Insight Generation from Real-World and Real-Time Treatment Pathways

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Abstract

Understanding of patient outcomes in relation to patient treatment pathways is critical for Comparative Effectiveness Research (CER) and healthcare quality improvement. The recent growing prevalence of longitudinal healthcare data from Electronic Health Records (EHR), health insurance claims, and disease/patient registries has made it possible to retrospectively reconstruct patient-level treatment pathways based on real-world data. Real-time decision support at the point of care for treatment pathways is also becoming available as the EHR systems are incorporating alerting and recommendation functionality into their user interface for physicians. The panel will focus on such retrospective and prospective pathway reconstructions and temporal visualization and analysis for better understanding treatment patterns in real world.

This panel will achieve the following learning objectives: 1) recognizing the urgent need to fill the evidence gap in treatment pathways for both CER research and healthcare quality improvement, 2) learning the big data approach to address this evidence gap, 3) gaining both academic and commercial views of evidence application through real-world use cases and pilots of both real-time prospective and retrospective treatment pathway analytics.

General description

From a Medical Informatics perspective, this panel will address the needs to: 1) reconstruct real-patient treatment pathways by introducing high performance platforms or tools to extract relevant data elements and information out of structured and unstructured healthcare data, 2) identify real-world treatment patterns using visual analytics, and to associate patient outcomes with treatment pathways, and 3) enable answering “what if” questions by predicting outcomes of new interventions in the context of prospective treatment pathways.

Presentation 1: Understanding real-world treatment patterns for Crohn’s disease. Zhaohui John Cai, MD, PhD. While multiple clinical practice guidelines for Crohn’s disease are mainly based on evidence from clinical trials, there is little evidence derived from data in real world healthcare settings. This evidence gap was addressed through a big data approach to reconstruct treatment pathways at cohort level as well as patient journeys at individual patient level. Using large scale pharmacy and medical claims, certain patterns of care and associated outcomes of care were identified, and possible what-if questions were raised for future opportunities of care quality improvement.

Presentation 2: Visual Analytics Methods for Interactive Pathway Analysis and Representative Cohort Selection. David Gotz, PhD. Visualization-based pathway analysis tools can be applied to large-scale real-world data to support tasks such as diagnosis, treatment planning, and population-based outcomes research. However, the complexity and high-dimensionality of such data pose significant methodological challenges in practical applications. This talk will review modern methods for visual pathway analysis; discuss common compromises and assumptions made to enable practical application despite high data complexity; and preview emerging work designed to overcome some of the most limiting assumptions.

Presentation 3: Use of Electronic Health Records data to study biologic treatment prior to J-code assignment. Aaron W C Kamauu, MD, MS, MPH. Pharmacoepidemiologic studies of newly approved treatments using claims databases can be challenging because of the time after approval before a specific billing J-code is released. Electronic Health Records (EHR) do not require billing codes in order to document treatment with a biologic medicine, and thus provide information about the use of new treatments sooner after approval. For example, the average time gap among Rheumatoid Arthritis (RA) biologic treatments is 561 days (18.4 months), thus providing a challenge to studying patient-level treatment patterns (including switching between RA treatments) soon after FDA
approval of a new biologic. Using EHR we identified patients treated with a given biologic within days of FDA approval and determined associated treatment patterns.

**Presentation 4: Real-time evidence presentation at the point of care through EHR alerting features.**

Gerasimos Petratos, MD, MS. Real-time treatment pathway decisions are influenced by multiple factors including the evidence of effectiveness and safety of new medicines, the reimbursement of the treatment option and experience/availability of the treatment options by a physician. Real-time information through documentation alerts provided at the point-of-care to prescribing physicians can improve the knowledge of the physician in the influential areas of evidence and reimbursement. Real-time alerts through Electronic Health Records (EHRs) can already inform physicians of deficiencies in the specificity of their description of the patient's diagnoses and problems (i.e. they write that the patient had acute heart failure but fail to specify whether it is diastolic or systolic) and newly available recommendations can be provided to help construct a treatment pathway for a patient based on matching a patient's profile (demographics, principal and secondary diagnoses and other co-morbidities, vital signs, diagnostic tests, imaging report findings, etc.) with various options of how to treat based on previous population-level analyses of similar patient profiles.

An explanation why the topic of this panel is timely, urgent, needed, or attention grabbing is required with a discussion of anticipated audience:

The topic of this panel will address an urgent need to fill the evidence gap in real-world treatment pathways. Knowledge in treatment pathways has been traditionally summarized in clinical practice guidelines (CPGs), which are generally derived from clinical trials and selected study samples resulting in peer-reviewed literature studies instead of treatment patterns from real-world healthcare settings. Filling this evidence gap using real-world data will enable understanding of patient outcomes in relation to treatment pathways and benefit all stakeholders in the healthcare ecosystem. By providing multiple solutions and approaches, this panel will stimulate a discussion with a wide audience from practicing physicians, academic researchers, industry innovators, and even patient advocates.

**A list of discussion questions to enhance audience participation:**

1. How do you like the patient story telling capability of such treatment pathway visualization?
2. How social, economical and behavioral factors are affecting treatment pathways?
   - patients behavioral factors (non-adherence)
   - patient tolerability to the treatment,
   - affordability of the treatment
   - Physicians behavioral factors (non-compliance) – Physician Story
3. How do payer pathways and drug formularies play a role? – Payer Story
4. What is role of treatment pathways in Precision Medicine (PM)?
5. What other data and technologies can be applied to treatment pathway analysis?
6. In the context of future learning healthcare system, how would you automate evidence generation using treatment pathways knowledge?

All participants above have agreed to take part on the panel.