

This series brings you up-to-date information about medication safety issues and strategies to prevent medication errors. It draws on Australian Incidents and also US experience, including (with permission) material from ISMP Medication Safety Alert! a bulletin published by the Institute for Safe Medication Practices, USA <www.ismp.org>. This series is coordinated through the Committee of Specialty Practice in Medication Safety (Chair, Rosemary Burke, Director of Pharmacy, Concord Hospital, NSW). Australian incidents are collated and editorial recommendations made by Penny Thornton (Federal Councillor, SHPA, and Pharmacy Services Manager, The Children's Hospital, NSW; e-mail: pennyt2@chw.edu.au).

AUSTRALIAN INCIDENTS

Parent administration of doses to their child in hospital—good idea? All the more reason to use oral syringes!

Oral codeine linctus was checked by two registered nurses (RNs) and drawn up by a student nurse. One of the RNs and the student then proceeded to the patient and the RN checked the name against the order. The mother asked the RN about the IV line the child was trying to remove and asked if she could do something about it. The RN said to the student nurse—'Let mum do the medication, while I grab a bandage for the IV catheter'. While the RN went for the bandage, the mother said to the student that she would prefer if she was to give the dose, so the student proceeded to give the codeine very slowly intravenously. The RN returned and within 5 seconds, stopped the procedure—0.7 mL had gone in and the mother was immediately advised that a mistake had occurred and that the child's anaesthetist was called. The student performed observations while the RN called and under instructions, withdrew 0.2 mL aspirate from the line. The patient's vital signs and site were monitored. There was an immediate local red, raised reaction at the site which subsided within an hour and the IV catheter was removed. Vital signs remained stable. The RN felt she had been distracted from her role as a supervisor by the child trying to remove the IV line. She and the student had only given IV medications all day and it was unfortunately assumed by the student that this was just another similar dose. [Australian Incident 44, May 2006]

A child had been receiving carbamazepine via nasogastric tube. His father had been demanding his child's medication dose be given during an overnight shift, even though the dose was only just due. It was prepared by the RN and given to the parent to be given under supervision. The RN spoke to the parent about getting sterile water to flush the dose and when she came back, the parent asked for a different syringe. When the syringe was changed over, it was found that there was 7 mL instead of the 8 mL previously prepared in the syringe. The nurse noticed white solution in the IV line which she immediately clamped. When the medical team was called, the father admitted that he had put 1 mL in the IV line. [Australian Incident 45, May 2006]

Recommendation: When parents are asked to give medication doses, it complicates the usual checking process. Even though they may pass the task over to another nurse, it interrupts nursing work practice flow and the checking process as normally applied, may not have any influence on actual administration. While we shouldn't discourage clinicians from involving parents, we could suggest introduction of a key statement for all RNs to say, each time the parent is giving a dose, something like: *This is the ... (oral, nasogastric, ...) dose of ... (drug) to be given into the ... (mouth, nasogastric tube, nose...)—physically indicating the exact point of administration.* It seems that misunderstanding by parents is perhaps a root cause of these incidents and their best wishes to assist means that sometimes they inadvertently place their children at greater risk!

Be prepared is often not the best option for risk management

In the process of attaching a patient to a Gambro haemodialysis machine, a nurse had drawn up two 20 mL syringes for flushing the patient's Permcanth and had set them aside in the sterile area. A third 20 mL syringe was drawn up with heparin for infusion during the treatment. When flushing the patient's line, the nurse accidentally picked up and used the wrong syringe, flushing the line with heparin. The practice of having multiple syringes which are not for immediate administration, drawn up at the bedside, increases the likelihood of a mix-up. Clear labelling is essential. There is also a concern about potential contamination and introduction of infusion-related sepsis depending on how long the syringe has been prepared and has been kept at room temperature. Only permitting this practice 'for immediate use' is good practice and best practice is only doing this with immediate labelling as an integral part of the process. [Australian Incident 46, May 2006]

Recommendation: A checking sequence for clinicians administering parenteral doses is crucial. While the accuracy check of dose and volume against the order is essential, the check should also include the actual administration of the dose. This is sometimes difficult if the patient is not ready or if another event intervenes. We need to introduce a key stage in our work practices to accommodate a true administration check. Ask four key questions. A full check should first include the checker, without looking at the order, asking:

- **Who** are we giving this dose to?
- **Which drug** are you giving?
- **How much** are you giving?
- **By which route** are you giving it?

Plus for parenteral doses:

- **How are you preparing** or diluting the dose?
- At **which rate** are you to give it? (The check must then include a check of the setting of any administration device used.)

