By Carrie Printz

EMERSE Data Tool Aids Researchers, Clinicians in Information Searches

Some of the most important sources of information for researchers gathering data about patients are physicians' clinical notes. Yet manually poring through these notes can be extremely time-consuming.

Researchers at the University of Michigan have developed a tool that speeds up the process considerably. Introduced in 2005, the Electronic Medical Record Search Engine, or EMERSE, is a data query system that works with free text (unstructured) clinical documents in an electronic health record (EHR) system. Since then, researchers have continually improved and updated the search engine and soon hope to make it available to other academic medical centers at no cost.

"We have a lot of clinical data available, but the most detail is in the rich clinical information in these clinicians' notes, such as nuances in the patient's history and the thinking behind the physician's decision-making," says David Hanauer, MD, associate professor of pediatrics at the University of Michigan at Ann Arbor, who developed the system.

Examples of such detail include information about biomarkers, side effects, infections, and clinical outcomes that would be highly valuable in translational research, he notes. EMERSE, which has tens of millions of documents and can integrate them from multiple sources, has been used in a wide variety of applications and in about 700 to 800 studies. It's been used successfully by the university's billing and coding team for complex case reviews, as well as by the university's compliance office, risk management, and infection control departments.

Dr. David Hanauer

The EMERSE data query system speeds searches through clinical notes stored in patients' electronic health records.

The software can keep all the clinical notes organized per patient and can search hundreds of patients' records at once. In addition, it searches for a huge list of terms and acronyms, such as multiple words associated with smoking (tobacco, cigars, etc.) and abbreviations like ROM for range of motion.

"Historically, people have had to open up every note and read through them all manually," Dr. Hanauer says. "It's very hard to scale up unless you have a program team that might be able to run some database queries for you, but they would be very simplistic."

He and colleagues have attempted to get the word out about EMERSE through their website, and a video demonstration on the Clinical and Translational Science Awards (CTSA) website.

Scripps Tests New Mobile Data Delivery System

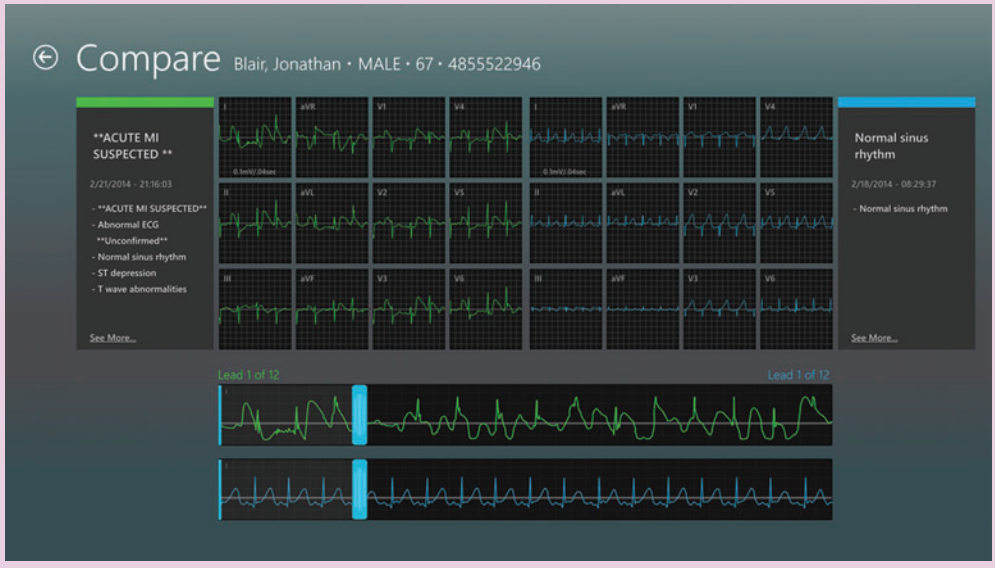
Physicians at Scripps Memorial Hospital La Jolla in California recently completed the pilot study of a software system that securely delivers critical care data from multiple hospital-based patient-monitoring systems to mobile devices.

Known as AirStrip ONE, the system provides physicians and other healthcare professionals with real-time access to patients' vital signs via iPads and smartphones. It has been tested on postoperative patients following open-heart surgery, patients who had experienced trauma, and patients in the hospital's critical care unit.

"I can quickly see what is on the patient's monitor and the history of what was on the monitor," says Scott McCaul, MD, medical director of the hospital's critical care unit, who helped assess the technology in the pilot study.

Typically, if physicians are not with the patient, they must rely on a nurse or other health care professional to interpret information on the monitors, he notes. With AirStrip ONE, Dr. McCaul says he can access those details directly.

"As a physician, you're not present everywhere, but you're getting calls from everywhere," he says. "The quicker you're able to assess the problem, the less delay and the better outcome for the patient."



AirStrip ONE allows physicians to monitor patients' vital signs on iPads and other mobile devices.

As of press time, results had not been released on the 60-day pilot study, but clinical leaders were considering whether to expand the system's use to study how it might improve hospitalized patient care.

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Immune Cells May Help Predict Response of Patients with Breast Cancer to Chemotherapy

A pilot grant from the Ohio State University Center for Clinical and Translational Science (CCTS) in Columbus has enabled researchers to investigate how levels of particular immune cells might predict whether patients with breast cancer will respond well to chemotherapy.

Robert Wesolowski, MD, assistant professor of internal medicine at The Ohio State University College of Medicine, is collaborating with laboratory colleagues to analyze the connection between myeloid-derived suppressor cells (MDSCs), tumor growth, and response to neoadjuvant (presurgical) chemotherapy. The goal of this type of chemotherapy is to shrink or kill the tumor before surgery occurs.

