CENTER FOR PATIENT SAFETY RESEARCH AND PRACTICE

TRANSFORMING PATIENT CARE

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Center Updates: a seasonal review

Special points of interest:

- **Mobile health application usability in diverse populations**
- **Indications-based prescribing**
- **Burden of diagnostic errors**
- **Patient relationship management strategies**
- **Global Fellows Corner with Sarah Slight, MPharm, PhD, PGDip, MRPharmS, MPSI**
- **Recent publications from Center Researchers**

Inside this issue:

Usability of Commercially Available Mobile Applications for Diverse Patients

Summary by Brittany Couture, Research Assistant

Significant advancements to smartphones and application technology have led to an increased use of apps in daily life and activities. Mobile health (mHealth) applications are now also gaining traction as useful and beneficial tools on a more regular basis, especially for addressing chronic conditions that need to be managed over time. A quick search of the app store will give you hundreds of options for applications to download, but these apps are not always useful to all patients. Currently, there is a noticeable gap in the knowledge about usability and acceptability of mHealth applications for more diverse patient populations, particularly for ethnically/racially diverse and lower-income patients. Many times these patients are not as familiar with using mobile technology, have different health literacy levels than the general population, and can lack access to the extra support or help that they might require in order to benefit from mHealth technology. Because these diverse populations often times see higher numbers of chronic conditions (e.g., depression, diabetes, etc...), there is a need to better understand how to effectively design the applications to provide support and assistance in disease management without being an extra burden.

In a paper titled "Usability of Commercially Available Mobile Applications for Diverse Patients"–recently published in the Journal of General Internal Medicine–Dr. Urmimala Sakar et al. look at mobile health applications for three common types of chronic conditions: diabetes, depression, and care giving. Their goal was to study the usability of several different apps (selected by reviewers based on a number of criteria) available for each of these three conditions in diverse patient populations. The app-selection process involved querying the first 150 iOS apps and 144 Android apps available using the search terms "diabetes," "depression," and "elderly." Three study reviewers selected the five best iOS apps and five best Android apps for each of the search terms based on a variety of categories, such as customer ratings and reviews, description, and screenshots. Together, the reviewers purposefully sampled four apps from each area that highlighted strengths of different functionalities. The final app selections were four apps for each chronic condition being studied (12 in total), a number settled on by balancing the time required for usability testing with measuring variation in app functionality. The setting of this study was in an urban outpatient primary care clinic that included patients with a range of demographics and whose patient population was known to be of low income. This clinic does not accept private insurance so participants either had no health insurance or had Medicare/Medicaid. Patients were deemed eligible to participate if they had one of the three target conditions and were also over 18 years old, English-speaking, and had adequate vision, hearing, and cognitive ability.

The usability sessions for each participant included one researcher running the session and giving the participant instructions and tasks. Sessions were videotaped so that the participants' interactions and successes/failures with the app could be later analyzed. Each participant was given a number of tasks to complete with the set of apps they were testing (if patients had diabetes they tested the four diabetes apps, if they had depression they tested the four depression apps, etc...). The tasks were broadly centered around data entry and information retrieval. The recorded interviews were reviewed and coded according to an established scale for completion of a given task: successful/straightforward, successful/prolonged, partial, unsuccessful/prolonged, and gave up. A total of 26 patients participated in this study, with most having one or more chronic conditions.

Data entry was found to have taken significant effort for all apps, and participants noted several difficulties. The lack of comprehensive and easy-to-understand instructions in the apps made it challenging for participants to complete the given task. These communicative issues also at times made it difficult to even locate the correct pages where they were meant to enter in the required information,

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Incorporating Indications into Medication Ordering— *Time to Enter the Age of Reason*

Summary by Theresa Fuller, Research Assistant

In a three-year study sponsored by the Agency for Healthcare Research and Quality (AHRQ), Dr. Schiff and his associates will prototype an indications-based prescribing system and simulate its effects to understand the benefits and challenges to implementing it.

Schiff GD, Seoane-Vazquez E, Wright A. Incorporating Indications into Medication Ordering–Time to Enter the Age of Reason. N Engl J Med. 2016 Jul 28;375 (4):306-9. doi: 10.1056/ NEJMp1603964.

