AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

High Risk Medication Alert – Vincristine

The former Australian Council for Safety and Quality in Health Care developed a national alert system for high risk medicines. The aim of this national communication strategy was to:

- warn health leaders and professionals about serious known medication-related hazards or risks
- provide tools to effectively ensure action to reduce these risks
- set out responsibilities for system change.

Vincristine injection is the subject for the attached alert.

Vincristine, a vinca alkaloid medicine commonly used in the treatment of leukaemias and lymphomas, is neurotoxic and must only be administered intravenously. Sentinel events associated with the inadvertent intrathecal administration of vincristine have been repeatedly reported in Australia and overseas. Adults and children are known to be at risk with 50% of reported cases in each group. This error results in a fatal outcome in 85% of cases with devastating neurological effects in the few survivors.

States, territories and hospitals have already been proactive through development of high risk medicine policies, procedures and guidelines that include implementation of risk management strategies for intravenous vincristine.

This alert was based on international and Australian work to make a range of recommendations. Health service organisations should consider these along with other more contemporary strategies to ensure safe and appropriate practices are in place for the management of high risk medicines such as vincristine.

The Australian Commission on Safety and Quality in Health Care (ACSQHC) gratefully acknowledges the contribution of many groups who worked together to contribute to the content of this alert.

The ACSQHC can be contacted through its website at www.safetyandquality.gov.au or by email mail@safetyandquality.gov.au.

Please note that the asterisked (*) references within the attached alert are no longer available via weblinks on the Commission's website. Additional references and more current information, that

- consider intrathecal administration as a never event
- review system failures relating to vina alkaloids, and
- promote the use of minibags to support safe administration of vincristine,

are provided on the next page.

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

High Risk Medication Alert – Vincristine

Additional references and more current information

1. ISMP Canada News. April 8 2008. World Health Organisation Recommendations for Vincristine. www.ismp-canada.org/news/item/63/
2. WHO Alert 115. Vincristine (and other vinca alkaloids) should only be given intravenously via a minibag. July 2007. www.who.int/medicines/publications/drugalerts/Alert_115_vincristine.pdf
3. HSC2008/001: Updated national guidance on the safe administration of intrathecal chemotherapy, 2008. https://webarchive.nationalarchives.gov.uk/+/http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Healthservicecirculars/DH_086870
4. NHS Specialist Pharmacy Service (SPS). Archived patient (medication) safety alerts from the NPSA and SPS resources to support their implementation. https://www.sps.nhs.uk/articles/patient-medication-safety-alerts-from-the-npsa-and-sps-resources-to-support-their-implementation/
5. NHS England Patient Safety Domain. Revised never events policy and framework, Version 1. March 2015. https://www.england.nhs.uk/wp-content/uploads/2015/04/never-evnts-pol-framwrk-apr.pdf
6. Noble DJ, Donaldson LJ. The quest to eliminate intrathecal vincristine errors: a 40-year journey. Qual Saf Health Care 2010;19:323-326. doi:10.1136/qshc.2008.030874 https://qualitysafety.bmj.com/content/19/4/323.short
7. Franklin BD, Panesar SS, Vincent C*, et al.* Identifying systems failures in the pathway to a catastrophic event: an analysis of national incident report data relating to vinca alkaloids *BMJ Qual Saf* 2014;23:765-772. https://qualitysafety.bmj.com/content/23/9/765
8. Gilbar P. Inadvertent intrathecal administration of vincristine: has anything changed? J Oncol Pharm Pract. 2012;18(1):155-7. doi:10.1177/1078155210396396
9. ISMP. Nurse AdviseERR Newsletter. Issue 3 (13), March 2015. https://www.ismp.org/sites/default/files/attachments/2018-04/NurseAdviseERR201503.pdf
10. ISMP Guidelines. Targeted medication safety best practices for hospitals. https://www.ismp.org/guidelines/best-practices-hospitals
11. National Cancer Control Program (NCCP). Ireland. UK. NCCP Oncology Medication Safety Review and Guidelines. www.hse.ie/eng/services/list/5/cancer/profinfo/medonc/safetyreview/
12. ISMP Canada. Safety Bulletin. Issue 6 (13), 23 July 2013. Preliminary results from the international medication safety self-assessment for oncology. https://www.ismp-canada.org/download/safetyBulletins/2013/ISMPCSB2013-06_International_MSSA_Oncology.pdf
13. The Joint Commission. QuickSafety Advisory. Issue 37, October 2017. Eliminating vincristine administration events. https://www.jointcommission.org/assets/1/23/Quick_Safety_Issue_37_2017_Vincristine_FINAL1.PDF
14. National Comprehensive Cancer Network (NCCN) www.nccn.org/
15. Clinical Oncology Society of Australia (COSA) www.cosa.org.au/
16. Cancer institute of NSW www.cancer.nsw.gov.au/
17. eviQ online (NSW Government) www.eviq.org.au/