"Cancer immunology is undergoing a renaissance, and I wanted to see how I could marry my training in medical oncology with my interest in the interaction between cancer and the immune system," Dr. Wesolowski says.

MDSCs were discovered about 15 years ago and are produced in the bone marrow in response to cancer. They can inhibit the immune response against cancer cells by inhibiting cytotoxic T cells, which kill cancer. Dr. Wesolowski notes that chemotherapy may not be enough to overcome this response by MDSCs.

He and colleagues are completing their analysis of the study, which included 24 patients and concluded last summer after 2 years. Preliminary results indicate that women with lower levels of MDSCs at the end of chemotherapy are more likely to have had a complete response to treatment, while those with high levels are more likely to have had residual disease at surgery.

"This was a pilot study to see if we could find any type of signal that could be a predictive marker for response to chemotherapy," Dr. Wesolowski says. "If we do, then we will design larger studies to look at more complete results."

NIH Program Funds Research into Unexplored Genes

Researchers at 8 institutions across the country are attempting to better understand those genes that can be modified by medicines through a new initiative supported by the National Institutes of Health (NIH) Common Fund. Even though as many as 3,000 genes express proteins that can be altered by medicines, only about 10 percent are currently targeted by drugs approved by the U.S. Food and Drug Administration, according to the NIH.

NIH has allocated $5.8 million for the initial phase of the 3-year program, called Illuminating the Druggable Genome (IDG). The initiative is being managed by the National Institute of Diabetes and Digestive Kidney Diseases (NIDDK) and the National Center for Advancing Translational Sciences (NCATS). Program investigators will research understudied genes in 4 gene families: nuclear receptors, ion channels, protein kinases, and G protein–coupled receptors.

"There are 400 genes in these categories for which we have very little information," says Christine Colvis, PhD, NCATS director of extramural therapeutics discovery. "Not much is known about them in terms of their function and how they work, as well as other proteins and receptors they might be influencing."

The funds include a grant to establish a Knowledge Management Center, led by the University of New Mexico in Albuquerque in collaboration with the Icahn School of Medicine at Mount Sinai in New York. Seven other grants will go to the University of North Carolina at Chapel Hill (2 grants); Massachusetts General Hospital in Boston; the University of California, San Francisco; Yale University in New Haven, Connecticut; the J. David Gladstone Institutes in San Francisco; and Baylor College of Medicine in Houston.

Investigators will analyze these uncharacterized genes and share what they learn on a public resource to help scientists build on their findings through both basic and clinical research. They also will develop ways to scale up technology in order to rapidly identify and describe genes they explore.

National Center for Advancing Translational Sciences

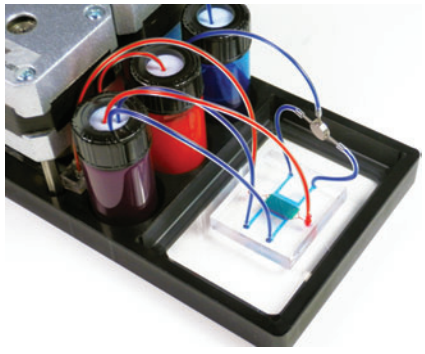
With the help of funding from NIH, NCATS executive Christine Colvis, PhD, and colleagues hope to explore understudied genes that can be modified by drugs.

Tissue Chip for Drug-Screening Program Moves into Second Phase

Researchers recently received funding from the National Institutes of Health (NIH) to move into the second phase of the Tissue Chip for Drug Screening program, which seeks better ways to predict drug safety and effectiveness.

A collaboration involving NIH, the Defense Advanced Research Projects Agency, and the U.S. Food and Drug Administration, the program involves developing 3D human tissue chips that can ultimately be tested with new drugs before they are launched into human clinical trials. Led and partly funded by the National Center for Advancing Translational Sciences (NCATS), the program supported 11 institutions with $17 million in 2014. NIH has committed nearly $76 million to the 5-year program, which launched in 2012.

Current drug safety and effectiveness testing typically relies on animal and cell culture testing. Some 80 percent of candidate drugs fail in human clinical trials because they are found to be unsafe and ineffective, and more than 30 percent fail due to toxicity even though they were promising before human trials, according to NCATS.



John Wilson, Vanderbilt University, Nashville, Tennessee

3D human tissue chips that mimic vital organs may prove valuable in assessing the safety and effectiveness of drugs in development and speed their way to human clinical trials.

"Tissue chips are a multidisciplinary approach where we are taking the best of engineering, biology, and materials science to come up with an in vitro platform of culture cells with 3-dimensional architecture," says Dan Tagle, PhD, NCATS project leader for the program.

During the first 2 years, investigators developed human tissue chips, which are essentially engineered miniature models of living organ tissues on a transparent microchip. They range in size from that of a quarter to a house key, and they are lined by living cells. The chips replicate organ functionality, mimic human biochemical properties, and generate more accurate and detailed data than traditional 2-dimensional cell- and animal-testing methods. Researchers have developed organ chips for the heart, liver, lung, blood–brain barrier, blood vessels, kidney, male and female reproductive systems, and more.

"We have an accurate representation of the tissues, and the task is to test them with a number of training compounds to see if they can predict the toxic response that humans would get and to eventually shorten the drug-development pipeline," Dr. Tagle says. "What we hope to get at the end of the next 3 years is a representation of the entire human body on a chip."

The second research phase is designed to connect individual organs with one another on a chip to better understand their interactions and determine if drugs might be toxic in different organ systems, he adds. CTS