A significant number of US adults are prescribed a medication each year. Of these, many will experience harm caused by a medication error, miscommunication, or unintentional misuse of the drug. The downstream effects of these issues are many and varied, including preventable ED visits, hospital readmissions, and incorrect diagnoses. Pursuing a healthcare system that prevents these frequent and burdensome harms represents a central imperative for safe prescribing.

The traditional method for ensuring prescription safety and avoiding medication errors follows five accepted "Rights." Each prescription should be matched to: 1) the Right Patient, 2) the Right Drug, 3) the Right Route, 4) the Right Dose, and 5) the Right Time. Unfortunately this system is not perfect, with patients, and even their care teams, often unaware of the intended purpose of their prescriptions. In an effort to remedy this and other potential prescribing risks, Dr. Gordon Schiff et al. propose a patient-centered addition to the traditional five "Rights": *the Right Indication*. Incorporating the medication indication into the prescription, they argue in their recent New England Journal of Medicine perspective piece, "Incorporating Indications into Medication Ordering— *Time to Enter the Age of Reason*," will complement the other elements to create a safer drug administration model. In a three-year study sponsored by the Agency for Healthcare Research and Quality (AHRQ), Dr. Schiff and his associates will prototype an indications-based prescribing system and simulate its effects to understand the benefits and challenges to implementing it. This article starts the conversation by exploring six central domains in which utilization of an indications-based prescribing system shows potential to improve the quality and safety of medication prescribing.

First, linking the medication to its indication would be akin to providing a second identifier to a prescription (similar to asking for both a patient's name and date-of-birth). The authors believe that this would provide a means for prescribers and automated systems to identify mismatches between indications and drug choices, reducing common errors associated with "Look-Alike, Sound-Alike" medications.

A second area of potential impact proposed by the authors is in providing knowledge to the patient. Increasing knowledge about and reasoning behind treatment plans has been shown to empower patients and give them an active role in their own healthcare, resulting in improved treatment adherence and a decrease in errors.

A third way in which indications-based prescribing could improve upon current processes is by guiding prescribers faced with an ocean of potential drug options to choose the best treatment for each patient's unique disposition. Starting with the indication, the prescriber could be given medication lists informed by up-to-date literature, ideally in concert with the

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Mobile Applications, continued

(Continued from page 1)

There is a noticeable gap in the knowledge about usability and acceptability of mHealth applications for more diverse patient populations.

Sarkar U, Gourley GI, Lyles CR, Tieu L, Clarity C, Newmark L, Singh K, Bates DW. Usability of Commercially Available Mobile Applications for Diverse Patients. J Gen Intern Med. 2016 Jul 14.

such as blood glucose levels for diabetes. Data retrieval was also very difficult for participants: only 43% of data retrieval tasks across all apps were completed without assistance. From review of the participants' comments during the study, researchers identified three main themes: (1) Lack of confidence with technology, (2) Frustration with design features and navigation, and (3) An interest in having technology to support their self-management. This in itself is enlightening: the motivation to use the technology is there, but the technology needs to be designed with forethought on ease-of-use in all populations.

The benefits of using mobile health applications are promising: better self-management of conditions, integration of patient-generated data into medical records, and potential to reduce health disparities between varying patient populations. It is clear, though, that work needs to be done to engage and involve diverse patients in the design, development, and adoption process of this technology; otherwise it may just serve to widen the digital divide. Based on the results, this paper recommends four design features to enhance usability of these apps: (1) A clear rationale embedded in the design, such that participants are reminded of the reason behind each task; (2) Use of simple language supplemented by graphics throughout; (3) Reducing the number of screens for completion of each task; and (4) Reducing manual data entry as much as possible. Following these guidelines, the authors conclude, will give mHealth apps a greater chance of reaching more diverse patient populations and doing what they are intended to do: help with self-management of chronic conditions and promote a better quality of life.

