EMPLOYING BEHAVIORAL AND SOCIAL SCIENCE TO MEET CHALLENGES IN HEALTH CARE QUALITY IMPROVEMENT

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Key Issue/Challenge

The key issue for this think tank session stems from a number of related challenges in U.S. health care. Healthcare expenditures in the U.S. are huge, and continue to increase at rates well above inflation.(cite) 2) The quality of healthcare in the United States – that is, the extent to which the system does the right thing for the right patient at the right time in the right way [1 2]-- leaves much to be desired and the pace of improvement has been slow. [3] Racial/ethnic and socioeconomic disparities in healthcare quality persist and in some cases are growing worse. Advances in information technology have finally permitted healthcare policymakers to envision a day when the use of information technology in healthcare delivery will facilitate improvements in healthcare quality and reductions in disparities.[4] Innovations in clinical settings, such as electronic medical records (EMRs), computerized order entry (COE) with computerized decision support (CDS) and electronic prescribing (eRx), have on occasion showed promising results for preventing medical (including medication) errors. Interoperable health information technology (HIT) used in regional applications called Health Care Innovation Exchanges (HCIE) are promising venue to increase care transitions and coordination across multiple providers and settings in the highly fragmented U.S. health care information.[4] However, adoption of HIT has been slow and many health care providers are skeptical that HIT will improve things for them or their patients.

As technologies and policies and incentives to promote their use continue to develop, there is increasing recognition that a critical barrier is lack of on the ground recognition that HIT implementation is a socio-technical process, and not just a technical innovation.[5, 6] Behavioral and social scientists could play a much greater role in insuring

that the social and behavioral challenges are understood and considered in HIT intervention planning, maintenance, and evaluation..

As a practical matter, interventions to improve healthcare quality are typically complex, multilevel interventions that call out for a new approach to evaluation research.[7, 8 9] Methodological challenges plague the field of quality improvement implementation research in general.[10] Because the "gold standard" of a randomized controlled trial with the patient as the unit of intervention and analysis is inappropriate, and there is no consensus on alternative designs and methods that will provide rigor and relevance, (cite Stange) the literature and practice are awash with single site studies that sometimes use retrospective data and lack comparison groups of any kind. Interventions frequently lack theoretical frameworks that take into account the additional organizational changes needed for effective implementation,[9] and study reports are not systematic in reporting how contextual factors may have contributed to results.[11]. Thus research reports are not helpful to decisionmakers who need to know whether HIT that's been shown to work in one setting will work for them. Lack of consensus about study designs, measures of inputs, potential modifiers, and outcomes, and analytic approaches have impeded development of a cumulative science and a common knowledge base.
The new administration and Congress are poised to provide a tremendous opportunity to accelerate the adoption of HIT, with an emphasis on improving healthcare quality and the nation's health. [1] However, the proposed allocation of $19 billion for implementation and research could go to waste without a more thoughtful approach to implementation and research.

Barriers/Strategies to Overcome Barriers.

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[1] Soon after the NIH session, the President signed The American Recovery and Reinvestment Act of 2009 (Public Law 111-5). The law provides $19 billion to support HIT implementation and research for "meaningful use."

Before addressing the barriers to effective implementation of HIT for quality improvement and optimal patient outcomes, Dr. White expressed his strong belief in the potential of HIT to: change how we deliver health care, help us live longer, suffer less, and potentially, spend less money doing it. His belief is based in evidence.[4] For example, David Bates and colleagues at Brigham and Women's Hospital at Harvard have shown on many occasions that mistakes in healthcare such as drug-drug or drug-condition interactions can be reduced when you use good information tools such as electronic prescribing or order entry software.[12] (add cites to Kaelber and Bates; Einbinder and Bates) Other studies show that preventive services increase when you use the right decision-support tools or standing order sets.[13] Two recent studies suggest that effective use of HIT could save money. Mark Fischer showed savings as a result of integrating a formulary into an electronic prescribing system, because providers prescribe generics more often.[14] Another study demonstrated that hospitals with good decision support and order entry saved money on high-cost, high-prevalence conditions and services such as heart failure and CABG.

