibrosis (CF) who are experiencing breathing difficulty, is associated with the development of acute kidney injury and with long-term kidney damage in adults with CF. However, data on AKI in pediatric patients with CF is limited.

Acute kidney injury (AKI) is characterized by an increase in serum creatinine (SCr) or a decrease in urine output. Traditional monitoring for AKI during aminoglycoside therapy involves nonsystematic measurement of serum creatinine (SCr), which may underestimate kidney damage in patients with CF.

In June 2011, CCHMC implemented a hospital-wide policy requiring daily SCr monitoring of all noncritically ill CF patients receiving aminoglycosides (AGs) for more than 3 days. They then assessed the impact of daily SCr measurement on AG-associated AKI detection, comparing two time periods: June 2010-June 2011 and June 2011-June 2012.

During the study period, 56 percent of all noncritically ill admitted patients with CF received an intravenous aminoglycoside. A total of 87 patients received AG courses of 3 days or more--124 courses from January 2010 through May 2011 and 103 from June 2011 through June 2012. Although the use of AG was similar in the two time periods, the detected rate of AG-AKI was nearly 50 percent lower prior to the implementation of daily SCr monitoring. The research team concluded that daily SCr monitoring allows for earlier and more accurate detection of AG-AKI in patients with CF than traditional, nonsystematic approaches. Systematic SCr monitoring may also promote early intervention to mitigate AKI when non-AG antibiotic options are limited.

Downes KJ, Rao MB, Kahill L, et al. Daily serum creatinine monitoring promotes earlier detection of acute kidney injury in children and adolescents with cystic fibrosis. *J Cyst Fibros* 2014 Jul;13(4):435-41. Select to access the [abstract](#).

## **Duke University Medical Center CERT**

The Duke CERT focuses on cardiovascular (CV) disease, the leading cause of illness and death in the United States. Duke's CERT team identifies gaps in CV care and their consequences, generates evidence on the safety and effectiveness of treatments, and translates knowledge into practice through work with providers around the country.

### **Atrial Fibrillation Treatment Strategy**

Atrial fibrillation (AF) is the most common form of irregular heartbeat in the United States. Management of this condition varies and may include therapies to maintain a normal beating rhythm of the heart ("rhythm control"), as well as strategies to control the rate at which the heart beats ("rate control"). Many patients who receive rhythm control medication also receive medications to control their heart rate; however, it is common for patients to receive only rate-controlling therapies. Criteria for selecting a management strategy in AF patients are not well-defined; therefore, it is largely left to providers to determine which patients should receive rhythm control therapy in addition to rate control therapy.

The Duke CERT undertook a study to measure the rates of use of these strategies, to identify what factors contributed to selection of a treatment strategy, and to describe additional management of AF patients with antiarrhythmic and anticoagulant therapies. Among 10,061 outpatients from 174 sites, more than two-thirds (68 percent) were treated with a rate control-only strategy, and nearly one-third (32 percent) with rhythm control. Those managed with rate control-only tended to be older, had more comorbidity, and were more likely to be cognitively impaired. Patients selected for rhythm control were younger and had less comorbidity, more recent-onset of AF, and higher symptom burden.

Rhythm-control patients were also more likely to be treated by electrophysiologists—heart rhythm specialists—suggesting that physicians who are more comfortable and familiar with antiarrhythmic therapies are more likely to implement them. Given the potential benefits of rhythm control, including alleviation of AF symptoms and improved function, greater involvement of electrophysiologists may be warranted for many patients with AF.

Researchers also found that oral anticoagulants (i.e., blood thinners)—which are a guideline-recommended treatment for AF—were used less often than would be expected for patients at higher risk for stroke. More than one-quarter of patients overall did not receive blood thinners. Underuse of blood thinners may represent a missed opportunity to prevent stroke in this population.

Steinberg BA, Holmes DN, Ezekowitz MD, et al. Rate versus rhythm control for management of atrial fibrillation in clinical practice: results from the Outcomes Registry for Better Informed Treatment of Atrial Fibrillation (ORBIT-AF) registry. *Am Heart J* 2013 Apr;165(4):622-9. Select to access the [abstract](#).

