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How to Utilize Data Visualization Method to Analyze Information Systems Related Medical Errors

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Abstract

Medical errors, such as misdiagnosis, incorrect drug dispensing, surgical injuries, even patient name errors, or misuse computer information systems in healthcare systems can cause serious consequences to patients. A meta-analysis estimates that medical errors cause approximately 22,000 preventable deaths in the United State each year (Rodwin et al., 2020). To help reduce medical errors and enhance patient safety, The Agency for Healthcare Research and Quality (AHRQ), one of twelve agencies within the United States Department of Health and Human Services, have created repository of medical error cases, which are often reports and case studies authored by clinical professionals (e.g., physicians, nurses, and hospital managers). These narratives provide patients and peer healthcare professionals with valuable lessons regarding the causes, contexts, and consequences of various medical errors, and some are following up with comments or suggestions from experienced professionals. In addition, those medical reports often have many attributes subjectively tagged by the report authors such as Computer Information Systems related, EHR related, or Telemedicine related. Some research has applied machine-learning methods (e.g., BERT) to mine medical error reports (Xu et al. 2021). The present study focuses on the attributes of medical error reports and seeks to identify and visualize the correlation between types of medical errors and the types of information systems related errors, and hope to provide patients, clinical professionals, healthcare administrators, and policy makers with straightforward illustrations to understand the medical error issues.

We have acquired over 500 medical error reports from AHRQ, from 2003 to 2021. The attributes of these reports include case title, error types, clinical area, safety target, target audience, setting of care, approach to improve safety, etc. Medical errors are categorized into seven major types: Active Errors, Cognitive Errors ("Mistakes"), Epidemiology of Errors and Adverse Events, Latent Errors, Near Miss, Non-cognitive Errors ("Slips & Lapses"), and Other. Our preliminary study explores all the medical error reports with one analysis focusing on the error cases which can be improved by clinical information systems related approaches, such as Computerized Adverse Event Detection (CAED), Computer-Assisted Therapy (CAT), Clinical Information Systems (CIS), Computerized Decision Support (CDS), Computerized Provider Order Entry (CPOE), Electronic Health Records (EHR), and Telemedicine. The preliminary result (see the chart below) shows that in each of the seven error types, EHR is a major type of approach to improve in six out of seven error categories.

References

Rodwin, B.A., Bilan, V.P., Merchant, N.B., et al. 2020. "Rate of preventable mortality in hospitalized patients: A systematic review and meta-analysis," Journal of General Internal Medicine (35:7), pp. 2099-2106.

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