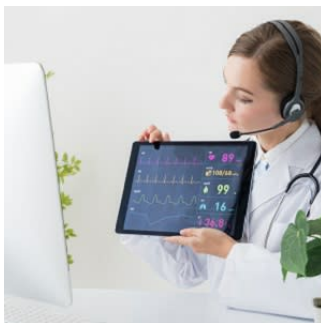

How effective are ICU telemedicine programmes?



Critical care is both resource intensive and costly, consuming nearly 15 percent of all hospital costs in the United States. With the demand for critical care outpacing the supply of intensivists in the setting of the ageing U.S. population, ICU telemedicine has been proposed as an intervention that may help alleviate this workforce crisis.

This review article discusses the different organisational models of ICU telemedicine, factors that have influenced its adoption, and the evidence regarding its effectiveness.

ICU telemedicine is defined as the provision of care to critically ill patients by healthcare professionals located remotely. It is a particularly appealing strategy because of its potential ability to improve access to trained intensivists, whose in-house presence is associated with lower mortality, shortened ICU length of stay (LOS), and lower costs for critically ill patients.

ICU telemedicine providers typically use electronic medical records combined with audiovisual technologies to assist bedside caregivers in patient care activities, including best practice adherence, monitoring of clinical stability, and the creation and execution of care plans.

The most common models of ICU telemedicine implementation include:

- Centralised telemedicine unit uses a hub-and-spoke model from which critical care services originate. The hub (or centre) is the remote site from which a multidisciplinary team (including variable combinations of intensivists, nurses, advanced practitioners, pharmacists, respiratory therapists, and administrative staff) provides off-site monitoring for critically ill patients.
- Alternatively, the decentralised model uses a reverse hub-and-spoke model, in which there is no central monitoring facility. In this model, computers equipped with audiovisual technology are also located at sites of patient care, but the remote monitoring occurs from sites of convenience for individual remote care providers, such as physician offices or homes.
- ICU telemedicine programmes may implement a reactive model, in which telemedicine providers respond to automated alerts for worrisome trends that may not yet be recognised by the bedside providers or to requests for involvement from bedside providers.
- In contrast, a proactive model typically involves the continuous remote surveillance of patients, including the methodical review of patient data and best-practice adherence (e.g., lung-protective ventilation for patients with acute respiratory distress syndrome).
- Scheduled (i.e., pre-emptive) care models also exist, in which virtual visits by the remote provider occur at defined times rather than in response to prompting from the bedside team.

Patient safety and increased access to an intensivist workforce that falls short of demand are often cited as primary motivations for adoption. ICU telemedicine programmes may also aid in the identification of patients appropriate for transfer to higher levels of care; alternatively, the

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supplemental care provided by the remote clinicians may enable patients to remain in their community facilities who would have otherwise been transferred.

In addition, some hospitals have viewed ICU telemedicine as a way to build relationships with smaller hospitals, support the development of regional care delivery systems, increase revenue by selling their ICU telemedicine services to unaffiliated hospitals, enable hospitals to provide high-risk procedures to patients with complicated medical histories, or distinguish themselves in competitive markets.

Identifying ways to improve collaboration and integration between the ICU remote team and the bedside providers is important for the effective implementation of ICU telemedicine programmes. For instance, studies in which the remote team was allowed full discretion in the care for all patients showed significant associations with improved mortality and LOS with the intervention. In addition, the use of a direct intervention with timely notification strategy by the remote ICU telemedicine team, rather than a passive monitor and notify approach, has been associated with improved outcomes.

It is also important to account for local culture and resources when deciding whether to implement ICU telemedicine in a particular healthcare system.

Although several decades of research have suggested many areas of potential benefit, we still lack understanding about how best to apply and leverage this technology to maximise its value and effectiveness. Future research using mixed-methods approaches and validated models for evaluating public health interventions will be essential to understand how, when, and whether ICU telemedicine should be implemented.

Source: [Annals of the American Thoracic Society](#)

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