Utilize the "Human Factors Engineering" Model for Telemetry Alarm Problems

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OBJECTIVE

Address telemetry alarms that are frequently misunderstood, disregarded and overridden. The objective is to redesign and reprioritize alarms to better discriminate alarm sounds and displays in a hospital.

METHODS

The "Human Factors Engineering Model" is based on a four year Patient Safety Learning Laboratory funded by the Association for Healthcare Research and Quality at The Ohio State University. The model is an alarm ontology, with a focus on the Second Alarm Notification System (SANS). Cardiac monitoring policies are continuously assessed, which means alarms are prioritized to help reduce response times and background noise.

EXAMPLES:

- High and low heart rate alarms are combined with tachycardia and bradycardia rates.
- Nurses are given greater authority to adjust heart rate and pulse oxygenation.
- Asses if patient is low-risk and needs cardiac monitoring.
- Patient volunteer survey: Agreement with statements about preferences, understanding, and emotional relations to telemetry alarms.

Clinical Monitoring: Cardiovascular Alarms

Urgency and SANS Strategy		Example
High	Triggered from ECG monitoring. Nurse Response time 2 min or urgently. Even if this is a high false alarm type, it does not go off often. This is an actionable alarm if true.	Asystole Vfib Vtach
Medium	Makes nurse aware of important change in condition. It is not required that this alarm be actionable, because it might not be new information.	Heart Rate (HR) high Heart Rate (HR) low
Low	Makes nurse aware that something has happened in the last few hours on a shift.	Premature Ventricular Contraction Noninvasive Blood Pressure

RESULTS

Telemetry and other medical device alarms are split into five different categories based on urgency. Categories one through three identifies who initiates the alarms (hospital staff, patient, or machine). Category four distinguishes whether it is a clinical or technical alarm, and category five are clinical functions. Identifying patterns are then used for system improvements. Alarm sound, pitch, and tempo are then adjusted to help technicians and nurses discriminate alarms from bedside medical devices, central monitoring stations, and secondary alarms.

CONCLUSION

The "Human Factors Engineering Model" helps hospitals to regularly redesign systems to better prioritize alarms from different devices. By doing so, common missteps are avoided; this allows for better nurse response times.

REFERENCE

Patterson, E. S., Rayo, M. F., Edworthy, J. R., & Moffatt-Bruce, S. D. (2021). Applying human factors engineering to address the telemetry alarm problem in a large medical center. Human Factors: The Journal of the Human Factors and Ergonomics Society, 64(1), 126–142. https://doi.org/10.1177/00187208211018883

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