

# Researcher shows data mining EMRs can detect bad drug reactions

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NJIT Assistant Professor Mei Liu, PhD, a computer scientist, has recently shown in a new study that electronic medical records can validate previously reported adverse drug reactions and report new ones.

"Comparative Analysis of Pharmacovigilance Methods in Detection of [Adverse Drug Reactions](#) from Electronic Medical Records" (*Journal of American Medical Informatics Association*, May 2013) examined the use of retrospective medication orders and inpatient laboratory results documented in the medical records to identify adverse reactions. Twelve years of data from Vanderbilt University Medical Center were studied by Liu and a research team. The researchers correlated abnormal laboratory results with specific [drug](#) administrations by comparing the outcomes of a drug-exposed group and a matched unexposed group.

"[Medication safety](#) requires that each drug be monitored throughout its market life as early detection of adverse drug reactions can lead to alerts that prevent patient harm," Liu said. "Recently, [electronic medical records](#) (EMRs) have emerged as a valuable resource for detecting bad [drug reactions](#)."

Liu, a computer scientist, recently joined NJIT. She uses advanced informatics approaches to improve health care, with the long-term research goal of developing data-mining methodologies to uncover [clinical knowledge](#) from EMRs to improve the quality, safety, efficiency and effectiveness of health care.

"EMRs have created an unprecedented resource for observational studies since they contain not only detailed patient information, but also large amounts of longitudinal clinical data," she said. Despite the promise of EMR as a research tool, challenges exist for large-scale observational studies. Much relevant clinical information is embedded in narrative text and multiple factors conspire to make drawing specific conclusions from EMR data more challenging than data collected specifically to answer research hypotheses. Thus, it is desirable to develop effective and efficient computational methods to mine EMR data for conducting large-scale observational research.

Adverse drug reaction (ADR) for instance, is one of the major causes for failure in drug development. And severe ADRs that go undetected until the post-marketing phase of a drug often lead to patient morbidity, as exemplified by numerous drug withdrawals. Currently, she is leading three projects to simultaneously examine ADRs from different angles. First, she aims to predict ADRs from the chemical, biological and phenotypic properties of drugs. Second, she uses laboratory and retrospective medication order data from EMR to ascertain ADRs. Third, she is exploring the use of natural language processing techniques to extract adverse events from the narrative notes in EMR and correlate those events with medications through association mining. She is also interested in other data mining tasks for clinical informatics, such as drug repurposing (i.e. application of known drugs to new diseases). She is also interested in using patient [medical records](#) to build predictive models for diseases such as diabetes and cancer.

Liu has published numerous papers in *Bioinformatics*, *PLOS ONE*, and the *Journal of American Medical Informatics Association*. She received her doctorate in computer science with a research focus in bioinformatics from the University of Kansas in 2009.

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