MedicalXpress

Research team issued patent for new anesthesia monitoring technology

June 16 2015

A team of researchers from Wayne State University was recently issued a U.S. patent (# 8,998,808) on a technology that will offer anesthesiologists better methods for monitoring and managing patients in the operating room.

General anesthesia decisions on dosages are challenging and depend on patient medical conditions, surgical procedures, drug interactions, and physiological variables such as blood pressure and heart rate. Therefore, drug impact is difficult to predict subjectively and manually, and depends on extensive clinical experience and highly sharpened vigilance. Errors in anesthesia decisions, while infrequent, can occur even with experienced personnel, and the resulting impact ranges from minor consequences to serious morbidity or even mortality.

While anesthesia has gotten much safer over the years, there is still a need for improved health monitoring systems during surgery. The technology, System for Identifying Patient Response to Anesthesia Infusion, developed by a collaborative team at Wayne State, uses smart, real-time monitoring of patients under anesthesia to provide individualized and dynamic prediction of a patient's anesthesia depth and vital signs, give physicians an early warning if vital signs are predicted to go above the standard threshold, and help anesthesiologists make decisions for targeted anesthesia depths during surgery.

"Our smart anesthesia monitoring system allows physicians to look into the near-future prediction of a patient's vitals and make decisions that

are more objective, timely and accurate," said Le Yi Wang, Ph.D., professor of electrical and computer engineering in WSU's College of Engineering. "The core of our technology is a novel information-processing methodology that uses measured drug rates, physiological signals and real-time data analysis to establish and update individual patient models."

The WSU team consisting of L.Y. Wang, Hong Wang, M.D., professor of anesthesiology in the School of Medicine, and Gang George Yin, Ph.D., professor of mathematics in the College of Liberal Arts and Sciences, have blended their unique mathematical, engineering and medical backgrounds to develop this system. With financial support from The Michigan Economic Development Corporation under its MUCI (Michigan Universities Commercialization Initiative) program, a prototype of the system has been successfully developed and tested with commercial anesthesia monitoring systems.

"The advantages of our smart anesthesia monitor compared to others includes drug impact predictions, optimal drug dosage and critical condition warnings in real time," said Hong Wang. "This ultimately could lead to increased decision accuracy, reduced clinical workload and improved patient care."

"Our monitoring system utilizes stochastic approximation methods," said Yin. "We have been working with Dr. L.Y. Wang on many aspects of system identification for more than 17 years, and with Dr. Hong Wang with a number of medical applications. It is nice to see mathematical methods used in real-world applications."

"We are excited to be working with Drs. Wang, Wang and Yin on taking their technology to the next level in the technology commercialization process," said Joan Dunbar, Ph.D., associate vice president for technology commercialization at Wayne State University. "They have

developed a unique method to monitor patients while under anesthesia, and it offers a new protection and safety measure while they are in surgery. It has great potential to benefit surgeons and patients alike."

Provided by Wayne State University