Healthcare

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Sensor-generated Data: A Guide to Promoting Safe, Effective Use

Wearable sensors, "smart room" tracking devices and related technologies are widely used in aging services facilities to remotely observe resident location and movement, monitor vital signs and behavior patterns, and assess equipment functioning and environmental conditions. (For examples of sensor technologies, their major benefits and relevant settings, see the diagram on page 2.)

Sensor-generated data can do much to enhance resident safety, identify clinical and behavioral trouble signs, and support compliance with care plans. However, as these systems are based on passive observation, they may heighten liability exposure if staff members miss alerts, fail to detect malfunctions, neglect required documentation or come to rely more on device readings than their own judgment. An effective risk management program is essential to ensure that sensor-enabled tools serve to support resident care and supplement staff observation and interaction.

To help aging services organizations maximize the benefits of sensor-generated data and minimize associated risks, this edition of *AlertBulletin*® notes common clinical and operational risks and offers suggestions in such key areas as oversight, policies and procedures, staff training, communication with residents and families, and quality assurance and performance monitoring programs. It also includes a sidebar on page 4 that outlines key advantages and limitations of sensor systems, offering organizations a quick reference point as they evaluate and adopt sensor technology.

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Quick Links to CNA Resources

- *AlertBulletin*® 2023-Issue 4, "Remote Patient Monitoring: Five Basic Risk-reduction Strategies."
- *CareFully Speaking*® 2026-Issue 2, "Artificial Intelligence: A Brief Risk Control Guide for Aging Services Organizations."
- *Vantage Point*® 2024-Issue 2, "Telemedicine Update: Coordinating Remote and In-person Care."

Sensor-generated Data: At a Glance

Common Technologies

Wearable devices for continuous monitoring of vital signs and biometrics.

Motion detection sensors, tracking bathroom usage and other activity patterns.

Fall detection technologies, including bed- and chair-exit sensors.

Smart medication compliance tools, integrating real-time intake monitoring, automated reminders and AI-generated adherence insights.

Door alarm and wander management systems, including tracking devices.

Environmental sensors capable of regulating temperature and humidity, detecting water leaks and monitoring air quality.

Major Benefits

Increase staff productivity by automating routine monitoring, enhancing situational awareness and facilitating workload triage.

Mitigate resident fall risk by detecting instability, unsafe transfers and high-risk movement.

Prevent elopement and unsafe egress by tracking resident location and behavior patterns.

Detect early signs of physical and mental decline by integrating biometric and behavioral data.

Improve trust and transparency by facilitating data-based reporting of safety events and staff response.

Applicable Settings

Independent living.

Assisted living.

Memory care.

Skilled nursing.

Home- and community-based services.

Continuing care retirement communities.

Identifying Exposures

The following potential liability exposures, among others, should be considered when developing policies and procedures for sensor devices to promote their safe and effective use:

Cybersecurity and data confidentiality risks. Connected devices heighten exposure to unauthorized access and network infiltration threats, while cloud storage and data-sharing practices create additional vulnerabilities, including weak vendor access controls, lax security practices and device misconfigurations. These risks underscore the need for policies that strengthen technology oversight, bolster data security, establish sound vendor requirements and expectations, and reduce overall exposure by mandating ongoing monitoring of data integrity and system performance.

Overreliance on technology. Sensors should function as a supplement to resident observation and clinical judgment, not as a substitute for human involvement. Training should emphasize that excessive dependency on devices may cause staff to interpret no-alert as no-risk, assume that devices always work properly or treat sensor-derived data as clinically definitive.

Privacy, dignity and autonomy concerns. Residents and families may view sensors – particularly in bedrooms, bathrooms and memory care settings – as intrusive or stigmatizing. Staff should clearly explain the purpose of data sensors when they are installed, as poor initial communication can erode trust; create concerns about privacy, dignity and autonomy; and pave the way for later complaints and lawsuits.

Missed and false alarms. Vital alerts generated by data sensors may go unseen, unheard or unaddressed, while false and excessive alerts can lead to alarm fatigue. To ensure that sensor-generated alerts are consistently and effectively responded to, and to minimize incidence of alarm fatigue, staff should be trained to understand sensor strengths and limitations. In addition, written policy should address oversight roles, staffing levels, alert volume, response protocols and time frames, off-shift coverage expectations and incident escalation procedures, among other issues.

Device failure and maintenance lapses. Reliable sensor performance requires ongoing, well-documented maintenance, including regular software updates, device calibration and battery testing, as well as periodic checking of device placement and overall system functionality.

Documentation and litigation risks. In the event of a claim, the plaintiff attorney may question whether sensor-generated data were promptly reviewed and appropriately responded to. For this reason, organizations must carefully document sensor use and data obtained, and retain these records for a reasonable period, as determined in consultation with legal counsel. (Note that such records are also essential in the context of regulatory actions, site surveys and internal investigations.)