The Global Burden of Diagnostic Errors in Primary Care

Summary by Jenzel Espares, Research Assistant

In the primary care setting, the provision of a diagnosis is deemed to be one of the most important tasks performed by physicians. An incorrect diagnosis, or "diagnostic error," can have extremely negative impacts on a patient's future health and well-being, thus leading to increased risk of patient harm. The World Health Organization (WHO) has recently recognized the importance of avoiding diagnostic errors, and has prioritized this endeavor on a global scale. In an article published in the BMJ Quality & Safety Online journal, Hardeep Singh, MD, MPH et al. synthesize and review literature pertinent to this topic to discuss the burden and significance of, and contributing factors to, diagnostic errors, as well as potential next steps to reduce the frequency of these errors.

In this paper, a diagnostic error is defined as an event "when a patient's diagnosis is missed altogether, inappropriately delayed, and/or wrong; as judged by the eventual appreciation of definitive information" (Singh et al.). The authors claim that about 5% of US adult patients experience diagnostic errors in outpatient settings yearly. While infectious disease, cardiovascular, cancer, and pediatrics patients are all identified to be at significant risk of harmful diagnostic errors, the authors argue that most people will likely experience a diagnostic error in their lifetime. Furthermore, this likelihood may not vary greatly among various patient environments. In low-and-middle-income countries (LMICs), limited access to care and diagnostic tests, a lack of primary care physicians (PCPs) and specialists, and obsolete documentation systems may exacerbate diagnostic errors, specifically underdiagnosis. Conversely, in higher-income countries, greater accessibility of advanced technologies, sophisticated laboratory tests, and subspecialty consultation may emphasize a larger risk for overdiagnosis errors.

Given the severity of conditions associated with these errors, it can be inferred that diagnostic errors can largely contribute to the manifestation of high-risk situations which can endanger patients, or in some cases, lead to death if not addressed promptly. In an effort to rectify this problem, Singh et al. propose eight themes of possible interventions for reducing the global burden of diagnostic errors.

The first theme the authors suggest targeting to reduce diagnostic errors is the improvement of diagnostic reasoning by establishing systems to better identify failures throughout the diagnostic process, which can increase the accuracy of diagnoses and ultimately improve the provision of care. Advancements in this first area feed into a second theme: the need for improving information technology, with the continuous optimization of internet services and applications, to provide remote diagnoses to more widespread clinical settings while promoting access to subspecialties. Related to this, Singh et al. recommend their third theme, that diagnostic tests need to be more accessible, especially in LMICs that do not have these commodities as readily available. A fourth theme mentioned in the paper is the need to increase patient involvement in their own health administration and care, empowering patients to be proactive about diagnostic tests, looking out for symptoms, and ensuring that their concerns are reviewed appropriately to decrease the likelihood of an error. Singh et al. also propose a fifth theme, the development of methods to identify diagnostic errors, to better understand the rationale behind past faults and how to avoid them in the future. Promising approaches presented for this theme include the design of triggers to pinpoint these errors and the assignment of clinical champions, who can encourage a paradigm shift in the front lines of healthcare. For their sixth theme, the authors argue that diagnostic strategies in primary care need to be optimized, in order to figure out the best way that PCPs can potentially handle uncertainties and learn from their own mistakes. Their seventh theme was the need to engage the government in augmenting current primary care systems and pushing for policies that advocate for the implementation of these strategies. As a final theme, physicians need to continuously refine their diagnostic skills. Singh et al. suggest that research should be conducted to understand the effects of feedback on the competency of one's diagnostic reasoning.

While some of these themes are logically appropriate to address the problem at hand, more research is necessary to confirm that they will indeed have a noticeable impact. Due to the multitude of contributing factors that may lead to a broad spectrum of errors, it is recommended that multiple interventions be implemented to ensure a substantial decrease of these errors in the primary care setting. Some of the interventions mentioned above are closely related to one another. Therefore, simultaneous implementation of like interventions may reduce diagnostic errors on a multiplicative level.

As diagnostic errors tend to reflect the flaws of the overarching healthcare system they exist in, it is imperative that they are dealt with in a swift manner. Moving forward, the authors state that leadership provided by the WHO will be crucial to improving intervention development and research opportunities in this area of study.