Then the checker is to review the actual order and if administration is to proceed—witness administration. If administration cannot be completed immediately, confirmation must be obtained from the person responsible as to the route to be used.

Dangers of halving or crushing SR tablets

A patient was transferred from one hospital to another on a Friday evening without medications. The patient had been prescribed Oxycontin 5 mg bd. On arrival at the destination hospital, the patient received halved Oxycontin 10 mg for six doses until the pharmacy service recommenced on the Monday and concern was raised. What should these nursing staff have done if they did not have 5 mg tablets on site? Clearly there are ramifications involved in splitting dose forms which are intended for sustained release. The sustained-release design of the dose form is breached with possible immediate administration of a much larger than intended dose with associated side effects. Additionally, pain relief may not be sustained for the intended 12 hours causing patient discomfort and suffering which may be unappreciated by carers who feel analgesia has been given appropriately. [Australian Incident 47, July 2006]

Recommendation: Make sure nurses are aware of the dangers of splitting oral dose units which have been designed for sustained release. They may be tempted to do this in an effort to give the prescribed dose. They should appreciate the multiplicity of terminology used by manufacturers for branded products of this nature, e.g. SR, ER, XR, Extend, Contin, etc. There may not even be a suffix to distinguish the product as sustained release but the concept may be incorporated in the brand name, e.g. Kapanol.

Lasix and Losec—again!

A poorly written prescription for ‘lasix 40 mg mane’ was mistaken as being for ‘losec 40 mg mane’ and dispensed to a patient. The patient took this incorrect medication for one week. [Australian Incident No 48, July 2006]

Influenza vaccine—no worries!

‘H. Influenzae vaccine’ was prescribed for a patient following splenectomy. Influenza vaccine (Fluvax) was dispensed by pharmacy. This error was thankfully detected by a nurse. [Australian Incident 49, August 2006]

Hiprex Hydrea confusion

A chart came down for a patient prescribed Hiprex (hexamine hippurate). The pharmacy was busy and Hydrea (hydroxyurea) capsules were dispensed instead and a cytotoxic sticker was placed on the bottle. Luckily, the patient noticed the drug was different and queried it as she normally only took half a tablet. The ward rang the pharmacy and asked why Hiprex looked different, how they were to halve it and how could they do it safely considering it was a cytotoxic! The pharmacist retrieved the drug. Hexamine and hydroxyurea were kept next to each other on the shelf. They are both 1 gram formulations. It was fortunate in this situation that the patient queried the dosage form and the nurse listened and then questioned. [Australian Incident 50, August 2006]

Quifusion

A patient was prescribed Quilonum (lithium carbonate) two bd. The pharmacist being unfamiliar with this brand of sustained release lithium misread the prescription and sent up Quinine instead. The dosages and strengths are quite different. This error was intercepted before administration because the tablets looked different. Many pharmacists are aware of the potential mix-up between quinine and quinidine due to the similarity of name. This however is an example of a brand name that could look like a different drug. [Australian Incident 51, August 2006]

After hours drug cupboard

Many hospitals have an after hours cupboard that can be accessed by designated staff members when the pharmacy is closed. Selection errors can occur due to the large number of similarly named drugs and packages. Examples include: incorrect drug selected, e.g. norfloxacin instead of moxifloxacin, incorrect dose form, e.g. nifedipine tablets 20 mg instead of nifedipine 20 mg long-acting (Adalat Oros), a single drug instead of the required combination product, e.g. irbesartan (Avapro) instead of irbesartan + hydrochlorothiazide (Avapro HCT). The after hours drug cupboard design should be considered carefully with respect to safety in terms of visibility of products and clear layout. The contents list should be regularly reviewed and lists of commonly confused drugs should be available. Even better, items often confused should be highlighted to distinguish them from each other. Some error-prone drugs should never be kept in an after hours drug cupboard, e.g. methotrexate. [Australian Incident 52, August 2006]

Coversyl change

From 1 August 2006 the salt of Coversyl, perindopril erbumine has changed to perindopril arginine. This will result in a change of dose for each patient maintained on this product. A dose of 2 mg is now replaced by 2.5 mg perindopril arginine, 4 mg by 5 mg and 8 mg by 10 mg. Packaging has also changed from platform unit-labelled packs (preferred for hospital use) to loose tablets in bottles.