## **Northwestern University CERT**

The Northwestern University CERT, formerly located at the University of Illinois at Chicago, works to improve patient safety by developing and refining tools for safer medication use by patients and clinicians. The Northwestern CERT researches and develops targeted tools that optimize the efficacy, safety, and cost-effectiveness of drug therapy.

### **Nurse Overestimation of Patients' Health Literacy Risks Poor Outcomes as well as Understanding**

Patient education and effective communication are essential if nurses are to provide safe and effective patient care. The nurse is the health care professional responsible for patient understanding about follow-up appointments, new medications, dietary restrictions, and activity level after discharge. Research has shown that patients with low health literacy—who do not obtain, process, and understand basic health information and the services they need to make appropriate health decisions—are at risk for poor outcomes including higher hospital readmission rates and shorter life expectancy. However, health care providers often overestimate their patients' health literacy.

To understand potential literacy-based gaps in nurse-patient communication, the Northwestern University CERT performed a study to compare nurses' perceptions of patient health literacy to patients' actual health literacy, as measured using a screening tool call Newest Vital Sign (NVS). The research team recruited 30 nurses and 65 patients from two inpatient cardiac units. After patients completed the six-question NVS screening tool, they were categorized as possessing adequate health literacy, possibility of functional health literacy, or high likelihood of limited health literacy. Subsequently, nurses estimated patients' health literacy level.

Based on the NVS scores, 63 percent of the patients had a high likelihood of limited health literacy, while nurses perceived that 19 percent of patients had limited health literacy. While nurses assessed 68 percent of patients to have adequate health literacy, only 22 percent of patients were categorized as such. Furthermore, although nurses and other health care providers traditionally use educational attainment to assess literacy or learning limitations, this study suggests that this may not be appropriate: 75 percent of patients had graduated from high school, but 40 percent had a high likelihood of limited health literacy.

This study's results demonstrate that nurses may overestimate health literacy and thus miss opportunities to assist patients with low health literacy who may not understand the information being provided. While health literacy is a subject now included in some nursing school curricula, most practicing nurses have not received this training. Because overestimation of a patient's health literacy by nursing personnel may contribute to poor health outcomes, the researchers encourage health literacy education for nurses and other health care professionals.

Dickens C, Lambert B, Cromwell T, Piano M. Nurse overestimation of patients' health literacy. *J Health Commun* 2013;18 Suppl 1:62-9. Select to access the [abstract](#).

## **Rutgers, The State University of New Jersey CERT**

The Rutgers Mental Health CERT serves as a national resource for improving the safety and effectiveness of treatments for mental health problems. In 2011–2012, the Mental Health CERT partnered with the American Psychiatric Association and Columbia University to assemble an extensive database that allows researchers to address a range of mental health issues, including the safe and effective use of psychotropic drugs and antidepressants, especially among young people and the elderly. This CERT's educational initiatives included quality-improvement collaborations with State mental health and Medicaid officials, and development of national treatment guidelines.

### **Reducing Antipsychotic Use Among Elderly Nursing Home Residents with Dementia**

Researchers at the Rutgers CERT focused on improving appropriate use of antipsychotic drugs among nursing home residents who have dementia. These drugs may be used to manage behavior issues, such as aggression or resistance to care. However, these drugs can also cause serious harm, including stroke and premature death.

In March 2012, the Centers for Medicare & Medicaid Services (CMS) initiated a National Partnership to Improve Dementia Care in Nursing Homes. Its aims include “protecting residents from being prescribed antipsychotic medications unless there is a valid, clinical indication and a systematic process to evaluate each individual.” The initiative includes a requirement that nursing homes report publicly on their use of antipsychotics.