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Singh H, Schiff GD, Graber ML, Onakpoya I, Thompson MJ. The global burden of diagnostic errors in primary care. BMJ Qual Saf. 2016 Aug 16. pii: bmjqs-2016-005401. doi: 10.1136/bmjqs-2016-005401.

Bates to Receive Morris F. Collen Award of Excellence

By Sarah Rose Slate, Research Assistant

David W. Bates, MD, MSc will receive the prestigious Morris F. Collen Award of Excellence from the American College of Medical Informatics at the American Medical Informatics Association's (AMIA) Annual Symposium this November. Dr. Bates was selected for his leadership in Biomedical Informatics and his significant contributions to healthcare and biomedicine. He is an internationally distinguished physician and patient-safety researcher who has led many influential studies on the use of information technology to improve healthcare quality. Through his work, Dr. Bates has pioneered advances in many clinical disciplines, including decision making and value-based care, which have dramatically enhanced patient safety in a multitude of healthcare settings.

The Morris F. Collen Award is one of the highest honors in Informatics, considered by many to be the most important award a member of the field can receive. Its namesake, Morris Collen, MD, FACMI, was a leader in medical informatics, whose innovative research helped develop one of the first computer databases used to track patient health. His award is given only to the top informaticians who have transformed the field of informatics with their research and monumentally impacted the safety, efficacy, and delivery of healthcare.

Patient Relationship Management: What the U.S. Healthcare System Can Learn from Other Industries

Summary by Megan Duckworth, Research Assistant

The key to improving the value of medical care is in building and maintaining long-term, sincere relationships with patients and families. Many healthcare institutions focus their efforts on patient satisfaction, but this narrow approach can lead to more costly, less efficient and unsafe care. A shift in focus onto developing deep relationships with patients and families has the potential to improve engagement and health outcomes, decrease costs and maximize value. The U.S. healthcare system is in the process of transitioning from fee-for-service reimbursements towards a value-based care payment system. This trend has been led by a government initiative that aims for 90% of traditional Medicare payments to be tied to value by 2018. This presents an incentivized opportunity for US healthcare institutions to focus on maximizing value.

In an article published online in the Journal of General Internal Medicine, Dr. Michael K. Poku, Dr. Nima A. Behkami and Dr. David W. Bates propose that the healthcare system should model a "patient relationship management" (PRM) practice after customer relationship management (CRM) strategies employed by non-healthcare companies in order to help providers develop meaningful relationships with patients. The authors examine three companies from other industries that place strong emphases on CRM. They seek to illustrate how CRM strategies can be adopted in healthcare institutions by focusing on PRM to improve patient experiences and relationships.

The Ritz-Carlton Hotel Company is detailed as an example of how strong, empowering employee management systems can translate into an immensely satisfied, loyal customer base. In healthcare, this would involve training frontline staff to go beyond superficial communication with patients by attempting to identify and address any barriers to successful treatment. Next, Disney is cited as an excellent example of a company that attempts to deeply understand its customers in order to improve their individual experiences. This is a priority that would have multi-faceted benefits if modeled by healthcare providers with their patients. For example, with a deeper understanding of patients' motivations and needs, reasons for non-adherence to treatments and missed appointments could be targeted for trouble-shooting. Southwest Airlines is the third company noted for its CRM prioritization; it has leveraged technology through the use of kiosks, social media and data analysis to connect with customers in easy, efficient and time-sensitive ways that yield huge returns in customer loyalty measures. The authors suggest that healthcare institutions should similarly focus on developing technologies that can improve areas like communication, patient education and care efficiency.

The authors, while recognizing that these strategies come from sectors that are outside of healthcare, posit that the healthcare system should adopt a PRM orientation, starting with cross-training current staff in the concepts of PRM and hospitality. When the benefits of improved value begin to be realized—which will be seen in areas ranging from patient empowerment, to lower job turnover rates in frontline healthcare staff, to harnessing IT for communication and efficiency—the investment in full-time staff focused solely on patient experience will grow. If healthcare institutions can adapt the CRM successes of other industries into patient relationship management processes, they will improve in providing consistent high-value care.

A shift in focus onto developing deep relationships with patients and families has the potential to improve engagement and health outcomes, decrease costs and maximize value.