[Australian Incident 53, August 2006]

US SAFETY BRIEFS

Read-back works

Physicians at Cincinnati Children’s Hospital Medical Center recently studied error rates with and without the use of read-back of orders given verbally and then entered into the computerised prescriber order entry system. The Joint Commission National Patient Safety Goal (2a) requires such a read-back process for both oral orders and oral critical test results. In the Cincinnati facility, the attending physician or chief resident typically communicates orders verbally during rounds and a resident physician then enters them into the computer system at a bedside terminal. In the first part of the study, the team on rounds accepted 70 consecutive oral orders and entered them into the computer. After rounds, they examined the orders and found a 9.1% error rate, mostly in drug dosages that would not have affected patient safety. However, in two instances, the resident ordered the wrong drug. In the second part of the study, before leaving a patient’s room, the resident read back the order entered into the computer. The attending physician or chief resident then verified its accuracy. The researchers examined 75 orders and found that the error rate dropped from 9.1% to zero. The process added only seconds to each visit to a patient’s room, so it did not slow down physician rounding. The data were presented last month at the Pediatric Academic Societies’ annual meeting in San Francisco and will eventually be published <www.cincinnatichildrens.org/about/news/release/2006/5-verbal-order-errors.htm>.

[Medication Safety Alert! May 18, 2006]

Tablet splitting: do it only if you ‘half’ to, and then do it safely

Problem: Most oral medications are available commercially in the dosage strengths most commonly prescribed for patients. Occasionally, the patient’s exact dose is not available commercially, so more than one tablet or just part of a tablet may be needed. While using more than one tablet for a single dose is customary, tablet splitting has become more commonplace in the past five years for several reasons.

- Different tablet strengths often cost about the same. Patients who cannot afford their medications have received a higher strength tablet with directions to take ½ tablet (or even ¼ tablet) per dose.
- Some healthcare organisations have not purchased all commercially available strengths of oral medications. Thus, some of the drugs may require tablet splitting for patient-specific doses in the inpatient setting.
- Patients may not be able to swallow whole tablets.

A recent article in the Veterans Administration (VA) *Topics in Patient Safety* newsletter, and a 2002 article on the American Society of Consultant Pharmacists web site, *Tablet Splitting for Cost Containment*, authored by Thomas Clark, offer several pitfalls with splitting tablets that clearly suggest it is not the safest option if the patient-specific dose is available commercially.^{1,2}

Patient factors: First, it is easy for patients to become confused about the correct dose. One woman learned this when she was admitted to hospital with unstable angina and hypertension. Her

physician found that she had been taking the wrong dose of lisinopril. She was supposed to be taking 5 mg BID, but the prescription label said there were 10 mg tablets in the bottle. When the physician looked inside, he saw both pink and peach tablets, some of which were split in half. Initially, the patient had been taking a 20 mg tablet BID. When her physician lowered the dose to 10 mg BID, she had the new prescription filled. The patient then cut the leftover 20 mg tablets in half and put them in the same bottle that held the 10 mg tablets. Later, her physician lowered the dose to 5 mg BID. Instead of filling the new prescription for 5 mg tablets, she tried to find all the 10 mg tablets to split them in half, but some remained whole. In this case, no one could be certain of the dose the patient had been taking before she was hospitalised. But a study by the VA showed that most people took too much medication because they forgot to split their tablets.¹ Between January 2001 and April 2005, the VA's National Center for Patient Safety database included 442 reports related to pill splitting. Of those, 38% were considered adverse events, mostly occurring in outpatient settings (65%). Two-thirds of the patients received more than the intended dose. Pharmacists caught these errors because the patients came in too soon to refill their prescriptions. A quarter of the medications were high-alert drugs. About 9% of patients were harmed by these mistakes and 2% required hospitalisation. In more than half of the events, the involved doses were available commercially. Clark identified a few additional risks with tablet splitting:²

- A pharmacist might misread a prescription written for ½ tablet as 1-2 tablets.
- Patients may assume the tablets have already been split when they have not, or split them again when they have been split already (especially if the pharmacy inconsistently splits the tablets upon refill).
- Patients may not have the visual acuity or manual dexterity needed to split the tablets.
- Patients may get confused and split the wrong medication, or get tired of splitting the tablets and stop taking it.
- To maximise cost savings, the patient may have been told to split the tablets in half, but the directions on the prescription may list '1 tablet' for each dose. These directions could mislead the patient or other healthcare providers who use the prescription label as a source of information when gathering a patient's medication history.
- Split tablets crumble more easily.

