Biomedical and Health Informatics Lecture Series

Tuesday, February 7, 2012
12:00 - 12:50 p.m., Room T-360

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"A Usability Evaluation of Pharmacogenomic Clinical Decision Support Aids in a Computerized Provider Order Entry System"

Pharmacogenomics (PGx) is the study of how genetic variations affect drug response. Numerous genetic variants have been identified and validated as predictors of drug response – both efficacy and toxicity. PGx test results can be clinically useful in guiding drug therapy for individual patients, yet research suggests that the adoption rate of PGx testing in clinical practice is low. Given the complexity of interrelated combinatory relationships of diseases, genes, PGx testing, and drugs, the presentation of PGx information in the setting of computerized provider order entry (CPOE) and clinical decision support (CDS) would be useful in guiding therapy, increasing efficacy and limiting toxicities. As CPOE with CDS is a sophisticated technology, poor CPOE usability can reduce acceptance of CPOE systems, limit successful deployment, and introduce adverse and unintended consequences. We conducted a usability study to: (a) evaluate the usability of an early prototype of a CPOE system with CDS aids in a simulated work environment; (b) identify improvements that can be made to the CPOE system user interface; and (c) understand the context under which PGx knowledge embedded in an electronic health record could be found useful to a clinician. The simulated system was a prototype version of PowerChart® (Cerner Millenium®), the University of Washington's inpatient electronic health record system application.

We created and applied a conceptual framework that integrated human factors engineering paradigm with current usability standards promulgated by the International Organization for Standardization (ISO 9241-11). We led ten physician-fellows through five hypothetical clinical case scenarios wherein they were asked to prescribe five unique drug when presented with patient-specific PGx information in the form of CDS. We recorded videos of their prescribing activities and audio-recordings of their comments; and invited them to complete the Post-Study System Usability Questionnaire (PSSUQ). We conducted both quantitative and qualitative analyses and will present our preliminary findings.

Dr. Devine's research program is centered at the intersection of clinical research informatics, comparative effectiveness research, medication safety, and quality. She is the lead co-investigator for the Comparative Effectiveness Research Core of the Surgical Care and Outcomes Assessment Program Comparative Effectiveness Research Network (SCOAP-CERTN; PI: Flum) – one of two AHRQ-funded grants in the Enhanced Registries for Quality Improvement and CER portfolio. On this same grant she leads the research study that is validating the extraction of semi-automated data from disparate electronic health records across select hospitals in Washington State. A second area of research interest is evidence synthesis, where she compares treatment alternatives to inform comparative effectiveness decision-making using indirect and mixed treatment comparison methods in a Bayesian framework. Dr. Devine is a past recipient of an AHRQ Mentored Clinical Scientist Training Award (K-08) and served as co-investigator and project lead on an AHRQ THQIT (Transforming Healthcare Quality through Technology) implementation grant where her team studied the impact of a computerized provider order entry system in the largest independent medical group in Washington State. She received her Doctor of Pharmacy degree from the University of the Pacific and her PhD in Health Services Research, with an emphasis on health information technology, from the UW School of Public Health.

Dr. Overby received her PhD in the Biomedical and Health Informatics Graduate Program (dissertation title: "A Clinical Decision Support Model for Incorporating Pharmacogenomics Knowledge Into Electronic Health Records for Drug Therapy Individualization: A Microcosm of Personalized Medicine") and a certificate in Public Health Genetics at the University of Washington. Prior to pursuing her PhD, she received her master's degree in Biotechnology and worked as a Data Analyst as part of the Biomedical Informatics Core Facility for the Abramson Cancer Center, the Department of Pathology and Laboratory Medicine, and the School of Medicine at the University of Pennsylvania. She is currently completing a post-doctoral research fellowship in the Department of Biomedical Informatics at Columbia University. Her research interests are in designing, developing, and evaluating tools to support decision-making and interpretation activities of various users of new diagnostics (e.g. genomics-based and other) and therapies (e.g. new biopharmaceutics).

Cheryl Lee is currently a third-year PhD student of the Biomedical and Health Informatics Graduate Program. Her research interests are in designing, developing, and evaluating informatics tools for representing and maintaining pharmacogenomics knowledge change over time to facilitate clinical pharmacogenomics decision-making. Prior to pursuing her PhD, she received her MS of Computational Biology and Bioinformatics at the Northwestern University, Evanston, IL.