Rutgers CERT researchers conducted an analysis of data from two sources to provide a snapshot of antipsychotic use in 12,867 nursing homes from 2011–2013: The National Partnership to Improve Dementia Care in Nursing Homes, and The Online Survey Certification and Reporting (OSCAR) administrative database (replaced by the Certification and Survey Provider Enhanced Reporting database [CASPER]). The analysis showed which States had achieved the lowest rates of antipsychotic use in nursing homes, and which States had not met targets for reduced usage. The analysis found that Medicaid clients experienced substantially higher antipsychotic use rates. In facilities with the highest proportion of Medicaid patients (75 - 100th percentile) the AP use rate was 23.01 percent compared to the lowest percentile facilities (0-25th) at 16.34 percent. Facilities with lower registered nurse staffing compared with licensed practical nurse or certified nursing assistant staffing had substantially higher antipsychotic use rates. For example, facilities with fewer registered nurses (0-25th percentile) had rates of 22.64 percent compared to facilities in the top percentile (75-100th) of registered nurse staffing where rates were 16.52 percent. Finally, nonprofit facilities had lower use rates (16.2 percent) compared with both government facilities (19.26 percent) and for-profit facilities (20.51 percent).

The Rutgers CERT also worked to establish substantial stakeholder involvement in efforts to reduce inappropriate use of antipsychotics in nursing homes. As part of these public/academic collaboration efforts, the Rutgers CERT convened a monthly workgroup during 2013 focused on this topic. State partners included State Medicaid agencies, agency personal from State

Divisions of Aging, Nursing Homes Survey and Certification teams, and State QIOs leadership. The issue of dementia care in nursing homes is a high priority for State health policy leaders. Measurement strategies were central to the discussion. For example, the Rutgers CERT provided expert consultation related to the CMS Advancing Excellence medication tracking tool, provided technical assistance in planning the scope of the problem from a national perspective, and helped partners craft quality improvement activities related to safe and judicious use of antipsychotic medications among the elderly, in particular individuals dually eligible for both Medicare and Medicaid, and those beneficiaries in long term care settings.

Crystal S. Antipsychotic use among nursing home residents with dementia: new initiatives, continuing challenges. Annual Meeting of the Gerontological Society of America; 2013 November 20–24; New Orleans.

### **University of Alabama at Birmingham CERT**

The University of Alabama at Birmingham (UAB) Deep South Arthritis and Musculoskeletal CERT seeks to improve the safety and effectiveness of musculoskeletal therapeutics, educate health care practitioners, insurers, and policymakers, and broaden the impact that musculoskeletal research has on public health. This focus is both important and timely, given the rising burden of musculoskeletal diseases in an aging society.

Since 1999, the UAB CERT has successfully conducted more than 50 projects, creating new knowledge and products, disseminating research and education, and improving public health. The UAB CERT invests substantial resources for infrastructure research as well as specific research projects. In the current reporting period, research included the use of large administrative databases to examine serious adverse events associated with biologic therapies, methods development in pragmatic clinical trials, and efforts to promote adherence to therapies and reduce disparities in risk assessment and communication.

### **Use of Non-Drug Strategies to Manage Pain After Joint Replacement**

UAB CERT researchers examined the use of nontraditional methods of pain management after total knee or hip replacement. Researchers and surgeons identified and recruited patients who had primary total knee replacement and total hip replacement from the FORCE-TJR national registry in 23 States. Researchers collected data on patient demographics, comorbidity, and pain and function. They queried patients at 2- and 8-weeks postsurgery regarding pain severity and use of nondrug therapies, and compared people who used nondrug therapies to people who did not use nondrug therapies.

The research cohort involved 969 primary total knee replacement patients and 584 primary total hip replacement patients at 2 weeks' postsurgery, and 1,022 primary knee replacement and 563 primary hip replacement patients at 8-weeks postsurgery.

The use of nondrug modalities was common in primary knee replacement patients at 2 weeks: people used cold packs (86 percent), meditation (6 percent), deep breathing (20 percent), heat (15 percent), relaxation (20 percent), walking (33 percent), distraction (51 percent), prayer (32

percent), massage (28 percent), listening to music (11 percent) and imagery (2 percent); numbers were similar and slightly lower for patients at 8-week followup. The use of most modalities was significantly lower among patients who had primary total hip replacements.

Compared to patients who did not use nondrug therapies, users of nondrug therapies at 2 weeks postsurgery were significantly: younger (65.56 versus 68.85 years of age), more likely to be female (61 versus 51 percent), more likely to be White (93 versus 89 percent), more likely to have college education or higher (70 versus 62 percent), and more likely to have household income 45K or higher (55 versus 48 percent).