Medication factors: Some medications or formulations are not suitable for splitting, including: enteric-coated/extended-release tablets, very small tablets, asymmetrical tablets, capsules and teratogenic medications (e.g. bosentan). Clark cites various studies that suggest that the accuracy of split tablets is questionable, even if the tablet is scored.³ In one study, 94 volunteers were asked to split 10 tablets of hydrochlorothiazide 25 mg; 41% of the split tablets deviated by 10% of the correct weight, and 12% deviated by more than 20%. After the study, two-thirds of the volunteers said they would be willing to pay more for commercially available tablets in the correct strength. Other research cited by Clark corroborates the significant variation in tablet halves with rates of inaccuracy ranging from 5 to 72%.

Recommendations: Healthcare providers should make every effort to use commercially available oral tablets when available in both inpatient and outpatient settings. However, tablet splitting may still be necessary if the drug is not commercially available in the patient-specific dose, or if the patient's inability to afford the medication as an outpatient outweighs the risks involved with tablet splitting. Under these circumstances, consider the following suggestions from Clark, the VA, and ISMP.

Verify suitability: Before prescribing, dispensing, or administering half tablets, check drug references to ensure that it is safe. If unsure, contact the manufacturer.¹

Select patients carefully: Establish criteria to screen patients before prescribing or dispensing half tablets to ensure they have the required level of understanding, ability, and motivation to split the tablets.^{1,2} Ensure that the patient understands the risks associated with tablet splitting. If the patient cannot be expected to split their own tablets, enlist the aid of a qualified family member.

Dispense split tablets for inpatients: For hospitalised patients, pharmacy staff should dispense exact doses by either splitting tablets and repackaging them or preparing an oral solution in a unit-dose oral syringe for each dose. Nurses should not be expected to split the tablets.

Keep it clean: Patients and healthcare providers who split tablets should wash their hands first. Healthcare providers should also wear gloves. If a tablet-splitting device is used, it should be washed afterwards to remove any powder or particles.

Prescribe by weight: Prescribers should order the medication strength and dose in 'mg' when possible to avoid misreading an order for a '½' tablet as 1-2 tablets.

Counsel patients: Establish a system to ensure patient counselling when prescriptions for medications that require half tablets are picked up at community pharmacies, even if the pharmacist has split the tablets for the patient.¹

Provide the right tools: If patients must split tablets at home, provide them with a tablet splitting device to improve the accuracy.¹

Provide discharge education: If patients are receiving half tablets while in the hospital, advise them regarding the dose they should take after discharge and whether this requires split or whole tablets.

1. Sales MM, Cunningham FE. Tablet splitting. Topics in Patient Safety 2006; 6: 1,4.

2. Clark TR. Tablet splitting for cost containment. August 2002. Available from <www.asep.com/advocacy/briefing/tabletsplittingcontainment.cfm>.

[*Medication Safety Alert! May 18, 2006*]

Proactively eliminating the risk of 'never' events

Despite the widespread increase in patient safety activities in the past decade, the importance of proactively reducing the risk of some of the most tragic medication errors has been minimised too often because the events have occurred infrequently, or the corresponding error-reduction strategies have not been quantified scientifically. Yet, from the perspective of both patient safety and credibility in the eyes of patients who place their trust in our hands, the urgency for eradicating these 'rare' events has never been greater. Disturbing accounts of continued fatalities from accidentally administering IV vincristine by the intrathecal route is just one of many examples of dramatic, preventable injuries that may have been side-lined as a priority because of their infrequency, despite relatively easy strategies that could prevent their occurrence. Inadvertent administration of an oral solution or suspension by the IV route is another example. The use of an inexpensive oral syringe could significantly reduce or eliminate such risks. The desire to get the most out of allotted patient safety resources has perhaps increased our tolerance of 'rare' but harmful events, knowing that, thankfully, they do not happen very often. We also may be too tolerant of practices that, if examined carefully, most would consider unsafe, simply because there are no quantifiable outcome data to confirm their danger, and no evidence-based proof about the effectiveness of seemingly safer practices that have face validity. Moreover, consumers are unlikely to understand our tolerance of 'rare' but harmful events when,

rightfully, they should be considered 'never' events in health care. We would not understand if the risk of an aeroplane crash was considered low priority because it happens infrequently, especially if it was caused by untrained or intimidating pilots, or a refusal to avoid dangerous abbreviations or repeat verbal commands to ensure understanding. 'Rare' but harmful events should not be discounted simply because of low frequency. Such an attitude of complacency or denial of the risk is indefensible. Prevalence should be one of many considerations when prioritising patient safety efforts, but certainly not the only determinant of whether proactive steps must be taken. When relatively simple actions could prevent 'rare' but harmful events, but we do not implement these actions because they are not on our priority list, consumers have every right to doubt our ability to accomplish anything safely. After all, if we cannot eradicate vincristine misadministration after 30 years of knowing about its causes and prevention, how can we expect patients and their families to trust us?

