

Team uses e-health records to search for hidden drug benefits

November 25 2014, by Paul Govern

With research and development costs for many drugs reaching well into the billions, pharmaceutical companies want more than ever to determine whether their drugs already at market have any hidden therapeutic benefits that could warrant putting additional indications on the label and increase production.

Such repurposing of drugs requires evidence of efficacy, and to find candidate drugs for randomized controlled repurposing trials, investigators can use computer simulation and scans of health care billing data, in addition to in vitro and in vivo testing.

A study led by researchers at Vanderbilt University Medical Center presents a new and efficient method for uncovering drug benefits that may lie hidden, and for drawing more informative repurposing predictions.

It looks to be the first study using automated analysis of [electronic health records](#) (EHRs) to validate a so-called drug repurposing signal.

More specifically, the study lends new plausibility to the hypothesis that metformin, a diabetes drug that patients generally find easy to tolerate, might have use in treating at least some types of cancer.

The study appears in the *Journal of the American Medical Informatics Association*. Josh Denny, M.D., M.S., associate professor of Biomedical Informatics and Medicine, and Hua Xu, Ph.D., M.Phil., M.S., adjunct

associate professor of Biomedical Informatics, are joined in the study by colleagues at Vanderbilt, Columbia University and Mayo Clinic.

Scanning records of some 32,000 cancer patients seen at Vanderbilt since the mid-1990s, the team trained their sights on five-year survival with and without exposure to metformin—a drug that's been in use as a first-line therapy for type 2 diabetes for more than five decades. (Patients with contraindications to metformin use were eliminated from the cohort.)

The team found that use of metformin as a therapy for type 2 diabetes was associated with: a 23 percent decrease in (all-cause) mortality compared with metformin-free, non-diabetic patients; a 22 percent decrease in mortality compared to other oral hypoglycemic medications; and a 39 percent decrease in mortality compared to diabetic patients receiving insulin but not metformin.

The results are adjusted for age, tobacco use, [body mass index](#) and other variables known to influence cancer survival.

For good measure, the team replicated these findings in a second cohort comprised of some 79,000 [cancer patients](#) seen at Mayo Clinic.

Site-specific cancers showing decreased mortality with metformin (in at least one of the two EHR cohorts) included breast, colorectal, lung and prostate.

"Our EHR allowed us to delve into details of treatment and response—cancer staging, control of cancer, the various timelines involved and cancer subtypes," Denny said.

The team drew on structured data from the clinical lab as well as [natural language processing](#), which uses linguistic rules and statistics to extract

concepts from written English.

"We're now building on this study, pursuing opportunities for using our EHR to look at all drug exposures across a given disease—starting with cancer. We're trying to find other signals that may look like metformin in terms of affecting patient outcomes," Denny said.

As EHR networks eventually take shape, the goal would be to adapt this strategy to yet larger, more geographically dispersed cohorts.

Elsewhere, meanwhile, a randomized controlled clinical trial is under way to examine [metformin](#)'s efficacy in regard to [cancer](#) treatment.

Provided by Vanderbilt University Medical Center

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