MEDICATION ALERT!

From the Australian Council for Safety and Quality in Health Care

The purpose of this alert is to provide frontline health professionals and administrators with information on high risk medications that have the potential to cause serious or catastrophic harm to patients. The intention is to raise awareness of the potential harm and provide a strategy for local level response.

www.safetyandquality.org

Alert 2, December 2005

VINCRISTINE can be fatal if administered by the intrathecal route

For the attention of *Chief Executive Officers* and *Directors of Nursing*, *Pharmacy,* and *Medical Services*; *Doctors*, *Nurses* and *Pharmacists*

For implementation immediately

Australian Cases

At least three cases of inadvertent intrathecal injection of vincristine have occurred in Australia over the last 20 years.

In 1986, a 17-year-old girl died 8 days after vincristine was injected intrathecally instead of methotrexate. An intern had been delegated to administer the treatment.[1]

In 1995, a 27-year-old man became quadriplegic following accidental intrathecal injection of vincristine.[2]

In 2003, a 28-year-old man was slowly paralysed, and died, as a result of intrathecal administration of vincristine by a radiologist. Methotrexate was also correctly administered intrathecally at the same time. Both medicines were in the treatment room.[3]

Overseas Experience

The catastrophic outcomes from inadvertent intrathecal administration of vincristine are well known. At least 55 cases have been reported internationally since 1968.

In the UK an 18-year-old boy died following intrathecal injection of vincristine. A junior doctor administered the injection under the supervision of a registrar. Both doctors were new to the cancer ward and were not familiar with local procedures.[4]

The latest fatal case was reported in the USA in November 2005.[5]

This alert contains strategies similar to alerts arising from the UK[6], USA[5, 7] & Canada[8] and from Australian practitioners.[9, 10]

TOOLS AND TIPS

Tools to action this alert can be found on the Council's website at **www.safetyandquality.org**

Vincristine, a medicine commonly used in the treatment of leukaemias and lymphomas, is neurotoxic and must only be administered intravenously. Sentinel events associated with the inadvertent intrathecal administration of vincristine have been repeatedly reported in Australia and overseas. Adults and children are at risk with 50% of reported cases in each group. This error results in a fatal outcome in 85% of cases with devastating neurological effects in the few survivors.

One common error – vincristine mistaken for an intrathecal injection

Vincristine, prepared in a syringe for intravenous administration, is mistaken as an injection to be given intrathecally. As a result, it is administered into the cerebrospinal fluid instead of, or in addition to, other medicines.

Incidents have a number of common contributing factors

- Same time - prescription of intravenous vincristine in treatment protocols that require medicines to be administered intrathecally on the same day and, often, at the same time.
- Same place - transport, storage and administration of intravenous vincristine in the same location as medicines required to be administered intrathecally.
- Inadequate checking of medicine labels against treatment orders when selecting medicines from storage locations and immediately prior to administration.
- Staff with insufficient knowledge or experience delegated to manage chemotherapy.

Recommendations to reduce the risk of error with vincristine

The following seven strategies focus on improving the safety of vincristine administration directly and indirectly by promoting safe systems for management of intrathecal medicines.

1. Vincristine should be administered in a minibag, not a syringe.

Use of a minibag aims to 'design out the error' by preventing connection to a spinal needle.

For adults - administer vincristine diluted to 50ml in a minibag over 5-10 minutes.

For children - administer vincristine diluted to 20-50ml in a minibag over 5-10 minutes.