In contrast to these promising results, stories of poor implementation abound. In 2002, within 48 hours of turning on an almost $30 million order entry system, leaders at a well-known hospital in Los Angeles were forced to turn it off. They had not thought to engage the providers and staff or teach them how to use the system. Subsequently, sociologists, organizational scientists, and clinical researchers who have studied HIT implementation have found that issues of usability, including how technological innovations fit into regular clinical workflows can doom a system to failure and even cause harm.[5, 6 15] Particularly troubling are results from implementation of a commercially available order entry system in a pediatric intensive care unit, with minimal training and limited onsite support. Mortality doubled among children arriving via interhospital transfer between the baseline period of 13 months prior to the installation and 18 months afterward, even after controlling for risk of death among the children.[16] As they looked into how this could have happened, they learned that in addition to inadequate preparation and support for HIT, the PICU was fraught with problems of communication between team members. In addition, other researchers who have studied the implementation of CPOEs in pediatric

and other critical care settings argued that concurrent policy changes were probably a larger factor than the CPOE in the disturbing results.[17] The overall lessons for research are that studies of implementation must consider more than just the technology and must look at outcomes as the technology develops.

HCIEs (also known as Regional Health Information Organizations [RHIOs]) are among the most promising HIT-based strategies for health care. They create a common space for interoperable clinical data across multiple healthcare delivery entities, potentially reducing the errors and inefficiencies endemic to the current patchwork of care facilities.[18] Here again there is evidence of dramatic failure to fulfill the promise of HCIE, due to a combination of lack of continued financial support over time, lack of a compelling business case, distorted economic incentives, passive leadership among participants, failure to share data, vendor limitations, software delays, and privacy and security issues.[19]

Dr. White summarized the lessons AHRQ (and many in the field) have learned since the beginning of AHRQ's big investments in HIT implementation, evaluation, and research. These include the importance of: a) recognizing how large a change HIT implementation is, b) engaging stakeholders from the top to the bottom of the healthcare delivery hierarchy (e.g., doctors, nurses, pharmacists, patients, clerical and administrative staff), c) allowing enough time; d) fixing preexisting problems; and e) listening to users and acting on their feedback to tailor the technology or the sociotechnical systems.

Session participants described the kinds of challenges they have faced in implementing and attempting to spread and sustain HIT to improve the quality of healthcare delivery. Some described successful approaches.

One reported challenge is the failure to create institution-wide knowledge of how electronic health records work, necessitating a provider-by-provider approach to implementation to avoid repeated errors in implementation. Similarly, participants expressed concern about the apparent lack of usability testing among providers and other

users before HIT is rolled out. (To improve usability, AHRQ is supporting work on "dense display of data," a term of art for approaches to taking a lot of data and effectively displaying it for rapid and effective use in healthcare.) Greater understanding of what leads to development of truly user-friendly and helpful innovations (e.g., the iPhone) is needed, and it's unclear that traditional research methods are the way to do that. Development and testing of creative ways to truly engage patients in design to achieve optimal provider-patient-system interaction around health care are also critical. In general, more recognition by those tasked with certifying HIT of the ultimate goal of the technology – to improve patient care and health outcomes – would be a great step forward.

Approaches to dealing with barriers to implementation and use presented by session participants included promulgation of set of culture changes in a community health center. First the staff is asked to think of themselves as part of a learning organization. Rather than focus on quality as defined by individual performance (which causes anxiety), the center focuses on overall excellence, putting systems in place to support staff and improve coordination and collaobration. Similarly, an NHLBI researcher reported that cardiology practices have been able to successfully integrate electronic health records into their practices, most likely because they were heavily involved in development of the EHRs, reminder systems, and other innovations. At MassGeneral, SMART forms have been well-accepted because they reduced the burden on clinicians. Providing sufficient technical support (e.g., geek squads) seems to be a promising approach.

Questions for future research

Many questions for future research are implicit in the descriptions of problem interventions discussed by Dr. White, and others stemmed from the challenges faced by session participants.. Questions for behavioral and social scientists then can include: how does one convey how large a change HIT implementation is so that adequate planning and resources – including time and organizational changes -- are employed?

What are effective strategies for truly engaging multiple relevant stakeholders so that systems do not fail? What is the best way to obtain continuous and useful user feedback? How can implementation planners and HIT designers be encouraged to use appropriate theories or logic models that can help prevent disasters?

At a more meta level, what kinds of studies and study designs will be rigorous and relevant enough to result in knowledge that's practical for potential users of HIT and to inform a constructive future research agenda? Is more formative research needed (e.g., to understand the values of the potential users, the nation's health care providers) or can these be uncovered with thoughtful implementation research (e.g., action research in the vein of Kurt Lewin)? How can expected variations in implementation of HIT across setting be exploited to understand what works and why?