Singh JA, Lemay C, Allison J, Saag K, Franklin P. Use of nontraditional modalities for pain management after knee or hip joint replacement. 2014 American College of Rheumatology Annual Meeting; 2014 November 14–19; Boston: Presentation Number:192.

Singh JA, Lemay C, Allison J, Franklin P. Effect of family support on short-and intermediate term pain and function outcomes after knee or hip replacement. 2014 American College of Rheumatology Annual Meeting; 2014 November 14–19; Boston: Presentation Number: 64.

### **Pain Control After Total Knee and Hip Joint Replacement**

In 2013, researchers at the UAB CERT explored pain management after a total joint replacement surgery, comparing the effectiveness and safety of nonsteroidal anti-inflammatory drugs (NSAIDs) versus narcotics in the critical rehabilitation period following hospital discharge.

The study used the existing FORCE-TJR registry of 22,000 patients. In a subgroup of patients, UAB CERT researchers are assessing the comparative effectiveness of these two types of pain relievers by measuring patients' pain severity, joint function, health-related quality of life, and satisfaction at 2 weeks, 8 weeks, and 6 months after surgery. Researchers are also comparing minor gastrointestinal side effects for all patients and serious adverse events for patients 65 and older (n = 2,000) using Medicare data. UAB CERTs researchers will also examine disparities in the use of NSAIDs and narcotics by patient characteristics (gender, race/ethnicity, age, co-morbidities) as well as by surgeon attributes (age, years in training).

### **CERTs Scientific Forum**

The CERTs Scientific Forum continued to support the work of the CERTs Program during the second year of the CERTs cooperative agreement. The Scientific Forum convened quarterly Steering Committee meetings; topics explored at our January 2013 and March 2013 Steering Committee meetings included an academic integrated delivery system's early experience with Medicare and commercial Accountable Care Organization contracts and the use of registry data and methodologies for research. Under the guidance of the CERTs Steering Committee, the Scientific Forum also directed the continuation of the CERTs collaborative project. Collaborative project activities included convening a workshop to examine the scientific evidence on medication adherence interventions from the patient-centered perspective and to explore the potential of patient-centered medication management to improve chronic disease treatment ([see](#)

[CERTs Collaborative Activity, above](#)). Scientific Forum staff also led the development of two manuscripts related to the CERTs collaborative project. In addition, the Scientific Forum disseminates research and educational materials developed by the six research centers. Dissemination of CERTs products occurs through two public Web sites supported by the Scientific Forum—the AHRQ CERTs Web site ([www.certs.hhs.gov](http://www.certs.hhs.gov)) and the Clinician-Consumer Health Advisory Information Network (CHAIN) Online Web site ([www.chainonline.org](http://www.chainonline.org); see CHAIN Online, below).

### **CHAIN Online: Disseminating Projects and Findings of the CERTs**

The CHAIN Online Web site ([www.chainonline.org](http://www.chainonline.org)), developed and hosted by Baylor College of Medicine (BCM), is a dissemination vehicle for the CERTs Program. CHAIN Online offers information and tools for patients, practitioners, and researchers, including articles on methods, recent CERTs publications, and features on CERTs research. For example, BCM and CHAIN Online collaborated with the Duke CERT to develop a handout for patients, “If You Have High Blood Pressure (Hypertension),” and a Continuing Medical Education (CME) activity for providers that described the consequences of poor blood pressure control, which prompted physicians to document actions when blood pressure was out of range, and described methods of treatment ([See CERTs Collaborations: Collaborating to Improve Hypertension, above](#)).

A BCM editorial board ensures that CHAIN Online offers a range of materials and topics representing CERTs that will appeal to all visitors. The following are examples of offerings featuring CERTs news, and tools for researchers, practitioners, and patients, published in 2012–2013:

- 2012 Recommendations for the Treatment of Maladaptive Aggression in Youth (T-MAY)
- 2012 Recommendations for the Use of Disease-Modifying Antirheumatic Drugs and Biologic Agents in the Treatment of Rheumatoid Arthritis
- Discovery Channel Documentary Features the Brigham and Women's Hospital HIT-CERT
- Statins and Your Health: Taking Care of Your High Cholesterol
- The Cincinnati Children's Hospital CERT: Improving Pediatric Outcomes Through Network Partnerships
- Brigham and Women's Hospital CERT-Leveraged Project: Placing Genetic Information at Physicians' Fingertips

## **CERTs Publications: 2012–2013**

### **2012**

#### **A-E**

Anderson JB, Czosek RJ, Cnota J, et al. Pediatric syncope: National Hospital Ambulatory Medical Care Survey results. *J Emerg Med* 2012 Oct;43(4):575-83. Epub 2012 Mar 8. Select to access the [abstract](#).