Poku MK, Behkami NA, Bates DW. Patient Relationship Management: What the U.S. Healthcare System Can Learn from Other Industries. J Gen Intern Med. 2016 Aug 8.

Obesity and Management of Weight Loss

Summary by Graham Lowenthal, Research Assistant

The New England Journal of Medicine (NEJM) recently published a commentary by Dr. Gordon Schiff concerning clinical decisions about recommended weight-loss treatment options for patients. The commentary was part of an interactive feature titled "Obesity and Management of Weight Loss," designed to engage the public in establishing a community opinion on appropriate methods for addressing clinical issues. The feature—on which Dr. Schiff partnered with James S. Yeh, MD, MPH and Robert F. Kushner, MD—presents a case vignette, followed by different potential treatment options argued for by clinical professionals. Arguments and options are neither correct nor incorrect. Readers are meant to consider the vignette, as well as the experts' discourses, and decide for themselves which is "the best treatment option." Readers can then vote for their preferences on the NEJM website and provide their own comments on why they believe the selected approach will best resolve the issue.

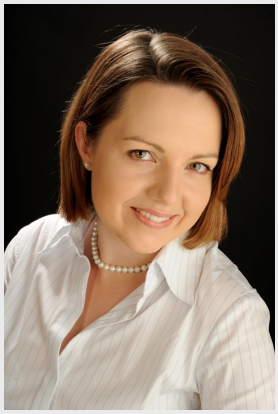
The case vignette, written by Dr. Yeh, illustrates a scenario in which a new patient has made an appointment to receive medical advice on weight management methods. The patient is a woman in her late 20s, described as obese (body-mass index of 32). She has no history of heart disease or diabetes, but is noted with high blood pressure. All other aspects of her workup are unremarkable. The patient is a nonsmoker. She does not exercise regularly, and her occupation seats her at a desk most of the day. She also frequently chooses less-healthy meal options, eating out at restaurants or ordering take-out. Having tried several weight-loss methods on her own with little success, she is consulting her doctor to discuss various measures she can take to influence and manage weight loss long term. Specifically, she would like her doctor to recommend one of two treatment options that she is considering: 1) Start lifestyle modification and therapy with an FDA-approved drug, or 2) Maximize lifestyle modification and nonpharmacologic therapies.

Dr. Kushner presents a commentary arguing for Treatment Option 1: Start lifestyle modification and therapy with an FDA-approved drug. Because the patient has difficulty sustaining commitment to dietary plans, Kushner suggests that weight-loss medications' appetite-suppressing properties may facilitate more prolonged adherence to her diet by helping her to better control her hunger. Though there is a marked downside of cost, subjects who use weight-loss meds have also been shown to experience 7 to 12.4% average weight loss, compared to placebo groups, who experience only 1.6 to 3.5% average weight loss. Considering these statistics, Kushner explains that assistance from medications could influence profound enough weight loss to significantly reduce the patient's obesity and risk of developing associated conditions. For instance, weight loss of just 5% has been linked to improvements in high blood pressure, with which the patient currently struggles. Kushner contests that weight-loss medications are a viable means to help this patient lose weight, but stresses that the patient's lifestyle adjustment should not primarily—or solely—rely on use of these drugs. As long as these medications are used as an add-on or supplement to other lifestyle modifications, including reduced caloric intake and increased physical activity, and usage is monitored closely to ensure safety and efficacy, the patient could potentially benefit greatly from pharmacotherapy treatments.

Advocating for Treatment Option 2: Maximize lifestyle modification and nonpharmacologic therapies, Dr. Schiff's commentary disputes that the risks associated with weight-loss medications overshadow the potential positive outcomes. Contrary to Kushner's point on the capacity of these meds to improve high blood pressure, Schiff cites evidence that they have been shown to actually *cause* this disorder. Additionally, forms of these drugs are linked to cardiovascular and neurological (e.g., stroke) events. Still other weight-loss medications have been associated with increased risks for a variety of conditions, ranging from mild—such as nausea and diarrhea—to severe—such as congenital defects, suicide, and even certain cancers. In the midst of all of these side effects, Dr. Schiff contends that there is also little data that proves this type of weight loss is sustainable. Although subjects may experience significant weight loss while taking these drugs, they often do not keep the weight off when the medications are stopped. This implies that positive results can only be maintained if these drugs are used unremittingly, which for many is not realistic, financially. Schiff instead claims that the best approach to helping patients manage their weight is through a lifestyle adjustment focused principally on proper diet and regular exercise, accompanied by clinical monitoring and mentorship, as well as steady support from peers.