For children younger than 10 years of age, where an individual risk assessment has determined use of a minibag to be inappropriate, administration in a syringe in a minimum volume of 10ml may be considered (*).

The recommended diluent is sodium chloride 0.9%. After administration, the line should be flushed with an appropriate volume to ensure no medicine remains.

(*) Note that inadvertent intrathecal administration of vincristine has occurred despite dilution to 10ml and 20ml in syringes. [11,12]

CAUTION - Despite dilution vincristine remains a vesicant and extravasation should be avoided. Policies ensuring safe administration techniques and stringent monitoring must be followed to avoid extravasation whenever vincristine is administered.

References

1. Case report – personal communication N. Burgess and The Sydney Morning Herald. 1987 August 13:5.
2. Case report – personal communication P. Muir and The Age. 1995 November 11:8
3. Case report – St George Hospital and ABC Television The 7.30 report. May 5 2004.
4. Dyer C. BMJ. 2002 Sept 21; 325 (7365): 616.
5. ISMP. Medication Safety Alert. Vol 10 (24), December 1 2005 (*).
6. Department of Health, UK. National guidance on the safe administration of intrathecal chemotherapy. HSC 2001/022 (*).
7. JCAHO. Sentinel Event Alert, Issue 34, July 14 2005 (*).
8. ISMP Canada. Safety Bulletin Oct 3 2001(*).
9. Gilbar PJ, Carrington CV. Med J Aust. 2004 Oct 18; 181(8): 464.
10. Stefanou A, Dooley M. J Clin Oncol. 2003 May 15; 21(10): 2044.
11. Meggs WJ, Hoffman RS. J Toxicol Clin Toxicol. 1998; 36(3): 243-6
12. Alcaraz A, et al. J Toxicol Clin Toxicol. 2002; 40(5): 557-61.
13. Burgess N. 2005 (*).

(*) weblinks available on the Council's website

TOOLS AND TIPS

Case studies and tools to action this alert can be found on the Council's website at **www.safetyandquality.org**

Recommendations (continued from page 1)

2. All vincristine products, including outer wraps, should be labelled with a prominent warning label stating: "FOR INTRAVENOUS USE ONLY – Fatal if given by other routes".

   Negative labels, such as "Not for intrathecal use" should NEVER be used.

3. The timing and location of vincristine preparation, delivery and administration should be such that it is separate from all medicines intended for intrathecal administration.

4. Vincristine, and other intravenous medicines, must be packaged, transported and stored in specifically designated containers. Separate packaging and different containers must be used for medicines to be administered intrathecally.

5. All medicines for intrathecal administration should be labelled with a prominent warning label, on the syringe and the outer wrap, stating "For intrathecal use".

6. Only staff specifically trained and experienced in cancer treatments should be designated to prescribe, prepare, dispense, deliver, receive or administer injectable chemotherapy. This includes registrars, consultants, pharmacists and nurses.

7. Staff administering intrathecal medicines must use formal checking procedures. This should include a 'time out' involving at least two health professionals, including an oncology trained nurse or pharmacist and a doctor. The patient identifiers, drug, dose, volume, route and rate should be verified against the medication order immediately prior to administration. Both health professionals should then sign the order.

Background to recommendations

This alert is aimed at raising awareness of the risks associated with vincristine administration and provides a guide for institutions to evaluate their existing practices.

The recommendations have been developed following review of Australian and international recommendations; current practices, evidence and technology (13) and, have been informed by a broad consultation process.

Underlying principles used to identify recommended strategies were that they should:

- focus on preventing error through design solutions. Other system changes may only reduce the likelihood of error, particularly human error.
- be accepted as effective and safe practice by international and local experts.
- address both adult and paediatric practice.
- be efficient, implementing those approaches with the greatest yield.
- be system-wide, with consideration of all consequences of change.

A key consideration was to identify the safest way to administer vincristine to reduce the risk of inadvertent intrathecal administration without increasing the risk of extravasation (damage to tissues resulting from leakage of medicine from a vein).