Atwater BD, Dai D, Allen-Lapointe NM, et al. Is heart failure guideline adherence being underestimated? The impact of therapeutic contraindications. *Am Heart J* 2012 Nov;164(5):750-755.e1. Select to access the [abstract](#).

#### **F-I**

Haas JS, Klinger E, Marinacci LX, et al. Active pharmacovigilance and healthcare utilization. *Am J Manag Care* 2012 Nov 1;18(11):e423-8. Select to access the [abstract](#).

Haviland AM, Elliott MN, Weech-Maldonado R, et al. Racial/ethnic disparities in Medicare Part D experiences. *Med Care* 2012 Nov;50 Suppl:S40-7. Select to access the [abstract](#).

Hernandez AF, Mi X, Hammill BG, et al. Associations between aldosterone antagonist therapy and risks of mortality and readmission among patients with heart failure and reduced ejection fraction. *JAMA* 2012 Nov 28;308(20):2097-107. Select to access the [abstract](#).

#### **J-N**

Jones WS, Patel MR, Dai D, et al. Temporal trends and geographic variation of lower-extremity amputation in patients with peripheral artery disease: results from U.S. Medicare 2000-2008. *J Am Coll Cardiol* 2012 Nov 20;60(21):2230-6. Epub 2012 Oct 24. Select to access the [abstract](#).

#### **O-Z**

Wright NC, Saag KG, Curtis JR, et al. Recent trends in hip fracture rates by race/ethnicity among older US adults. *J Bone Miner Res* 2012 Nov;27(11):2325-32. Select to access the [abstract](#).

## 2013

### A-E

Beukelman T, Xie F, Baddley JW, et al. Brief report: incidence of selected opportunistic infections among children with juvenile idiopathic arthritis. *Arthritis Rheum* 2013 May;65(5):1384-9. Select to access the [abstract](#).

Billett AL, Colletti RB, Mandel KE, et al. Exemplar pediatric collaborative improvement networks: achieving results. *Pediatrics* 2013 Jun;131 Suppl 4:S196-203. Select to access the [abstract](#).

Brady PW, Muething S, Kotagal U, et al. Improving situation awareness to reduce unrecognized clinical deterioration and serious safety events. *Pediatrics* 2013 Jan;131(1):e298-308. Epub 2012 Dec 10. Select to access the [abstract](#).

Brady PW, Varadarajan K, Peterson LE, et al. Prevalence and nature of adverse medical device events in hospitalized children. *J Hosp Med* 2013 Jul;8(7):390-3. Epub 2013 Jun 7. Select to access the [abstract](#).

Clancy CM, Margolis PA, Miller M. Collaborative networks for both improvement and research. *Pediatrics* 2013 Jun;131 Suppl 4:S210-4. Select to access the [abstract](#).

### F-I

Fox S. After Dr Google: peer-to-peer health care. *Pediatrics* 2013 Jun;131 Suppl 4:S224-5. Select to access the [abstract](#).

Galanter W, Falck S, Burns M, et al. Indication-based prescribing prevents wrong-patient medication errors in computerized provider order entry (CPOE). *J Am Med Inform Assoc* 2013 May 1;20(3):477-81. Epub 2013 Feb 9. Select to access the [abstract](#).

Goldstein SL, Kirkendall E, Nguyen H, et al. Electronic health record identification of nephrotoxin exposure and associated acute kidney injury. *Pediatrics* 2013 Sep;132(3):e756-67. Epub 2013 Aug 12. Select to access the [abstract](#).

Haynes K, Beukelman T, Curtis JR, et al. Tumor necrosis factor  $\alpha$  inhibitor therapy and cancer risk in chronic immune-mediated diseases. *Arthritis Rheum* 2013 Jan;65(1):48-58. Select to access the [abstract](#).