Both commentaries make an interesting case for their respective treatment options. Which approach would you recommend for this patient? Join the conversation at NEJM.org.

Yeh JS, Kushner RF, Schiff GD. Obesity and Management of Weight Loss. N Engl J Med. 2016 Sep 22;375(12):1187-9. doi: 10.1056/NEJMclde1515935.



Global Fellows Corner, Sarah Slight, MPharm, PhD, PGDip, MRPharmS, MPSI

Interview by Hilary Stenvig, Research Assistant

For each issue, the Center's Global Fellows are invited to share their experiences in the program, and how working with the Center has influenced their own patient safety initiatives.

Sarah Patricia Slight, MPharm, PhD, PGDip, MRPharmS, MPSI is a fully-registered clinical pharmacist and a frequent visitor to the Center for Patient Safety Research and Practice. Dr. Slight's partnership with the Center and BWH began in 2012, when she obtained a Global Research Fellowship to work alongside Dr. Bates. Although now back home in the UK, Dr. Slight continues to be an invaluable collaborator with the Center. Dr. Slight is currently an Associate Professor in Pharmacy Practice at Durham University (UK), an Honorary Consultant Pharmacist at North Tees, and an Honorary Research Pharmacist at Newcastle upon Tyne Hospitals National Health Service Foundation Trust. She is also Associate Editor for the journal, BioMed Central (BMC) Medical Informatics and Decision Making, and a member of the UK National Institute for Health Research (NIHR) Health Technology Assessment Advisory Panel (the largest NIHR grant program in the UK).

Dr. Slight received her PhD in Pharmacy Practice from the University of Manchester in 2007, and an additional Diploma in Health Economics from the University of York in 2011. In 2010, she was honored with a NIHR School for Primary Care Research Career Development Award. This award enabled her to work with Professor Tony Avery at the University of Nottingham on a few different projects, including the development of a Patient Safety Toolkit for general practice, which is now available on the Royal College of General Practitioners, UK website. With this toolkit, primary care physicians were given access to a range of equipment to help identify and prevent patient harm. Throughout the course of her work, Dr. Slight became aware of the seminal studies that Dr. Bates had conducted around Computerized Provider Order Entry systems and patient safety, and was eager to work with him. Prof. Avery made the introductions, and after accepting the Global Research Fellowship at BWH, Dr. Slight travelled to Boston to begin her work at the Center with Dr. Bates.

During Dr. Slight's time at the Center, she has contributed to numerous highly significant studies. One of her most influential projects was the Agency for Healthcare Research and Quality (AHRQ)-sponsored Center for Education and Research in Therapeutics (CERT 2) study. The CERT 2 team examined the electronic systems that physicians use to prescribe medications, and identified new ways in which these systems could be utilized to improve safety, quality, and efficiency. According to Dr. Slight, "This research generated a number of high-impact publications, which I feel have influenced care—not only in the US—but in the UK." In January 2015, she, along with the rest of the CERT 2 research team, received the Partners Healthcare Partners in Excellence Award for Leadership and Innovation for their work.

When asked which one of her most recent papers stands out, Dr. Slight referenced an article that she and Dr. Bates published in the Journal of Medical Internet Research last year. The publication—"Meaningful Use of Electronic Health Records: Experiences From the Field and Future Opportunities"—critically examined the impact of the US Meaningful Use policy to date, and developed a set of recommendations to help inform future Health IT policy. According to Dr. Slight, "This paper brought together some of the leading advocates and developers of electronic health records from US institutions, such as Harvard Medical School, AHRQ, Kaiser Permanente, BWH, Cincinnati Children's Hospital Medical Center, the FDA, Duke University, Rutgers University, University of Alabama at Birmingham, Intermountain Healthcare, and a variety of others. I really enjoyed working with this group." In 2015, Dr. Slight was invited to present their findings at the AMIA Annual Symposium in San Francisco.

