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Data, Teamwork Thwart Smart Pump Alert Fatigue

By Jillian Mock

The hospital soundscape is crowded, and filled with beeps and alerts signaling different problems—some urgent and others ultimately insignificant. Many of these alerts come from smart infusion pumps meant to reduce medication errors.

When the pumps sound unnecessarily, however, the noise can numb providers to real alerts. This phenomenon, known as alert fatigue, is a serious issue in medicine. When nurses, physicians, pharmacists and other clinicians are overwhelmed by unimportant alerts, it can be easier for them to miss or dismiss other alerts that signal real danger.

“Alarm or alert fatigue desensitizes us to a safety intervention that should be telling us we should do something,” said Kathryn Marwitz, PharmD, MPH, an assistant professor of pharmaceutical sciences, social and administrative sciences, at Manchester University, in Indiana. “That desensitization means that we are losing that patient safety element built into the pump; we want the pump to tell us when something is going wrong.”

Over the last 15 years, smart infusion pumps have become a routine and important part of medical practice. Respondents to a recent Institute for Safe Medication Practices (ISMP) survey reported 99% of their institutions used smart pumps to administer IV medications, 96% for IV fluids and 93% for blood (bit.ly/3RAV42u).



The devices catch dosing errors and warn providers when a patient is in distress. But the pumps are not perfect and errors still occur. Respondents to the ISMP survey wrote more than 700 comments about how the devices could be improved, citing false alarms, frequent overrides due to unacceptable limits and issues updating the drug library.

“Overall, organizations probably haven’t maximized what the pump can do in terms of safety,” Michelle Mandrack, MSN, RN, the director of consulting services at ISMP told *Pharmacy Practice News*. A 2021 ASHP guide to improving smart pump usage (bit.ly/3fG1iRo) echoed the same sentiment: “Many errors still occur because health care organizations and clinicians are not optimizing the use of [dose error reduction software] technology.”

To improve safety and reduce alert fatigue from smart infusion pumps, experts recommend a variety of interventions involving drug libraries, staffing and other key operational areas (box). “We never want to be dull to what an infusion pump is doing and what it’s telling us,” said Dawn Berndt, DNP, RN, CRNI, the director of publications and educational design at the Infusion Nurses Society.

Clinically Insignificant Alerts

Clinically insignificant “alerts” are distinct from “alarms” generated by smart pumps. Alarms are triggered by something physically wrong: air in the line from priming too quickly, occlusion, pressure buildup or a malfunction. Clinically insignificant alerts, meanwhile, are triggered by soft or hard limits for a given medication as programmed in the drug library.

The causes of clinically insignificant alerts are pretty multifaceted, Dr. Marwitz noted. They often happen when pump settings are not tailored to the patient population or hospital where they are being used, she said. The out-of-the-box settings will not necessarily be relevant to all groups. For example, the smart pump needs for a pediatric facility are very different from those of an adult ICU or oncology ward.

Another common cause is when the indications for a particular medication—a change to dosing limits or infusion time or speed—are made but the drug library has not yet been updated to reflect the new practice, noted Sharon Thompson, PharmD, a drug information specialty practice pharmacist at The Ohio State University, in Columbus. For example, a new chemotherapeutic agent could have a new indication that uses a higher dosage than before based on new research. (The oncology world is often where medication dosage, duration and speed change most frequently, she noted.) Or perhaps a drug has a new soft limit, but the pumps are updated quarterly and the drug library has not yet been updated, she added.

“If the hard and soft limits are not adjusted regularly or adjusted according to how the medication is ordered, the nurses will hit a soft limit that allows them to override the pump,” Dr. Berndt said. “The nurse then is trained to look past or override soft-limit alerts because they happen way too frequently.”

Some medications also are inherently more difficult to program, including titrated medications or those that vary depending on the patient, such as narcotic or insulin drips, Dr. Thompson said. Pharmacists try to build limits that are true for 85% to 90% of the population, but there’s always an odd patient who requires going outside that norm, she said. Medications that do not have a universal maximum dose published pose a similar challenge, Ms. Mandrack said.

Clinically insignificant alerts also can be the result of conservative medical practice, Dr. Marwitz said. Providers and hospital administration can be scared to take alerts away to ensure they catch all problems, but overdoing the alerts comes with risks as well.

