## Advancing Digital and Patient-Centered Care Requires Competent Clinicians and Informatics Professionals

William Hersh, MD, FACP, FACMI Professor and Chair Department of Medical Informatics & Clinical Epidemiology Oregon Health & Science University Portland, OR, USA Email: <u>hersh@ohsu.edu</u> Web: <u>www.billhersh.info</u> Blog: <u>http://informaticsprofessor.blogspot.com</u> Twitter: <u>@williamhersh</u>

References

Angrisano, C, Farrell, D, et al. (2007). Accounting for the Cost of Health Care in the United States. Washington, DC, McKinsey & Company.

http://www.mckinsey.com/mgi/rp/healthcare/accounting\_cost\_healthcare.asp Anonymous (2010). The State of Health Care Quality: 2010. Washington, DC, National Committee for Quality Assurance. http://www.ncqa.org/tabid/836/Default.aspx Anonymous (2012). Demand Persists for Experienced Health IT Staff. Ann Arbor, MI,

College of Healthcare Information Management Executives. http://www.cio-

chime.org/chime/press/surveys/pdf/CHIME\_Workforce\_survey\_report.pdf

Anonymous (2014). 2014 HIMSS Workforce Survey. Chicago, IL, HIMSS Analytics. http://www.himssanalytics.org/research/AssetDetail.aspx?pubid=82173

Blumenthal, D (2011). Implementation of the federal health information technology initiative. *New England Journal of Medicine*. 365: 2426-2431.

Blumenthal, D (2011). Wiring the health system--origins and provisions of a new federal program. *New England Journal of Medicine*. 365: 2323-2329.

Brill, S (2013). Bitter Pill: Why Medical Bills Are Killing Us. Time, April 4, 2013. http://healthland.time.com/2013/02/20/bitter-pill-why-medical-bills-are-killing-us/

Bui, AAT and Taira, RK, Eds. (2010). <u>Medical Imaging Informatics</u>. New York, NY, Springer. Buntin, MB, Burke, MF, et al. (2011). The benefits of health information technology: a review of the recent literature shows predominantly positive results. *Health Affairs*. 30: 464-471.

Chaudhry, B, Wang, J, et al. (2006). Systematic review: impact of health information technology on quality, efficiency, and costs of medical care. *Annals of Internal Medicine*. 144: 742-752.

Classen, DC, Resar, R, et al. (2011). 'Global trigger tool' shows that adverse events in hospitals may be ten times greater than previously measured. *Health Affairs*. 30: 4581-4589.

DesRoches, CM, Painter, MW, et al. (2015). Health Information Technology in the United States 2015 - Transition to a Post-HITECH World. Princeton, NJ, Robert Wood Johnson Foundation. <u>http://www.rwjf.org/en/library/research/2015/09/health-information-technology-in-the-united-states-2015.html</u>

Detmer, DE and Shortliffe, EH (2014). Clinical informatics: prospects for a new medical subspecialty. *Journal of the American Medical Association*. 311: 2067-2068.

Frank, JR, Mungroo, R, et al. (2010). Toward a definition of competency-based education in medicine: a systematic review of published definitions. *Medical Teacher*. 32: 631-637. French, MG (2014). <u>Health Literacy and Numeracy: Workshop Summary (2014)</u>. Washington, DC, National Academies Press.

Furukawa, MF, Vibbert, D, et al. (2012). HITECH and Health IT Jobs: Evidence from Online Job Postings. Washington, DC, Office of the National Coordinator for Health Information Technology.

http://www.healthit.gov/sites/default/files/pdf/0512\_ONCDataBrief2\_JobPostings.pdf Gadd, CS, Williamson, JJ, et al. (2016). Eligibility requirements for advanced health informatics certification. *Journal of the American Medical Informatics Association*. 23: 851-854.

Gadd, CS, Williamson, JJ, et al. (2016). Creating advanced health informatics certification. *Journal of the American Medical Informatics Association*. 23: 848-850.

Gardner, RM, Overhage, JM, et al. (2009). Core content for the subspecialty of clinical informatics. *Journal of the American Medical Informatics Association*. 16: 153-157.

Goldzweig, CL, Towfigh, A, et al. (2009). Costs and benefits of health information technology: new trends from the literature. *Health Affairs*. 28: w282-w293.

