EMR²: Evidence Mining Research in Electronic Medical Records Towards Better Patient Care

Xiaochun Li
Department of Biostatistics, Indiana University
School of Medicine, Richard M. Fairbanks School of Public Health

Abstract

The Indianapolis Network for Patient Care (INPC) was created in 1995 with the goal of providing clinical information at the point of patient care. It houses clinical data from over 80 hospitals, public health departments, local laboratories and imaging centers, surgical centers, and a few large-group practices closely tied to hospital systems, for approximately 13.4 million unique patients. This wealth of data provides great opportunities for comparative effectiveness and pharmaco-epidemiology research leading to knowledge discovery. In this talk, I will present four representative projects with the ultimate goal of better patient care:

- **Record Linkage**
  This is the requisite step before better patient care and research. Health information exchanges (HIEs) are increasingly distributed across many sources as our nation moves into an era of electronic health record systems. But HIE data are often from independent databases without a common patient identifier, the lack of which impedes data aggregation, causes waste (e.g., tests repeated unnecessarily), affects patient care and hinders research.

- **Sensitivity analyses in Drug safety investigation (pharmaco-epidemiology)**
  To assess the association between an exposure and an outcome, decisions have to be made regarding design, and analyses. The validity of the conclusion of an epidemiological study for drug safety surveillance or comparative effectiveness depends largely on design and analysis decisions. Sensitivity analysis is an important tool in assessing the robustness of the results.

- **Benchmark an Electronic Medical Record database**
  In typical database studies to investigate drug-outcome associations, risk measures are calculated after adjusting for an extended list of possible confounders, and then the strength of drug-outcome association is obtained by comparing the risk estimates against a theoretical null distribution. It has been recognized that electronic health records (EHR) databases are created for routine clinical care and administrative purposes but not for research, and thus they may have more hidden biases. If a list of medications is known not to cause an outcome under study, their association with the
outcome (or lack of to be more precise) can be used to estimate a null distribution. Then this estimated null distribution will be used to calibrate the strength of the risk estimate.

- Predictive modeling for clinical decision support (CDS)
  This research is towards the ultimate goal of the meaningful use of EMR to achieve better clinical outcomes, improved population health outcomes and increased transparency and efficiency.

I will discuss the statistical approaches, results and the challenges encountered in these projects.

The Johns Hopkins Bloomberg School of Public Health, Department of Biostatistics, Monday, March 2, 2015, 12:15-1:15, Room W3008, School of Public Health (Refreshments: 12:00-12:15)

Note: Taking photos during the seminar is prohibited

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