PS1-1b:

Use of the CER Hub to Evaluate Exercise Counseling in Primary Care

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Background/Aims: Regular physical activity (PA) markedly improves health, physical function, independence, mood, and quality of life while reducing the risk of obesity, diabetes, cardiovascular disease, and some cancers. However, most people in the US do not meet recommended PA levels. The primary care setting is well-suited to long-term follow-up with repeated assessment and modification of treatment plans (e.g., for controlling hypertension). This approach is adaptable to exercise assessment and counseling—"exercise as medicine". Kaiser Permanente (KP) recently introduced a PA promotion initiative that includes a new electronic medical record (EMR) feature to document current PA level (called "Exercise as a Vital Sign" or EVS). Provider counseling and referral for exercise items do not appear in structural fields in the EMR. We therefore plan to use natural language processing to assess the efficacy of EVS. **Methods:** We developed a method to measure the prevalence of leisure-time PA assessment, counseling, and referral in electronic medical records (EMRs) in primary care. The protocol was adapted from the "5As" of smoking cessation counseling, a motivational interviewing strategy designed to effect behavioral change, and operationalizes how clinicians document PA status and counseling for PA, including key concepts, phrases, words, numbers, orders, and procedures. Three chart reviewers used tools provided by the CER Hub to identify these measures in 400 charts each from two healthcare organizations. We assessed the internal validity of the measures through analysis of the manual chart review data. **Results:** Abstractors as a group (n = 3) reliably identified components of PA counseling, including non-specific advice, personalized advice, and referral for PA, in approximately 25% of encounters from a health plan that had implemented EVS. Significantly fewer instances of PA counseling were found in encounters from a second health system without EVS. **Conclusions:** This preliminary work supports the development of strategies to create a Mediclass program to automatically search the ambulatory component of EMR for these measures. We plan to assess PA counseling before and after the implementation of EVS, which has occurred at different times in different regions of KP, allowing a lagged baseline design for evaluation of relationships between EVS, PA counseling, and health outcomes.

Keywords: Physical Activity; Behavioral Counseling; Primary Care

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PS1-1c:

The CER Hub: A Platform for Conducting Comparative Effectiveness Research

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Background/Aims: The primary goal of comparative effectiveness research (CER) is to generate new evidence on the effectiveness, benefits, and harms of different treatments, diagnostics, and disease prevention methods under "real world" conditions. To accomplish this goal using data generated in the course of providing care, CER requires the identification, capture, aggregation, integration, and analysis of disparate data sources held by different institutions with diverse care practices and data systems. **Methods:** To address the goals of CER, we built the CER Hub; a web-based platform for collaborative development and conduct of healthcare research studies using multi-institutional, comprehensive electronic medical record (EMR) data. The Hub provides informatics tools and methods for developing and applying study-specific processors of EMR data, enabling access to the entire clinical record (including text clinical notes) to answer study questions. These processors are developed on the Hub and then distributed out to participating study sites to enable efficient and accurate aggregation of study

data, allowing pooling of standardized limited datasets for analysis of multi-institutional clinical data. As an Internet-based platform, the Hub provides support for collaborative design, development, and conduct of research studies that use electronic clinical data. The Hub provides investigator-initiated studies with capacity to address questions of interest to independent researchers and their organizations, while providing a mechanism for the knowledge gained to be built into subsequent, related research efforts.

Results: To demonstrate the CER Hub, we established multiple research studies that involve six diverse health systems dispersed throughout the U.S. (including 3 HMORN sites), which utilize 3 distinct EMR systems. Each study developed, validated, and deployed a study-specific data processor to identify aspects of patient health and care services delivered to study patients, locally within their health system's data processing environment. Aggregate data resulting from this process were then assembled at a central site for descriptive and outcomes analyses. **Conclusions:** The CER Hub provides a scalable method to generate evidence on fundamental questions in health and care delivery (including comparative effectiveness, epidemiology, health services, public health, quality and patient safety questions) with capacity to analyze large populations from multiple and diverse healthcare systems.

Keywords: Natural Language Processing; CER Informatics Infrastructure; Multi-Institutional Research

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PS1-1d:

Use of CER Hub to Evaluate Outcomes of Smoking Cessation Services, a Behavioral Treatment

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Background/Aims: The US Public Health Service task force on tobacco use and dependence developed an evidence-based treatment guideline for primary care (the "Five As" - Ask, Advise, Assess, Assist, Arrange). The Five As guidelines have been implemented by most primary care treatment organizations, including the six health systems in this project. Use of this guideline has been shown to substantially increase smoking-cessation rates in carefully managed research projects, however only a few assessments of implementation and effectiveness have been conducted in real-world clinical settings. **Methods:** Using the CER Hub, we specified operational definitions for each of the 5A's enabling their identification in the EMR, including definitions unique to specific care settings (e.g., the names of local cessation programs). We refined an automated system, MediClass, with these definitions and used software tools on CER Hub to manually code samples of 500 test records at each site for comparison to performance by MediClass. We are using this automated data processor to assess smoking cessation care delivered to over 400,000 smokers across the six health systems during a 6-year study period. **Results:** Each site deployed the automated processor in their secure data environment and are generating and sharing a standardized limited dataset for analyses. The pooled dataset contains the relevant clinical events (including updates to tobacco use status as well as the Five A's) to identify patients who smoke, those who stop smoking, and the smokers who received various types of treatment. Patients are classified as smokers if they are using tobacco at a visit, or if they were identified as a smoker at a previous visit with no change in tobacco use status noted since that visit. Smoking cessation services are being assessed for each primary care visit during the study period. Delivery of smoking cessation services will be summarized with respect to patient and provider characteristics and populations of interest, and quitting outcomes assessed. **Conclusions:** The CER Hub provides a common format for organizing data from multiple data systems and provides a practical and scalable method for identifying smoking counseling in the free text and coded data of electronic medical records.

Keywords: Smoking Cessation; Behavior Change; Health Services Research

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