Finally, a critical issue raised by a session participant is the need to identify the quality improvement and patient outcome objectives of implementation of HIT. One place to look is the many quality and disparities problems enumerated in the National Healthcare Quality and Disparities Reports.[3] Dr. Fine noted several problems that NHLBI outcomes and effectiveness research is dealing with (e.g., clinical inertia when patients' blood pressure reaches a certain plateau that is not yet within guidelines). Cutting across these clinical challenges are the overall challenges of our fragmented, inefficient, non-patient-centered healthcare delivery system. Having a clear goal in mind is essential for posing important research questions.

References

1. Eisenberg J. Testimony on health care quality before the House Subcommittee on Health and the Environment. http://www.ahrq.gov/news/test1028.htm. Accessed Mar. 17, 2008.

2. Institute of Medicine Committee on Quality of Health Care in America. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academies Press; 2001.

3. Agency for Healthcare Research and Quality. National Healthcare Quality Report and National Healthcare Disparities Report. *Measuring Healthcare Quality* [http://www.ahrq.gov/qual/measurix.htm. Accessed Mar. 14, 2008.

4. Clancy C, Anderson K, White P. *Health Aff (Millwood).* 2009;28(2).

5. Koppel R, Metlay J, Cohen A, et al. Role of computerized physician order entry systems in facilitating medical errors. *JAMA.* Mar. 9 2005;293(10):1197-1203.

6. Harrison M, Koppel R, Bar-Lev S. Unintended consequences of information technologies in health are--An interactive sociotechnical analysis. *JAMIA.* 2007;14:542-549.

7. DeVinney B. Expanding Research and Evaluation Designs to Improve the Science Base for Health Care and Public Health Quality Improvement Symposium-Meeting Summary http://www.ahrq.gov/qual/phqisymp/. Accessed Apr. 4, 2009.

8. Mercer S, DeVinney B, Fine L, Green L, Dougherty D. Study designs for effectiveness and translation research: Identifying the tradeoffs. *Amer J Prev Med.* August 2007;33.

9. Craig P, Dieppe P, Macintyre S, Mitchie S, Nazareth I, Petticrew M. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ.* Oct 25 2008;337:979-983.

10. Clancy C. Building the path to high-quality care. *HSR.* Feb 2009;44(1):1-4.

11. Davidoff F, Batalden P, Stevens D, Ogrinc G, Mooney S. Publication guidelines for improvement studies in health care: Evolution of the SQUIRE project. *Annals of Internal Medicine.* Nov. 4 2008;149(9):670-676 and W-128.

12. Kuperman et al. Medication-related clinical decision support in computerized provider order entry systems: a review. *J Am Med Inform Assoc.* 2007;14(1).

13. Goins KV ZJ, Geiger AM, Solberg LI, Taplin S, Yood MU, Gilbert J, Mouchawar J, Somkin CP, Weinmann S,. Implementation of systems strategies for breast and cervical cancer screening services in health maintenance organizations. *American Journal of Managed Care.* 2005;2003 Nov;9(11):745-55.

14. Fischer M. Effect of electronic prescribing with formulary decision support on medication use and cost. *Arch Intern Med. 2008 Dec 8;168(22):2433-9.* 2008.

15. van Rosse F, Maat B, Rodemaker C, van Vught A, Egberts A, Bollen C. The effect of computerized physician order entry on medication prescription errors and clinical outcome in pediatric and intensive care: a systematic review. *Pediatrics.* Apr 2009;123(4):1184-1190.

16. Han YY CJ, Venkataraman ST, Clark RS, Watson RS, Nguyen TC, Bayir H, Orr RA,. Unexpected increased mortality after implementation of a commercially sold computerized physician order entry system. *Pediatrics.* 2005;Dec;116(6):1506-12.

17. Longhurst et al. Perceived Increase in Mortality After Process and Policy Changes Implemented With Computerized Physician Order Entry *Pediatrics.* 2006;117(4).

18. Kern L, Barron y, Abramson e, Patel v, Kaushal R. HEAL NY: Promoting interoperable health information technology in New York State. *Health Aff (Millwood).* Mar-April 2009;28(2):493-504.

19. Robert H. Miller PD, UCSF Institute for Health and Aging and Bradley S. Miller, M.D., M.B.A., Element Mobile, Inc.,. The Santa Barbara County Care Data Exchange: Lessons Learned. http://www.chcf.org/topics/view.cfm?itemID=133404. Accessed Apr. 4, 2009.