More Actionable Warnings

Organizations can follow several best practices outlined below to improve smart pump function and reduce the number of clinically insignificant alerts generated by smart pumps.

Start smart. Smart pump optimization should begin with pump setup and implementation, Dr. Marwitz noted. That means ensuring the drug library is set up to serve the specific patient population of a particular medical facility; adult versus pediatric drug libraries are going to be quite different, for example, she reiterated. All pumps should be set up and programmed correctly, and staff members should be trained about using those particular pumps appropriately, she said. Education should be provided to staff and even patients about the pumps, what they do and what their alerts mean.

Strive for consistency. When building your smart pump library, consistency is key, Dr. Thompson said. That can mean deciding what the standards are for specific medications and not offering multiple choices unnecessarily. For example, select a standard concentration for continuous infusion; if a package insert says to dilute in 50 or 100 mL, choose one as the institutional standard, she said. This can help eliminate alerts generated by human error. "One of the major ways to help eliminate alerts is to eliminate the human element and keystroke errors."

12 Ways to Improve Smart Pump Safety and Reduce Alert Fatigue

1. Set up patient population–specific drug libraries.
2. Track pump data for trends that require pump adjustments.
3. Frequently update drug libraries with changing clinical guidance.
4. Take recommended changes to the drug library through the hospital's medication safety committee.
5. Have a multidisciplinary team in place to evaluate and enact drug library updates.
6. Ensure the entire smart pump fleet is always up-to-date.
7. Standardize as much as possible across all major formulation types (e.g., continuous infusions).
8. Ensure adequate staff training.
9. Collaborate with different departments within the hospital to ensure all stakeholders are invested in smart pump accuracy and optimization.
10. Empower all stakeholders to report pump-related errors and error-prone practices, and advocate for changes.
11. Insist that the smart pump and electronic health record are compatible.
12. Optimize the use of dose error reduction software technology.

Be real. Drug library guidelines also should reflect actual clinical practice, and the entry order from the provider and pump setup should match, Dr. Berndt said. "A provider should not be able to order a rate that is far faster or slower, or infuse longer or shorter, than what the pump will allow," she added.

Do regular data mining. Once the smart pump network and drug library are in place, tracking and making the most of the pump data will guide updates that minimize clinically insignificant alerts. "Figure out what alerts are coming up most frequently and see if there is a trend there," Dr. Marwitz said. "Maybe a certain alert is going off

really frequently but it is super relevant to your patient population and their condition,” she said. Or perhaps there was an unusual patient in the hospital that quarter, and no changes are needed, Dr. Thompson said.

The trends also can identify problems. “The number of soft pump limit alerts need to be reviewed over and over again and where you find thousands of alerts for a particular medication, those parameters need to be changed,” Dr. Berndt said.

Don’t skimp on drug library updates. These changes should be done constantly based on changing best practices, drug shortages or other factors, Dr. Marwitz said. If the drug library isn’t up-to-date, providers may get into the habit of overriding the pump’s alerts or out of the habit of using the drug library and doing basic infusions instead, Dr. Thompson said. It’s also crucial to ensure all the pumps in a given fleet are updated regularly, she noted.

Identifying and enacting changes to the drug library will need to involve collaboration with different departments within the hospital, Dr. Marwitz said. “Everyone in the organization has to be attuned to what’s happening with these devices,” Dr. Berndt said. Nurses, for example, need to be empowered to report errors and error-prone practices and advocate for changes.

Involve your medication safety colleagues. Dr. Thompson also described how she and her fellow pharmacists take recommended changes to the drug library through the hospital’s medication safety committee, which reviews the recommendations before the pharmacists integrate changes into the next pump library update. Ensuring hospital staff are aware of smart pump updates is also important.

Interoperability between the smart pump and electronic health record (EHR) also can help reduce alerts. Integrating the pump and EHR can allow providers to customize alerts to the patient in the room, Dr. Marwitz said. Interoperability is still rare; 15% of the respondents to the ISMP survey said their institutions had this feature at the time of the survey, but 13% reported they planned to implement this feature within the next 12 months.

“If you do the heavy lift and you really work to review the literature, compare what’s in the drug library with actual practice and then use that information to provide safeguards for each of these medication infusions in the drug library. That is a strong safety strategy to build upon,” Ms. Mandrack said. “The ongoing work is to ensure you’re keeping the library up-to-date, and ensuring the most recent version is working in all the smart pumps in your fleet.”

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