Looking back on her time as a Global Research Fellow, Dr. Slight is highly appreciative of the prospects that the Center provided her. "Dr. Bates strongly encouraged me to integrate into the life of the academic department: introducing me to colleagues; suggesting opportunities for learning; pointing me toward funding sources; critiquing my papers and grant proposals," Slight reflects. "I feel time devoted to such activities was well spent, with cross-fertilization of many ideas and insights from researchers with similar and disparate backgrounds."

Since returning home, Dr. Slight has continued to build on the work she conducted while at the Center, with one of her long-term goals being to build a Center for Patient Safety Research at her own institution. She has conducted a number of studies, including the largest UK evaluation of an electronic prescribing system. The investigation aimed to measure the impact of the system on the number of medication errors and adverse

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Selected Publications by members of the Center

Consensus Statement on Electronic Health Predictive Analytics: A Guiding Framework to Address Challenges. Amarasingham R, Audet AM, Bates DW, Glenn Cohen I, Entwistle M, Escobar GJ, Liu V, Etheredge L, Lo B, Ohno-Machado L, Ram S, Saria S, Schilling LM, Shahi A, Stewart WF, Steyerberg EW, Xie B. EGEMS (Wash DC). 2016 Mar 7;4(1):1163. doi: 10.13063/2327-9214.1163.

Ten key considerations for the successful optimization of large-scale health information technology. Cresswell KM, Bates DW, Sheikh A. J Am Med Inform Assoc. 2016 Apr 23. pii: ocw037. doi: 10.1093/jamia/ocw037

Digital Health and Patient Safety. Agboola SO, Bates DW, Kvedar JC. JAMA. 2016 Apr 26;315(16):1697-8. doi: 10.1001/jama.2016.2402. No abstract available.

Acute care patient portals: a qualitative study of stakeholder perspectives on current practices. Collins SA, Rozenblum R, Leung WY, Morrison CR, Stade DL, McNally K, Bourie PQ, Massaro A, Bokser S, Dwyer C, Greysen RS, Agarwal P, Thornton K, Dalal AK. J Am Med Inform Assoc. 2016 Jun 29. pii: ocw081

A web-based and mobile patient-centered "microblog" messaging platform to improve care team communication in acute care. Dalal AK, Schnipper J, Massaro A, Hanna J, Mlaver E, McNally K, Stade D, Morrison C, Bates DW. J Am Med Inform Assoc. 2016 Aug 18.

A systematic review of the types and causes of prescribing errors generated from using computerized provider order entry systems in primary and secondary care. Brown CL, Mulcaster HL, Triffitt KL, Sittig DF, Ash JS, Reygate K, Husband AK, Bates DW, Slight SP. J Am Med Inform Assoc. 2016 Aug 30.

Accelerating Innovation in Health IT. Rudin RS, Bates DW, MacRae C. N Engl J Med. 2016 Sep 1;375 (9):815-7. doi: 10.1056/NEJMp1606884.

A Cluster Randomized Trial of a Personalized Multi-Condition Risk Assessment in Primary Care. Haas JS, Baer HJ, Eibensteiner K, Klinger EV, St Hubert S, Getty G, Brawarsky P, Orav EJ, Onega T, Tosteson AN, Bates DW, Colditz G. Am J Prev Med. 2016 Sep 14. pii: S0749-3797(16)30280-X. doi: 10.1016/j.amepre.2016.07.013. [Epub ahead of print]

How to do better health reform: a snapshot of change and improvement initiatives in the health systems of 30 countries. Braithwaite J, Matsuyama Y, Mannion R, Johnson J, Bates DW, Hughes C. Int J Qual Health Care. 2016 Sep 21. [Epub ahead of print] Review.

Computerized prescriber order entry-related patient safety reports: analysis of 2522 medication errors. Amato MG, Salazar A, Hickman TT, Quist AJ, Volk LA, Wright A, McEvoy D, Galanter WL, Koppel R, Loudin B, Adelman J, McGreevey JD 3rd, Smith DH, Bates DW, Schiff GD. J Am Med Inform Assoc. 2016 Sep 27. pii: ocw125. doi: 10.1093/jamia/ocw125.