Henry, J, Pylypchuk, Y, et al. (2016). Adoption of Electronic Health Record Systems among U.S. Non-Federal Acute Care Hospitals: 2008-2015. Washington, DC, Department of Health and Human Services. <u>http://dashboard.healthit.gov/evaluations/data-briefs/non-federal-acute-care-hospital-ehr-adoption-2008-2015.php</u>

Hersh, W (2004). Health care information technology: progress and barriers. *Journal of the American Medical Association*. 292: 2273-2274.

Hersh, W (2009). A stimulus to define informatics and health information technology. *BMC Medical Informatics & Decision Making*. 9: 24. <u>http://www.biomedcentral.com/1472-6947/9/24/</u>

Hersh, W (2010). The health information technology workforce: estimations of demands and a framework for requirements. *Applied Clinical Informatics*. 1: 197-212.

Hersh, W (2014). Square Pegs into Round Holes - Challenges for the Clinical Fellowship Model for Clinical Informatics Subspecialty Training. <u>Informatics Professor</u>, May 14, 2014. <u>http://informaticsprofessor.blogspot.com/2014/05/square-pegs-into-round-holes-</u> <u>challenges.html</u>

Hersh, WR (2014). Healthcare Data Analytics. <u>Health Informatics: Practical Guide for</u> <u>Healthcare and Information Technology Professionals, Sixth Edition</u>. R. Hoyt and A. Yoshihashi. Pensacola, FL, Lulu.com: 62-75.

Hersh, WR and Wright, A (2008). What workforce is needed to implement the health information technology agenda? An analysis from the HIMSS Analytics<sup>™</sup> Database. *AMIA Annual Symposium Proceedings*, Washington, DC. American Medical Informatics Association. 303-307.

Holmboe, E (2014). Realizing the promise of competency-based medical education. *Academic Medicine*: Epub ahead of print.

Jones, SS, Rudin, RS, et al. (2014). Health information technology: an updated systematic review with a focus on meaningful use. *Annals of Internal Medicine*. 160: 48-54.

Kann, M and Lewitter, F, Eds. (2013). <u>Translational Bioinformatics</u>. San Francisco, CA, Public Library of Science.

Kohn, LT, Corrigan, JM, et al., Eds. (2000). <u>To Err Is Human: Building a Safer Health System</u>. Washington, DC, National Academies Press.

Kulikowski, CA, Shortliffe, EH, et al. (2012). AMIA Board white paper: definition of biomedical informatics and specification of core competencies for graduate education in the discipline. *Journal of the American Medical Informatics Association*. 19: 931-938.

Magnuson, JA and Fu, PC, Eds. (2014). <u>Public Health Informatics and Information Systems</u>. New York, NY, Springer.

McGlynn, EA, Asch, SM, et al. (2003). The quality of health care delivered to adults in the United States. *New England Journal of Medicine*. 348: 2635-2645.

Richesson, RL and Andrews, JE, Eds. (2012). <u>Clinical Research Informatics</u>. New York, NY, Springer.

Safran, C, Shabot, MM, et al. (2009). ACGME program requirements for fellowship education in the subspecialty of clinical informatics. *Journal of the American Medical Informatics Association*. 16: 158-166.

Schoen, C, Osborn, R, et al. (2009). A survey of primary care physicians in eleven countries, 2009: perspectives on care, costs, and experiences. *Health Affairs*. 28: w1171-1183.

Schwartz, A, Magoulas, R, et al. (2013). Tracking labor demand with online job postings: the case of health IT workers and the HITECH Act. *Industrial Relations: A Journal of Economy and Society*. 52: 941–968.

Smith, M, Saunders, R, et al. (2012). <u>Best Care at Lower Cost: The Path to Continuously</u> <u>Learning Health Care in America</u>. Washington, DC, National Academies Press.

Smith, PC, Araya-Guerra, R, et al. (2005). Missing clinical information during primary care visits. *Journal of the American Medical Association*. 293: 565-571.

VanDenBos, J, Rustagi, K, et al. (2011). The \$17.1 billion problem: the annual cost of measurable medical errors. *Health Affairs*. 30: 596-603.

Wetter, T (2016). <u>Consumer Health Informatics - New Services, Roles, and Responsibilities</u>. New York, NY, Springer.





























