Practitioner Attitudes towards an Early Warning System: From Professional Distraction to Relational Support

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EXTENDED ABSTRACT

As the general population ages and life expectancy increases in the United States, demand for virtual health care is also on the rise. Undoubtedly, the next several decades will see a rise in automated patient care and the widespread use of data-driven warning systems, trends which have already accelerated in the wake of Covid-19. Thus, understanding how traditionally trained healthcare practitioners respond to predictive analytics, like early warning systems, is vital for their successful implementation in the future.

An example of an early warning system is the Rothman Index [1][2], which is a proprietary closed source algorithm that uses vital statistics, lab results, and other health related information to predict health deterioration. This qualitative research project focused on a local hospital that implemented the Rothman Index across units several years ago and has recently made the decision to terminate their contract with Rothman. We conducted observations in a Virtual Intensive Care Unit (VICU) where nursing staff mediate between databases like the Rothman and patient care on the hospital floor, deciding when to call floor nurses about alerts they receive through the system. This presentation will report on findings regarding practitioner attitudes towards early warning systems derived from interviews with two groups: 1) nurses working in the VICU and 2) hospital administrators involved in the decision to implement the Rothman and to dissolve the contract.

Tele-ICU technology has been expanding rapidly and as of 2008 had been implemented in 28 states covering more than 200 hospitals and 40 healthcare systems [3]. Previous research on tele-ICU's has found high levels of resistance from healthcare workers partly related to disruptions in communication workflows [4]. Workers are more likely to continue reporting information according to their chain-of-command on the hospital floor rather than to involve the tele-expert in decision-making [5]. In addition, workers tend to be resistant to the experience of being monitored by tele-ICU staff [5]. Meanwhile, research on early warning systems has found challenges with provider buy-in [6], delays in documentation [7], and warning fatigue, which is often coupled with decreased compliance [8].

Our findings both reinforce and also extend previous research on tele-ICU's and early warning systems, offering important insights into the relational and organizational dynamics that underlie their implementation. Hospital administrators had a high level of skepticism for early warning systems and most attributed the Rothman's implementation to a single individual with wide-spread organizational influence. Administrators also repeatedly questioned the validity of studies demonstrating improved outcomes using early warning systems and doubted the ability of such systems to out-perform practitioner attention or response times. On the whole, they viewed the systems as distracting and a drain on hospital resources.

Along similar lines, nurses in the VICU were skeptical about the ability of the Rothman to predict patient deterioration more accurately or efficiently than nurses on the floor. As day-to-day mediators, they frequently experienced flaws in the algorithmic design. For example, they would receive alerts about pre-surgery patients who had not eaten in 12 hours; however, these patients are typically NPO (nothing by mouth). However, many of the nurses noted the relational benefits of the Rothman for improving interactions between the tele-ICU and the floor nurses. While these relationships were described as "always a little dicey," alerts from the Rothman offered a structured system in which VICU nurses could provide support. They found that especially for newer floor nurses this facilitated a mentoring relationship that was mutually beneficial and extended beyond just alert response.

Overall, healthcare workers are more willing to accept the use of technology in their workplace when they see tangible benefits to themselves. Administrators who were removed from everyday interactions with algorithmic systems were highly skeptical of their utility. In contrast, those who frequently mediated between the Rothman and

the hospital floor were able to weigh frustrations with the algorithm's shortcomings with the positive relationship-building that emerged through interactions with the system. This points to the need for more communication between providers and administrators about day-to-day experiences with algorithmic systems, as well as the need for more qualitative research to gain a complete picture of the potential benefits of early warning systems and strategies to support successful implementation.

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