Herrinton LJ, Harrold LR, Liu L, et al. Association between anti-TNF- $\alpha$  therapy and interstitial lung disease. *Pharmacoepidemiol Drug Saf* 2013 Apr;22(4):394-402. Epub 2013 Jan 29. Select to access the [abstract](#).

Hernandez AF. Preventing heart failure. JAMA 2013 Jul 3;310(1):44-5. Select to access the [abstract](#).

## J-N

Kilgore ML, Outman R, Locher JL, et al. Multimodal intervention to improve osteoporosis care in home health settings: results from a cluster randomized trial. Osteoporos Int 2013 Oct;24(10):2555-60. Epub 2013 Mar 28. Select to access the [abstract](#).

Kociol RD, Liang L, Hernandez AF, et al. Are we targeting the right metric for heart failure? Comparison of hospital 30-day readmission rates and total episode of care inpatient days. Am Heart J 2013 Jun;165(6):987-94. Epub 2013 Apr 6. Select to access the [abstract](#).

Lannon CM, Miles PV. Pediatric collaborative improvement networks: bridging quality gaps to improve health outcomes. Pediatrics 2013 Jun;131 Suppl 4:S187-8. Select to access [abstract](#).

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Lannon CM, Peterson LE. Pediatric collaborative improvement networks: background and overview. Pediatrics 2013 Jun;131 Suppl 4:S189-95. Select to access the [abstract](#).

Margolis PA, Peterson LE, Seid M. Collaborative Chronic Care Networks (C3Ns) to transform chronic illness care. Pediatrics 2013 Jun;131 Suppl 4:S219-23. Select to access the [abstract](#).

Miles PV, Conway PH, Pawlson LG. Physician professionalism and accountability: the role of collaborative improvement networks. Pediatrics 2013 Jun;131 Suppl 4:S204-9. Select to access the [abstract](#).

Miller M. Roles for children's hospitals in pediatric collaborative improvement networks. Pediatrics 2013 Jun;131 Suppl 4:S215-8. Select to access the [abstract](#).

Mudano AS, Gary LC, Oliveira AL, et al. Using tablet computers compared to interactive voice response to improve subject recruitment in osteoporosis pragmatic clinical trials: feasibility, satisfaction, and sample size. Patient Prefer Adherence 2013 Jun 14;7:517-23. Select to access the [abstract](#).

Navar-Boggan AM, Shah BR, Boggan JC, et al. Variability in performance measures for assessment of hypertension control. Am Heart J 2013 May;165(5):823-7. Epub 2013 Feb 5. Select to access the [abstract](#).

## O-Z

Olfson M, Blanco C, Wang S, et al. Trends in office-based treatment of adults with stimulants in the United States. *J Clin Psychiatry* 2013 Jan;74(1):43-50. Select to access the [abstract](#).

Olson DM, Cox M, Pan W, et al. Death and rehospitalization after transient ischemic attack or acute ischemic stroke: one-year outcomes from the adherence evaluation of acute ischemic stroke-longitudinal registry. *J Stroke Cerebrovasc Dis* 2013 Oct;22(7):e181-8. Epub 2012 Dec 25. Select to access the [abstract](#).

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Phansalkar S, van der Sijs H, Tucker AD, et al. Drug-drug interactions that should be non-interruptive in order to reduce alert fatigue in electronic health records. *J Am Med Inform Assoc* 2013 May 1;20(3):489-93. Epub 2012 Sep 25. Select to access the [abstract](#).

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Steinberg BA, Holmes DN, Ezekowitz MD, et al. Rate versus rhythm control for management of atrial fibrillation in clinical practice: results from the Outcomes Registry for Better Informed Treatment of Atrial Fibrillation (ORBIT-AF) registry. *Am Heart J* 2013 Apr;165(4):622-9. Epub 2013 Feb 20. Select to access the [abstract](#).

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van der Sijs H, Baboe I, Phansalkar S. Human factors considerations for contraindication alerts. *Stud Health Technol Inform* 2013;192:132-6. Select to access the [abstract](#).

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