		Table I Competencies in clinical informatics and specific learning objective/milestone within each		
			Competency	Learning objectives/milestones
Duck also any Backle to all here the same		Find, search, and apply knowledge-based information to patient care and other	Information retrieval/search: choose correct source for specific task, search using advanced features, apply results	
Probably applicable to all healthcare			clinical tasks	Evaluate information resurces (literature, databases, etc) for their quality,
professional students				umming sources, usass Identify tools to assess patient safety (eg, medication interactions) Utilize knowledge-based tools to answer clinical questions at the point of care (eg, textbooks, calculators, etc.)
				Formulate an answerable clinical question
Advances in Medical Education and Practice Dove		Dovepress	Effectively read and write from the electronic health record for patient	Identify deviations from normal (laboratory tests/X-ray/results) and develop a list of causes of the deviation Graph, disbay, and trend vital signs and laboratory values over time
		open access to scientific and medical research		Adopt a uniform method of reviewing a patient record
Copen Ancess Full Text Article PERSPECTIVES		care and other clinical activities	Create and maintain an accurate problem list Recognize medical safety issues related to poor chart maintenance	
Beyond information retrieval and electronic			Identify a normal range of results for a specific patient	
Bejond mormation redictal and electronic			Access and compare radiographs over time Identify inaccuracies in the problem list/history/medication list/allergies	
health record use: competencies in clinical				Create useable notes
information for modical advantion				verite orders and prescriptions List common errors with data entry (drop down lists, copy and paste. etc)
informatics for medical education			Use and guide implementation of CDS	Recognize different types of CDS
	This works was welching in the following Parce Base income			Be able to use different types of CDS Work with clinical and informatics colleagues to guide CDS use in clinical settings
Advances in Medical Education and Practice			Provide care using population	Utilize patient record (data collection and data entry) to assist with disease
	Number of times this article has been viewed	icle has been viewed	health management approaches	management General generation for any classical in difference bealth serve definitions protoners
				Use and apply data in accountable care, care coordination, and the
William R Hersh	Abstract: Physicians in the 21st century will increasingly interact in diverse ways with information systems, requiring competence in many aspects of citical informatics. In recent years, many medical school curricula have added content in information rotrieval (search) and basic use of the electronic health record. However, this omits the growing number of other ways that physicians are interacting with information that includes activities such as clinical school and the school curriculation of the school and the school		Protect patient privacy and security Use information technology to improve nations safery	primary care medical home settings
Paul N Gorman <sup>1</sup>				Use security features of information systems Adhere to HIPAA privacy and security regulation
Vishou Mohan				Describe and manage ethical issues in privacy and security
leffrey A Gold <sup>3</sup>				Perform a root-cause analysis to uncover patient safety problems Exmiliarity with rafety insure
George C Mejicano <sup>4</sup>	decision support, quality measurement and improvement	ent, personal health records, telemedicine,	patrent sarety	Use resources to solve safety issues
Department of Medical Information and Clinical Epidemiology. Department of Analy Medicaline, University Medicaline, Corport Information Science University, Percland, OR, USA	and personalized medicine. We describe a process whereby six faculty members representin different perspectives came together to define competencies in clinical informatics for a curricu		Engage in quality measurement selection and improvement	Recognize the types and limitations of different types of quality measures. Determine the pros and cons of a quality measure, how to measure it, and how
	lum transformation process occurring at Oregon Health & Science University. From the broad competencies, we also developed specific learning objectives and milestones, an implementa- tion schedule, and mapping to general competency domains. We present our work to encourage debate and refinement as well as facilitate evaluation in this area.	Use HIE to identify and access patient	to use it to change care Recognize issues of dispersed patient information across clinical locations	
		mains. We present our work to encourage in this area.	information across clinical settings	Participate in the use of HIE to improve clinical care
			Engage patients to improve their health and care delivery though personal health records and patient portals	Instruct patients in proper use of a personal health record Write an e-message to a patient unity a patiente portal Demonstrate appropriate written communication with all members of the health care team Intergrate technology into patient education (eg. decision making tools, diagrams, patient education) Educate patients to discorm quality of online medical resources (Web sites,
			Maintain professionalism through	applications, patient support groups, social media, etc) Maintain patient engagement while using an electronic health record (eye contact, body language, etc) Describe and manage etbics of media use (cloud structure issues revring cell
			use of information technology tools Provide clinical care via telemedicine, and offer these for whether is in terms	phones, social media professionalism) Be able to function dinically in telemedicine/telebealth environments
			Apply personalized/precision medicine	Recognize growing role of genomics and personalized medicine in care Identify resources enabling access to actionable information related to precision medicine
			Participate in practice-based	Use electronic health record alerts and other tools to identify patients and
			clinical and translational research	Populations for offering clinical trial participation Participate in practice-based research to advance medical knowledge





























