

Study explores how telemedicine may ease ER overcrowding

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Overcrowding in emergency rooms is a costly and concerning global problem, compromising patient care quality and experience. In a new study, a researcher from The University of Texas at Dallas investigated

whether telemedicine could enhance ER care delivery.

"This longstanding problem is mainly driven by the imbalance between increasing patient flow and the shortage of emergency room capacity," said Dr. Shujing Sun, assistant professor of information systems in the Naveen Jindal School of Management and lead author of the study.

"While the ER is supposed to be a safety net of the health care system, the overcrowding problem has strained this safety net and posits various threats," Sun said. "For example, long waiting times and treatment delays cause adverse patient outcomes, such as high readmission and mortality rates. They also increase financial costs, reduce patients' satisfaction and impair physician efficiency."

In the study, published online Aug. 27 and in the September print issue of the INFORMS journal *Information Systems Research*, Sun and her colleagues investigated the potential of [telemedicine](#) as a generic solution to reduce ER congestion.

Sun said telemedicine, defined as the remote delivery of health care services and clinical information using telecommunications technology, has been gradually adopted in recent years, but there is little evidence on the impact of its applications within the ER setting.

"Telemedicine application in the ER has two distinguishing features from home-based telemedicine," Sun said. "First, patients present in the ER. Second, on-site assistance is available to connect patients and off-site physicians throughout the telemedicine service. Off-site physicians can be within the same hospital, in a different hospital, or even at home, as long as they can connect with emergency patients through videoconferencing tools and have access to patients' health records."

According to the National Hospital Ambulatory Medical Care Survey,

from 2000 to 2015, the number of ER visits in the U.S. increased 27% from 108 million to nearly 137 million. With the sharp rise in ER visits and critical shortages of emergency care physicians, ER overcrowding is not abating, particularly as the COVID-19 pandemic strains the capacity of hospitals nationwide.

Using a large data set covering all emergency visits in New York state from 2010 to 2014, the researchers found that the adoption of telemedicine in the ER significantly shortened average length of stay and wait time.

ER telemedicine improves an on-call physician's efficiency through transportation elimination and smoother workflow, which can shorten a patient's wait for physicians.

For example, when there is an influx of emergency patients, telemedicine enables on-site nurse practitioners or physician assistants to treat patients with minor conditions under the remote supervision of off-site physicians. Sun said this is important because many hospitals require that all patients be seen by an attending physician. With telemedicine, on-call physicians can work from their office without traveling to the ER. Having an on-call physician available through telemedicine also can speed up the ordering of lab work, so that those processes can start long before they otherwise would, and physicians can pivot to their administrative tasks more quickly in between visits.

The researchers replicated the analysis using annual U.S. hospital data and found that ER telemedicine adoption significantly reduces average wait times documented in Medicare.gov's Hospital Compare, or the average time a patient spends in the ER before being seen by a health care professional. That finding suggests that the reduction in length of stay—the total time from the first documented time after arrival at the ER to the time the patient is discharged from the ER—partially comes

from the reduction of waiting time.

Telemedicine could achieve greater efficiencies through several channels, Sun said. In addition to more efficient information exchange, the study showed telemedicine can significantly improve ER care delivery through flexible resource allocation, especially when there is a shortage of on-site [physician](#) staffing or a hospital lacks certain expertise.

For example, whether to administer tissue plasminogen activator after stroke symptoms is a time-sensitive and complicated medical decision. However, some hospitals lack such expertise. Through a telestroke program, a type of ER telemedicine application, on-site emergency physicians can immediately consult remote stroke specialists to perform real-time diagnoses and recommend treatment plans in a timely manner.

"Although the ER seems to be an unlikely place for telemedicine to play its role, it is happening, and in fact, is very promising," Sun said. "We believe our findings are critical for ERs, considering the unique setting of unscheduled arrivals and unpredictability of patient traffic."

It's important to note that the improvement in care delivery does not come at the expense of care quality or patient cost, Sun said.

The study provides health care decision-makers with a careful examination of the causal implications of ER telemedicine on care delivery efficiency, care quality and medical expenditure.

"Due to the lack of evidence and the inflexibility of reimbursement policy, the adoption rate of telemedicine in the ER remains low and is growing only slowly," Sun said. "Policymakers can incentivize adoption of ER telemedicine by reducing regulatory barriers, such as lifting restrictions regarding cross-state practitioners' licensure and providing

better reimbursement coverage."

With the current global COVID-19 pandemic and the expanded use of telemedicine applications in recent months, Sun said telemedicine has shown its promise to protect patients and providers without compromising health care access.

"When more and more hospitals join the resource-sharing network, telemedicine will have great potential to rebalance the geographically imbalanced health care resources and reduce health care access disparity," she said.

The use of telemedicine during the pandemic offers researchers an opportunity to take a more in-depth look. Sun plans to conduct further research to gather a better understanding of whether, how and why telemedicine functions in various health care situations.

Co-authors of the paper included Dr. Susan F. Lu of Purdue University and Dr. Huaxia Rui of the University of Rochester.

More information: Shujing Sun et al, Does Telemedicine Reduce Emergency Room Congestion? Evidence from New York State, *Information Systems Research* (2020). DOI: 10.1287/isre.2020.0926

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