The decision to recommend use of minibags as the preferred form for vincristine administration was based on the following:

- it essentially provides a design solution and is currently the best available method to prevent the error occurring.
- this strategy has been safely implemented in multiple centres in both Australia and overseas.
- current evidence suggests there is no significant increase in rate of extravasation compared to use of a syringe.
- vincristine in a minibag can be administered at a similar rate as a syringe and with similar requirements for monitoring.
- dilution of vincristine reduces the impact of any extravasation which may occur.
- although the extravasation of vincristine can result in serious consequences for a patient (e.g. pain, tissue necrosis, possible limb dysfunction), this is less devastating than the usually fatal outcome associated with the intrathecal administration of vincristine.

Appropriate procedures should be in place to minimize the risk of extravasation for all vesicant medicines. Use of a minibag may result in a slight increase in the time taken to administer and monitor vincristine.

In recognition that there may be some practical issues to consider with use of minibags in babies and young children, Recommendation 1 includes the option of a lower volume of fluid and allows for some flexibility in this group following a local risk assessment.

ACTION

Successful implementation of the actions below requires the commitment of personnel from all clinical areas.

Many acute care facilities have already implemented risk management strategies for intravenous vincristine—it is recommended that all facilities evaluate their current safety controls against the actions below.

CHIEF EXECUTIVE OFFICERS

1. Convene and provide resources for a multidisciplinary team to action the recommendations in this alert, and review and evaluate progress (see review and evaluation below). Team members would include medical and nursing representatives from Oncology/Haematology Services, the Pharmacy Department, Risk Management or Quality Department and other relevant patient care teams e.g. Radiology. A consumer representative may also be involved.

2. The team should be given a mandate to reduce the potential for error associated with vincristine injection and define an implementation strategy (including timelines).

3. The team should provide regular updates to the CEO and/or the appropriate hospital committee outlining progress toward preventing incidents with intravenous vincristine and ensuring safe practice for medicines administered intrathecally.

DRUG & THERAPEUTICS COMMITTEES, DIRECTORS OF CANCER SERVICES, PHARMACY AND NURSING

Collaborate to ensure safe practices for chemotherapy services are in place to minimise the risk of errors with intravenous vincristine administration and with administration of intrathecal medicines.

4. Policies and procedures reflecting national recommendations and incorporating local information should be developed. To inform this process and as a baseline, a multidisciplinary review of existing practices should be undertaken. The review should include process mapping of an intravenous and an intrathecal treatment from prescription to administration.

5. Determine impact of preparation and administration of intravenous vincristine in minibags. Identify any organisational barriers to the use of minibags. If the use of minibags is deemed inappropriate for any patient group, a risk management policy should be developed and staff education on strategies to minimise risk should be undertaken. Specific issues will need to be addressed for the safe infusional administration of vincristine in minibags.

6. Ensure that practices are in place which separate the prescription, preparation, dispensing, supply, receipt and administration of intravenous vincristine and medicines to be administered intrathecally.

7. Implement procedures for formal checking of intrathecal administration of chemotherapy involving two health care professionals including an oncology trained nurse or pharmacist; and medical officer. A ‘time out’ should occur immediately prior to administration to verify the patient identifiers, drug, dose, volume, route, rate and date against the medication order. Both health professionals should then sign the order.

8. Consideration may also be given to developing mechanisms to involve patients/carers in checking procedures.

9. Ensure appropriate orientation, education, training, assessment and designation of all staff involved with chemotherapy is maintained. Maintain a register of staff designated to prescribe, prepare/dispense, supply, receive or administer chemotherapy.

10. All staff should be made aware through training, and via documentation in policies and procedures, of the catastrophic outcomes associated with the administration of vincristine via the intrathecal route. Access to information on treatment options should be available to facilitate rapid treatment in the event of an error.

PHARMACISTS

11. Assess the labelling of vincristine products to ensure that appropriate and prominent warning labels are in place and that specific information including patient identifiers, drug, dose, volume, route and date are clear on all products.

12. Review procedures and practices for preparation, dispensing and delivery of chemotherapy to ensure appropriate checks and documentation are in place.

13. Evaluate practices for storage of intravenous chemotherapy and intrathecal medicines in the pharmacy, in wards and treatment areas to ensure the likelihood of substitution errors is minimised.

14. Work together with the relevant medical and nursing staff to ensure good communication channels are established regarding patient’s chemotherapy requirements and protocols in use.