Balancing digital information-sharing and patient privacy when engaging families in the intensive care unit. Brown SM, Aboumatar HJ, Francis L, Halamka J, Rozenblum R, Rubin E, Sarnoff Lee B, Sugarman J, Turner K, Vorwaller M, Frosch DL; Privacy, Access, and Engagement Task Force of the Libretto Consortium of the Gordon and Betty Moore Foundation. J Am Med Inform Assoc. 2016 Sep;23(5):995-1000. doi: 10.1093/jamia/ocv182.

Iterative user centered design for development of a patient-centered fall prevention toolkit. Katsulis Z, Ergai A, Leung WY, Schenkel L, Rai A, Adelman J, Benneyan J, Bates DW, Dykes PC. Appl Ergon. 2016 Sep;56:117-26.

Medical Scribes: Salvation for Primary Care or Workaround for Poor EMR Usability? Schiff GD, Zucker L. J Gen Intern Med. 2016 Sep;31(9):979-81. doi: 10.1007/s11606-016-3788-x.

The Big Phish: Cyberattacks Against U.S. Healthcare Systems. Wright A, Aaron S, Bates DW. J Gen Intern Med. 2016 Oct;31(10):1115-8. doi: 10.1007/s11606-016-3741-z. No abstract available.

Prevention of Medication Errors in Hospitalized Patients: The Japan Adverse Drug Events Study. Noguchi C, Sakuma M, Ohta Y, Bates DW, Morimoto T. Drug Saf. 2016 Nov;39(11):1129-1137.

Take a look at some recent publications by members of the Center!

THE CENTER FOR PATIENT SAFETY RESEARCH AND PRACTICE

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RESEARCH AND INNOVATION TO IMPROVE QUALITY

Global Fellows Corner, continued

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drug events, and to explore users' experiences with the system's different design features. Dr. Slight has also recently initiated work with Mint Solutions, a company whose founders she was introduced to by Dr. Bates in 2013. Mint Solutions has developed a new technology, MedEye, a medication safety suite for hospitals and healthcare institutions. Slight and Mint Solutions have since partnered up, and were awarded a 1.8 million euro European Union Horizon 2020 grant to assess the effect of MedEye on reducing medication administration errors in hospitalized patients, as well as on nursing and pharmacy efficiency and satisfaction.

We at BWH and the Center are so honored to have hosted and partnered with Dr. Slight for so many years, and eagerly await her return to Boston at the end of October to continue our important working relationship.

Her friends and colleagues at BWH and the Center would also like to offer our most sincere congratulations on the birth of her new baby daughter! We wish her and her family a lifetime of good health and happiness.

Indications, continued

(Continued from page 2)

patient's own medical history and insurance information. This would provide a patient-centered prescription that represents the best possible option for the patient's clinical and logistical needs.

Pharmacists have long advocated for the need to alter the fourth domain: making everyone from care team, to pharmacist, to patient, clear about the motives and intended outcomes for every prescription. Understanding the treatment rationale and the expected outcome better enables each clinical and pharmaceutical role to prevent errors and educate patients.

The fifth area the authors describe is the uncertain field of medication reconciliation. Currently it is difficult to tease out the history of prescriptions, the reasoning behind medication decisions, and whether a medication should be discontinued. With an indications-based prescribing system, the history of a medication would be tied to its purpose, there would be efficient tracking of how a problem was treated in the past, and it would be easier to keep medications appropriate and up to date.

The sixth opportunity for inclusion of indications to benefit prescribing practices is through improving global post-market pharmacosurveillance. Linking medication to indication enables us to study and enhance the effectiveness of medications, their use, their impact, and their safety.

Discussions of these and other possible implications of including *the Right Indication* with prescription orders will occur in seven AHRQ-funded international web conferences. The development of an indications-based prescribing system prototype will be informed by human factors experts, systems engineers, and clinicians. The goal is to create an intuitive interface that fits into existing workflows and is perceived as more beneficial to the end user than standard systems. Only then will the potential impacts of the "Sixth Right" be realized.

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