

# Surveillance Monitoring of General-Care Patients

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## An Emerging Standard of Care

### PART THREE

## **ALARM AND ALERT MANAGEMENT**

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## PART THREE: ALARM AND ALERT MANAGEMENT

### Alarm and Alert Management: Implications of Surveillance Monitoring

For the purposes of this document, Alarms and Alerts are defined as follows:

**Alarm** is a term which represents the internal state of a system (recognition).<sup>1</sup> **Alert** is a term which refers to the annunciation of the alarm state (reporting). An alert is a message and the by-product of an alarm condition – they are not synonymous.

### Surveillance Monitoring: Setting the Parameters

When determining alarm and alert strategies for surveillance monitoring, the fundamental questions are: Why is the patient being surveilled? What are the primary goals of surveillance? Is monitoring to be primarily predictive, detective, or both? To help answer these questions, Devita et al divide monitoring goals into two broad categories: prediction and detection.<sup>2</sup> They define prediction (prognostication) as the estimation of the risk of deterioration over various time frames, and detection as the recognition of critical illness at a particular moment. These two types of monitoring may have different data requirements,

but since it is unknown when any given patient might begin to deteriorate, it makes sense that detection will be better served by frequent if not continuous measurements.

A recommended approach is to begin with detective monitoring: the identification and reporting of clinically significant deterioration or the emergence of a new clinical condition. In “detective mode,” surveillance monitoring can be viewed as an ongoing diagnostic test that is continuously assessing the patient for the emergence of new clinical states (recognition). If alarm thresholds are set too liberally, the monitoring will be highly sensitive, but will generate a high level of clinically non-actionable alerts that can contribute to alert fatigue. Since many physiological derangements are transient, self-limited alarm delays may be used to improve specificity. But if delays are too short, specificity will suffer and again result in non-actionable alerts.

So what is best approach to setting alarms, alerts, and alert-delay thresholds? Unfortunately there is little scientific literature or national standards to look to for guidance.

In the absence of ‘best practice’ evidence, Sotera offers a uniquely data-driven approach in which

hospitals can draw on its cloud-based, high-fidelity database, currently comprising almost 60,000 hours of physiological monitoring data gathered from multiple facilities and over 2000 patients. Data from the ViSi Mobile® Patient Monitoring System is extracted and uploaded to a secure platform where customized tools allow for evidence-based simulations. These tools allow hospitals to predict, based upon their own set of alarm thresholds, what the subsequent alert volumes will be, enabling a very tailored approach to setting alarm sensitivity and specificity.

At first, some clinicians may consider the resulting alert parameters as extreme or risky, since these are likely to be very different than what clinicians have used in the past. However, it is important to recognize that because alerts will fire infrequently, the information should have a high degree of actionability, thus minimizing the problem of alert fatigue. Finally, within the first few weeks after installing ViSi Mobile, the client’s own data can be used to further refine the alarm settings.

### Surveillance Monitoring and Message Volume

One of the biggest challenges facing hospitals today is managing the large volume of data gen-

erated by the growing number of systems and devices, to help ensure that the staff receives truly actionable information. Staffs are increasingly using smartphones and other devices to send voice and text messages. Hospitals need to manage the expectations and responsibilities of both sender and receiver. In addition, more equipment and systems now send status and activity information to clinicians over existing hospital-based networks. Unless properly set and managed, surveillance monitoring alerts, which add to nurses' message load, may contribute to dissatisfaction and alarm fatigue.

## Alert Reporting

The purpose of an alert is to attract attention and initiate action from a responsible recipient. If an alert occurs behind closed doors and goes unnoticed, the system has failed – thus the importance of a robust reporting (annunciation) process cannot be overemphasized.

Although a special type of message, an alert should conform to the same requirements as any other: it must be the right message sent to the right person at the right time, in the right context, in the right format, using the right technology and security.<sup>3</sup> Alerts can be generated by

a technician watching a monitor, routed via middleware to compatible phones and tablets, directly trigger a rapid response team via paging or texts, or trigger decision support rules hosted by the hospital or EHR. Deciding how to route alerts should be done through multidisciplinary collaboration involving nursing, information technology (IT), medical leadership, and rapid response system/emergency code oversight committees.<sup>4</sup> The ultimate outcome of a surveillance monitoring alert is an intervention by a nurse or a rapid response team.

To maximize the value of alerts, careful thought must be given as to when and how to notify staff members of a patient's condition. When should information be passively provided and when should it be actively pushed? An analogy may help clarify this distinction:

While driving my car, how am I messaged about my speed? Passively, my speed of travel is constantly presented to me via the dashboard speedometer, which does not block my view of the road and can be accessed comfortably and safely within my normal workflow (driving). When I exceed the speed limit, I am aware of the situation because the information is continuously present and visu-

ally accessible. When, however, I exceed 80 mph, an audible alert is fired, actively pushing the speed warning to me: the situation is dangerous and I must take action. This customized alert is based on my specific driving habits and individual requirements and is analogous to the individualized monitoring plans recommended in the medical literature for surveillance monitoring.<sup>2</sup> In general, patient monitoring plans should include:

- Description of the parameters to be measured
- Assessment frequency
- Values requiring specific pre-defined action

A plan should also take into account:

- Severity of illness
- Co-morbidities
- Age
- Therapies being delivered

Any nursing intervention has consequences. At a minimum, an alert distracts the recipient from the work at hand; at worst, a clinically false positive alert may result in errors of omission (alert fatigue) and/or commission (taking action when none was truly indicated). In addition, all monitor alerts add to the volume of messages clinicians already receive.

If alerts are triggered by events associated with only minor

outcomes, staff will have little tolerance for false positive alerts. Conversely, if the potential outcome is sufficiently injurious, staff members will tolerate more false positives. If an alert was triggered by imminent cardiac arrest, staff will tolerate more false positives than if the outcome is simply a reapplication of the patient's low-flow oxygen cannula.

## CONCLUSION

No nurse should enter a room and unexpectedly find a patient in extremis or worse; surveillance monitoring provides an important safeguard, protecting patients when the nurse is not in the room, in order to prevent such a catastrophe from happening. The initial implementation of surveillance monitoring parameters should aim to prevent a worst-case scenario. Personal monitoring plans are recommended, taking into account the patient's clinical situation and plan of care. With ViSi Mobile, hospitals can use Sotera's proprietary database to customize their initial alarm limits and later use their own data to refine alarm performance.

*For further information about ViSi Mobile, please contact Mary Savoy, Clinical Director of Marketing at [Mary.Savoy@soterawireless.com](mailto:Mary.Savoy@soterawireless.com)*

### References

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