15. Establish and implement training and competency assessment for pharmacy staff involved with preparation, dispensing and delivery of chemotherapy.

NURSES

16. Collaborate with medical and pharmacy staff to ensure practices support separation of the time and location of administration for intravenous and intrathecal chemotherapy.

17. Work with the Pharmacy Department to develop policies and procedures to ensure safe practice in storage and delivery of intravenous chemotherapy and intrathecal medicines.

18. Review protocols and practices for administration of chemotherapy to ensure good administration techniques and stringent monitoring for vesicant drugs. Report any extravasations that may occur via local incident monitoring systems.

19. Be familiar with local policies and procedures for administration of intrathecal chemotherapy and, where appropriate assist in the formal checking procedures.

20. Establish and implement training and competency assessment for staff involved with administration of chemotherapy, including administration of intrathecal and vesicant medicines.

DOCTORS

21. Review the literature and be aware of the catastrophic outcomes of administration of vincristine via the intrathecal route.

22. Prescribe vincristine in minibags as per hospital procedures.

23. Be familiar with local policies and procedures for administration of intrathecal medicines, in particular chemotherapy, and the treatment options for inadvertent vincristine administration by the intrathecal route.

24. Ensure effective communication channels between medical, nursing and pharmacy staff responsible for chemotherapy.

25. Collaborate with nursing/pharmacy staff to ensure checking procedures are followed when administering intrathecal medicines.

26. Ensure appropriate orientation, training and competency assessment are routinely provided and accessed.

STAFF TRAINING AND DESIGNATION

27. A register of staff designated to prescribe, prepare, dispense, supply, receive or administer chemotherapy should be in operation and accessible across the institution. Only staff listed on the register may undertake the specified tasks.

28. Ensure formal training and regular competency assessment for all staff involved with chemotherapy and intrathecal medicines.

REVIEW AND EVALUATION AT FACILITY LEVEL

Resources must be made available to evaluate progress at an appropriate time, e.g. after 6 months. For example:

- *Are procedures in place for separate preparation, delivery, storage and administration of vincristine and intrathecal medicines?* Evaluate procedures and flow chart a vincristine dose from prescription to administration.
- *Is there an up to date list of staff designated to prescribe, prepare, dispense, supply, receive and administer chemotherapy?*
- *Are staff aware of the risks associated with incorrect vincristine administration?*
- *Are minibags being used for administration of vincristine and are appropriate warning labels in place?* Audit the number of vincristine doses being prepared in syringes and minibags pre and post system change.
- *Are good administration techniques and policies for monitoring of vesicant drugs in place?* Assess safety controls in chemotherapy administration areas.
- *Are 'near miss' incidents or extravasations relating to vincristine reported and assessed?* Communicate with staff.
- *Is there a written protocol for intrathecal medicine administration including formal checking procedures involving two health professionals? Is the protocol up to date and followed by staff?*
- *Is there routine communication between staff responsible for each patient's chemotherapy?*
- *Are intrathecal medicines delivered directly to the location of administration?* Assess protocols.
- Have regular meetings and monitor progress. Survey staff regarding knowledge of policies and guidelines.
- Provide feedback on this alert and its implementation and share your knowledge and tools via the S&Q Council website.

FURTHER INFORMATION

Australian Council for Safety and Quality in Health Care
MDP 46, GPO Box 9848
Canberra ACT 2601

Phone: +61 2 6289 4244 Fax: +61 2 6289 8470
Email: medalerts@health.gov.au
Website: www.safetyandquality.org

ACKNOWLEDGEMENT

The Australian Council for Safety and Quality in Health Care thanks the following organisations/government agencies for their input and/or dissemination of this alert notice:
ADGP, ADRAC, ADSA, AIMS, ANF, ANZCHOG, APAC, APHA, Australian Government DoHA and PHIB, Baxter Healthcare, CHF, , COSA, CNSA, MOGA, MUNCCI, NICS, NCIS, NPS, NSWTAG, NTD&TC, PFK, QHDAC, RACMA, RACP, RACS, SATAG, SHPA, SQOF, TSTDC, VicTAG, VMAC, WATAG.