Mitigating Risk

The following table summarizes key areas of liability exposure related to sensor-generated data and corresponding measures to mitigate these risks. As vulnerabilities vary, organizations should conduct their own assessments and tailor these measures, among others, to their specific operational needs.

Governance and Oversight

Under the guidance of executive leadership, appoint a team to supervise the safe deployment of sensor-related technology and develop policies addressing the following issues, among others:

- Indications for and restrictions on use.
- Resident eligibility.
- Authorized settings.
- System oversight and performance monitoring.
- Review triggers, including resident safety incidents, device malfunctions, introduction of new device features or updates, and instances of noncompliance with safety standards or guidelines.

Monitor basic performance indicators, including (among others) adverse events, missed events, workflow failures, equipment malfunctions and staff complaints of alert fatigue.

Assess effectiveness of oversight and governance protocols on an annual basis and document findings.

Staff Training

Train staff to understand both core technology functions and their specific job-related responsibilities, including the following:

- What the sensor system does and does not do.
- When sensors should and should not be used.
- Documentation requirements.
- Alert monitoring duties.
- Response and escalation procedures.
- Device troubleshooting basics.
- Downtime protocols and device failure response.

Instruct staff to uphold resident privacy and dignity in all interactions involving sensor-generated data.

Warn staff of the dangers of overreliance on technology, underscoring the continuing importance of clinical judgment, direct observation and timely follow-through.

Resident/Family Communication

Communicate straightforwardly with residents and families – i.e., avoid overpromising and clearly state that while sensor devices can support care and resident safety, they do not eliminate risk.

Reinforce realistic expectations on the part of residents and family members by being clear, direct and consistent about what sensor technology can and cannot do, and document these discussions in the resident care record.

Formulate a legally compliant informed consent process for sensor use, involving both resident and family, and retain signed consent forms in the resident's healthcare information record.

Quality Assurance and Performance Monitoring

Track key performance indicators for sensor-generated data, including the following, among others:

- Alert volume by device type.
- False-positive frequency.
- Response time trends.
- Staff training completion.
- Care plan changes triggered by sensor data.
- Device downtime.
- Adverse events.

Include questions about sensor use in satisfaction questionnaires and periodically review survey findings and sensor-related complaints to identify problems requiring corrective action.

Establish a formal assessment schedule for sensor devices that includes an initial "pilot" evaluation, routine monthly or quarterly interdisciplinary reviews, post-incident investigations, and an annual analysis of policy/procedure and system performance.

This table serves as a reference for aging services organizations seeking to evaluate risk exposures associated with sensor-generated data. The content is not intended to represent a comprehensive listing of all actions needed to address the subject matter, but rather is a means of initiating internal discussion and self-examination. Your organization and risks may be different from those addressed herein, and you may wish to modify the activities and questions noted herein to suit your individual organizational practice and resident needs. The information contained herein is not intended to establish any standard of care or address the circumstances of any specific healthcare organization. It is not intended to serve as legal advice appropriate for any particular factual situations or to provide an acknowledgement that any given factual situation is covered under any CNA insurance policy. The material presented is not intended to constitute a binding contract. These statements do not constitute a risk management directive from CNA. No organization or individual should act upon this information without appropriate professional advice, including advice of legal counsel, given after a thorough examination of the individual situation, encompassing a review of relevant facts, laws and regulations. CNA assumes no responsibility for the consequences of the use or nonuse of this information.

Weighing Advantages and Limitations

The following chart lists some pros and cons of sensor use, which should be considered when adopting these tools and creating related risk management plans:



Enhanced resident safety due to early detection of fall risk, bed exits, wandering and elopement, as well as shifts in resident activity patterns.

Quicker intervention and better care planning attributed to timely identification of changes in resident function, mobility and sleep patterns, as well as toileting and other routines.

Improved staff performance through smoother prioritization of tasks and more thorough retrospective review of adverse events.

Clearer communication with families, as recommendations are supported by objective data.



Possibility of false alarms generated by monitoring devices, as well as expanded response obligations for staff, which can impair morale, heighten turnover and result in staffing issues.

Potentially burdensome documentation expectations, as detailed and timely records of sensor-generated data may be requested to meet regulatory expectations, support audits and show adherence to standards of care.

Heightened vendor-related risks, creating exposure to data exploitation or theft when technology partners are not adequately vetted for cybersecurity safeguards.

Greater discovery-related exposure in the event of litigation, especially when documentation of sensor-generated data is inconsistent or incomplete.

The aging services industry has become increasingly reliant upon wearable and environmental sensors, which allow wide-ranging, real-time monitoring of resident vital signs, movement, overall physical condition and behavior patterns. While these benefits are very real, the technology also produces various liability exposures, ranging from violation of privacy and potential missed or false alerts to data breaches and heightened documentation requirements. By instituting sound operational and oversight protocols and training staff to avoid overreliance on sensor technology, organizations can enhance resident safety while keeping risk to a minimum.

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