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ISMP comments on IOM report, preventing medication errors

Release last week of the Institute of Medicine (IOM) report, *Preventing Medication Errors*, has led to considerable excitement and media coverage, even outside the US. Although most of the recommendations in the document have been previously suggested, ISMP views the report as an excellent reinforcement of error-reduction concepts that have been stressed by the medication safety community during the last decade. The report notes that the primary focus for research on safe medication use needs to shift from incidence rates to the development and validation of error-prevention strategies. ISMP has long endorsed this, believing that patient safety is dependent on systems that defy errors. As such, ISMP is very supportive of a recommendation for prescribers to have plans in place for technology to prescribe medications electronically by 2008, and for all prescribers to order prescriptions and all pharmacies to receive them electronically by 2010. While we have repeatedly called for the elimination of handwritten prescriptions; today, less than 20% of all prescriptions are transmitted electronically. Access to comprehensive risk-benefit information, clinical outcome data, and effectiveness data is urged, not only to promote clinical understanding, but also to populate automated decision support systems. Improved error reporting was another topic of interest to the IOM Committee. The report suggests that all stakeholders, should promote medication error reporting more aggressively. (ISMP would also like to see professional societies aggressively promote medication error reporting to its members.) ISMP can demonstrate, first-hand, the value of voluntary error reports, as literally hundreds of product problems and practice issues have been improved based on health professionals' reports to the US Pharmacopeia- ISMP Medication Error Reporting Program (USP-ISMP MERP). Imagine what could be accomplished with more reports from which to learn! A national taxonomy with standard terminology was also recommended for error reporting so that data sharing on a national level will be useful. The Committee recognized that, with few exceptions, there is currently little medication safety oversight of community pharmacies. Noting that safety education is lacking in professional schools, the Committee also called upon academic accreditation agencies to set new standards for this training. Also important to medication safety is the report's recognition of the role of FDA and the pharmaceutical industry in eliminating medical product errors. The report specifically calls upon

industry, FDA, and others as appropriate (e.g. USP, ISMP) to work together to undertake actions to address labelling and packaging issues, and problems with the distribution of free samples—all music to our ears, and yours, too, we hope! In the coming years, we look forward to advancing the recommendations made in the latest IOM report to better serve the health needs of consumers, the practice needs of providers, and most importantly, to prevent medication errors. To learn more about *Preventing Medication Errors*, please visit <www.iom.edu/CMS/3809/22526/35939.aspx>.

[Medication Safety Alert! July 27, 2006 (abridged)]

More on 'double keying' errors

An infusion pump double-keying error occurs when a number key is pressed twice, instead of once, most often resulting in over-infusions. Such errors, have been reported with various types of pumps. Recently, we learned about another double-keying incident that resulted in infusion of TPN at 445 mL/h, instead of 45 mL/h, for four hours before a rapid response team uncovered the error. The team had been called to evaluate the patient for tachycardia. The error occurred on a busy, understaffed, trauma unit where several new graduate nurses had just been hired. In this case, a graduate nurse had programmed a new Hospira infusion pump (Plum A+) incorrectly. When investigating the error, staff noticed a slight delay before a number appeared on the screen after pressing the number key on the pump. In this case, the nurse had pressed '4', and when it did not immediately appear on the screen, she pressed it again, believing the first key press had failed. Thus, the pump had been programmed to deliver 445 mL/h. The cause of the delayed response to the key press is unknown. In other cases, an accumulation of dirt or sticky substances, such as glucose, under the keys has caused similar problems. Please alert nursing staff about the potential for double-keying errors and encourage a thorough review of pump settings before leaving a patient's room. The issue of double-keying errors should also be included in all new pump evaluations. New infusion pumps may also have dose checking capabilities, which could alert staff to programming errors. (Although the Plum A+ pumps are available with this software, it is not known whether the pump involved in the error had this functionality.) Although actual 'dose' limits may not be appropriate for TPN, an infusion rate limit (e.g. 200 mL/h as a soft upper limit for TPN and/or general infusions) would detect a significant over-infusion such as in the error above. Also, thoroughly clean all infusion pumps between patient uses to prevent keys from sticking. We have notified Hospira of this problem, although, keep in mind, similar programming errors have occurred with other pumps.

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Today and Qday

'Qday', used as a substitute for the unapproved abbreviation 'QD' has been misread as 'Today' (and vice versa). These two terms also sound alike and could be misheard as one another. Always communicate a frequency of 'daily' by writing it out fully.

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