

Patient Safety Alert

‘High-alert’ medications and patient safety

This ‘Patient Safety Alert’ is the second in a series of periodic features in the Journal providing important information regarding the occurrence, management and prevention of sentinel events. A ‘sentinel event’ is an unexpected occurrence involving death or serious physical or psychological injury, or the risk of such injury. This risk includes any variation in a care provision process, where recurrence of the variation would carry significant likelihood of a serious adverse outcome. Such events are called ‘sentinel’ because they signal the need for immediate investigation and response.

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In 1996 JCAHO established a Sentinel Event Policy designed to encourage health care organizations to self-report health care errors. In the ensuing years JCAHO has developed and implemented a procedure for recording, assembling and analyzing the data provided in these reports. Application of this carefully formulated process – termed a ‘root cause analysis’ – for identifying the underlying causes of the performance variation or adverse event provides a means for structured investigation of the occurrence and for improvement of systems to prevent recurrence.

Data reported to the JCAHO under the Sentinel Event Policy by JCAHO-accredited health care organizations and by outside experts and organizations provide the basis for this series of Alerts.

Since the Joint Commission for Accreditation of Healthcare Organizations (JCAHO) began tracking sentinel events in 1995, JCAHO’s Board of Commissioners’ Accreditation Committee has reviewed 89 cases related to medication errors, one of the most common causes of avoidable harm to patients in health care organizations.

In an address to this same topic, during the years 1995 and 1996 the Institute for Safe Medication Practices (ISMP) in Huntingdon Valley, PA, USA, conducted a study to determine the drugs and situations most likely to cause harm to patients. Approximately 161 health care organizations submitted data on serious errors that had taken place during this period. The results of the study showed that a majority of the medication errors resulting in death or serious injury involved a small number of specific medications. The ISMP has termed these medications that have the highest risk of causing injury when misused ‘high-alert medications’ [1].

The top five high-alert medications identified by the ISMP are (i) insulin, (ii) opiates and narcotics, (iii) injectable potassium chloride (or phosphate) concentrate [2], (iv) intravenous anticoagulants (heparin) and (v) sodium chloride solutions above 0.9%.

Listed below are some common risk factors associated with the storage and use of these high-alert medications and suggested strategies for increasing patient safety and avoiding harm.

Common risk factor

Insulin

Lack of dose check systems

Insulin and heparin vials kept in close proximity to each other on a nursing unit may lead to mix-ups

Use of ‘U’ as an abbreviation for ‘units’ in orders. This may be confused with ‘O’ and result in a 10-fold overdose

An incorrect infusion rate may be programmed on the infusion pump

Suggested strategies

Establish a check system whereby one nurse prepares the dose and another nurse reviews it

Store insulin and heparin separately

Spell out the word ‘units’ and avoid use of the abbreviation ‘U’

Build in an independent check system for infusion pump rates and concentration settings

‘Medication errors have caused serious problems in health care organizations. It makes sense to be aware of risk reduction information and react to it before something serious takes place.’

Michael Cohen, MS, FASHP

President, Institute for Safe Medication Practices

‘Several measures may reduce the number of severe and fatal opioid adverse drug events at your organization. . . . Of these measures, the most important is the use of a mechanical visual analog pain scale, particularly for post-operative patients whose pain severity is changing, for that is often the setting where opioid overdose occurs.’

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Opiates and narcotics

Storage of parenteral narcotics in nursing areas as floor stock	Limit the opiates and narcotics available in floor stock
Confusion between hydromorphone and morphine	Educate staff about the potential for confusion between hydromorphone and morphine
Potential for concentration and rate errors in patient-controlled analgesia (PCA)	Implement PCA protocols that include double-checks of the drug, pump setting and dosage

Injectable potassium chloride or phosphate concentrate

Maintaining a supply of concentrated potassium chloride/phosphate that is not under pharmacy controls	Remove potassium chloride/phosphate from floor stock
Mixing potassium chloride/phosphate extemporaneously	Proscribe all on-site drug preparation; use only commercially available premixed intravenous solutions
Requests for unusual concentrations	Standardize and limit drug concentrations

Intravenous anticoagulants (heparin)

Unclear, imprecise concentration and total volume information on container label	Standardize concentrations; use only clearly labeled, commercially available premixed solutions
Multi-dose containers	Use only single-dose containers
Proximity of heparin and insulin in storage system; similar measurement units in heparin, insulin usage	Store heparin and insulin separately; remove heparin from the top of medication carts

Sodium chloride solutions above 0.9%

Storage of sodium chloride solutions (above 0.9%) on nursing units	Limit access to sodium chloride solutions (above 0.9%); remove from nursing units
Availability of large numbers of concentrations/formulations in same location	Standardize and limit availability of drug concentrations
No double-check system in place for rates, concentrations, line attachments	Establish, implement double-check system for pump rate, drug concentration, line attachments

Issue for consideration

In light of these risks and the suggestions provided to address them, the JCAHO expects that health care organizations will implement systems that will assure the correct patient receives

- the correct drug
- in the correct dosage
- at the correct times
- by the correct route.

To accomplish this on a consistent basis, organizations must have policies and procedures in place that address the ordering, preparing, dispensing, administering and monitoring of medication.

'The FDA is quite concerned about medication errors and their impact on patient safety and considers this a serious issue. From the FDA's perspective, this is a "systems" problem and will require a joint effort from all health care participants to improve patient safety with respect to minimizing errors. The FDA's particular focus on this issue is with the labeling and/or packaging of drug products. This includes proprietary and generic names, misleading nomenclature and/or packaging that contributes to or has the potential to contribute to a medication error. All efforts, including a focus on high-alert drugs which cause sentinel events, are worthy goals.'

Jerry Phillips

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References

1. Cohen MR, Kilo CM. High-alert medication: safeguarding against errors. In Cohen MR, ed. *Medication Errors*. Washington, DC: American Pharmaceutical Association, 1999, 5.1–5.40.
2. Medication error prevention: potassium chloride [Patient Safety Alert]. *Int J Qual Health Care* 2001; **13**: 155.