

Chapter 7.1

Sociotechnical Issues of Tele-ICU Technology

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ABSTRACT

Intensive care units (ICUs) are highly complex organizations where lives are hanging by a thread. Approximately 400,000 to 500,000 people die each year in American ICUs. The highly complex environment and large responsibilities put a burden on ICU staff including physicians and nurses. Research has shown that ICU physicians and nurses report high levels of workload and burnout that are related to lower quality of care provided to ICU patients and patient safety problems. Furthermore, there is a shortage of ICU personnel. In the past decades, the number of critical care beds has

increased while the number of hospitals offering critical care services has decreased. Telemedicine may be one solution to deal with the shortage of ICU personnel. The tele-ICU technology represents the application of telemedicine in ICUs: ICU patients are monitored remotely by physicians and nurses trained in critical care. Recent estimates show that a nurse in the tele-ICU environment can monitor as many as 50 ICU patients in different ICUs, using the most recent telemedicine technology that provides access to patient information as well as video and audio links to patient rooms. The physicians and nurses in the tele-ICU collaborate with the physicians and nurses in the ICUs in what can be considered virtual teams. We know little about how the virtual team characteristics

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affect communication and trust between the participating members of the team. Furthermore, we know little about how the technological environment of the tele-ICU may affect the physicians and nurses' workload and possibly burnout, and how this may affect quality of care and patient safety. In this chapter we describe the ICU and tele-ICU from a sociotechnical perspective, and examine how organizational factors may affect the jobs of nurses in the tele-ICU, and possible consequences for quality of work life, quality of care and patient safety.

INTRODUCTION

The delivery of health care is going through major changes, including reduction of hospital stays and increasing severity of hospitalized patients. The provision of critical care provided to patients spread over large geographical regions such as the US or Australia has become increasingly difficult because of shortage of critical care staff (in particular, physicians and nurses) and lack of access to critical care expertise. Telemedicine is seen as an answer to providing care remotely (Field 1996; Norris 2002); the tele-ICU technology is the application of telemedicine to support critical care. In this chapter, we review sociotechnical issues related to the implementation of tele-ICU technology. We first explain the challenges related to critical care and then describe the tele-ICU technology. We discuss the major sociotechnical issues related to the tele-ICU technology, i.e. communication, trust, conflict management and performance of tele-ICU nurses and physicians.

GENERAL CONTEXT OF ICUS

People are living longer than ever before. The number of older Americans, people age 65 and older, is expected to double from 36 millions in 2009 to 72 million by 2030 (Administration on

Aging, 2009). A study comparing the number of adverse events between patients under age of 65, and patients 65 and older, demonstrated that adverse events are more prevalent among the older patients (Thomas and Brennan 2000). Care of the older patient is frequently more complex because of the high number of drug orders and procedures performed, and the fact that older patients frequently do not present typical signs and symptoms of diseases (Thomas and Brennan 2000; Breslow, Rosenfeld et al. 2004). Between 1985 and 2000, the number of critical care beds has increased by 26.2% in the US, while the total number of hospitals offering critical care services has decreased by 13.7% (Halpern, Pastores et al. 2004). Due to the current shortage of ICU qualified staff, only 10 - 12% of US ICUs offer 24-hour coverage by intensivists (Pronovost, Angus et al. 2002). This statistic is worrisome as numerous studies have shown that the presence of intensivists can reduce mortality, morbidity, length of stay, resource utilization, and ICU charges (Pronovost, Angus et al. 2002; Breslow, Rosenfeld et al. 2004) as well as reduce the risk of death by 40% (Pronovost, Angus et al. 2002).

Approximately 400,000 to 500,000 people die each year in ICUs (Angus, Linde-Zwirble et al. 1996). The ICU is a fast-paced, complex, high-risk, and team-oriented environment. Patients in ICUs are critically ill and receive roughly twice as many medications as non-ICU patients (Wu, Pronovost et al. 2002). A study conducted by Donchin et al. (1995) estimated that 1.7 errors occurred per patient per day in ICUs. Many of these errors appear to be system-related and therefore patient safety researchers suggest system approaches to reduce errors and improve the quality of care in ICUs (Carayon, Hundt et al. 2006).

ICU: Organizational Characteristics

From an organizational theory perspective, ICUs can be considered complex organizations providing services (Hoonakker, Carayon et al.

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