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IV Heparin flushing solutions—avoid the risk of confusion with higher strengths



In 2008, the National Patient Safety Agency issued a Rapid Response Report on the risks associated with intravenous heparin flush solutions. A number of incidents had been reported where other medicines, including higher strengths of heparin were selected by mistake instead of the weaker heparin flush solution. The use of higher doses of heparin sodium to treat DVT or PE is **extremely rare** in primary care, low molecular weight heparins are more commonly prescribed e.g. enoxaparin.

A serious adverse incident occurred in Northern Ireland in 2009 when heparin injection 5000 units/5ml was prescribed, dispensed and administered to a baby instead of heparin flush solution 50 units/5ml.

Learning from this incident was shared in a HSCB 'Medicines Safety Alert' issued in April 2010.

More recently, an adult patient was prescribed, dispensed and administered 5000 units/5ml heparin instead of the heparin flush solution.

Use of higher doses of heparin instead of flush solutions can result in a **100 times** overdose of heparin which can increase the risk of bleeding.

This newsletter focuses on reducing the risks of prescribing, dispensing and administering incorrect doses of heparin and actions that can be taken to prevent errors.

Important references for further information:

NPSA Rapid Response Report April 2008
Risks with intravenous heparin flush solutions.

<http://www.nrls.npsa.nhs.uk/resources/?entryid45=59892&p=11>

HSCB Medicines Safety Alert April 2010
Learning from adverse events - Heparin

http://www.hscboard.hscni.net/medicinesmanagement/Medicines%20Safety%20Alerts/index.html#P-1_0

1. Recommendations for flushing intravenous (IV) lines

In primary care, the most common reason for prescribing IV flush solutions is for flushing central venous lines. Central venous lines are inserted in hospital for patients requiring extended periods of IV therapy e.g. chemotherapy, antibiotics, nutrition.

Routine flushing of IV lines is performed to:

- Prevent blockage of the device due to clot formation
- Prevent the mixing of incompatible medications and solutions.

Sodium chloride 0.9% injection is the most commonly used IV flush solution, used routinely before, between and after any medications and/or solutions injected into an IV line.

Heparin sodium flush solutions are sometimes used as an additional measure to prevent blockage due to clot formation in the device and **should only be prescribed in primary care when advised by the Trust.**

Over the last few years, in response to adverse incidents, the NPSA report and evidence to suggest that heparin flushes should not be used for peripheral IV lines, hospitals have significantly reduced their use of heparin flushes for both peripheral and central venous IV lines.

All flush solutions should only be administered following prescribed instructions and should **not** be ordered on stock requisitions.

2. Prescribing the correct heparin sodium injection for IV flush

✓ Correct

Heparin sodium flush solutions are listed in the drug dictionary (depending on the GP clinical system) as either:

- Flush solutions or
- Patency solutions



Both products are preservative-free

- ✓ Heparin sodium flush/patency solution 10 units/ml
5ml ampoules (50 units per 5ml ampoule)
- ✓ Heparin sodium flush/patency solution 100 units/ml
2ml ampoules (200 units per 2ml ampoule)

✗ Incorrect

Do not prescribe heparins other than those described as either flushing or patency solutions or any heparin sodium injection stronger than 100 units/ml without checking if clinically indicated

Do not prescribe by the brand names Hepsal[®] or Canusal[®] – these products were discontinued in 2009

Some heparin injections that have been prescribed in error, with up to 100 x the intended dose are:

Heparin sodium injection 1000 units/ml
1ml ampoule (1000 units per 1ml ampoule)

Heparin sodium injection 1000 units/ml
5ml vial or ampoule
(5000 units per 5ml ampoule)

3. Dose of heparin sodium flushing solution

- The **strength** of the heparin flushing solution used depends on how often the IV line is used e.g.
 - The 10 units/ml strength is used for weekly flushing of IV lines that are in regular use
 - The 100 units/ml strength is used for monthly flushing of IV lines that are used less frequently.
- The **frequency** of IV line flushing will depend on how often the IV catheter is used.
- The **volume** of flush solution depends on the type of IV catheter. As a guide, this is usually:
 - 5ml of the 10 units/ml flush for adults (50 units)
 - Up to 2.5ml of the 10 units/ml flush for children (25 units)¹.

4. Review of NI primary care prescribing

In a review of NI GP prescriptions (Oct - Dec 2011):

- 100 Rx were issued per quarter for heparin sodium
- 97% Rx were for heparin flush solution
- 3% Rx were for **higher strength** heparin sodium injection 1000 units/ml (both 1ml and 5ml size)*
- 80% were prescribed "as directed"
- 4% had precise directions for use e.g. dose and frequency (16% had dose, volume or frequency only)
- 10% were coded incorrectly as high strength by pharmacists.

* The community pharmacists who received the Rx for the high strength heparin have confirmed that the patients received the correct flush solution. The GP records have now been corrected.

All primary care staff: query any strength of heparin injection other than 10units/ml or 100units/ml

Advice for prescribers:

- Check Trust referral information for details of: indication for use, dose, volume & frequency of administration. Speak directly with referring clinician if required.

- Take care to select the correct product from the clinical system
- Full dose instructions should be stated on the Rx - not 'as directed' or 'flush as directed'.

Advice for community pharmacists:

- Check correct product, dose & use as flush
- Speak directly with the prescriber if you have any queries

- Label with full directions for use as per Rx.

Advice for administration:

- A syringe containing a flush solution should be labelled if it leaves the hand of the person who prepared it at any time
- Check product & dose before administration
- Consider double checking if possible.

5. Pharmacy Codes for Heparin Flush solution

PIP code	BSO description (revised Feb 12)	BSO Item Code
114-6430	Heparin sodium flush ampoule 10 iu/ml 5ml 10	2949 / 10
114-6448	Heparin sodium flush ampoule 100 iu/ml 2ml 10	2646 / 10

1. <http://www.gosh.nhs.uk/health-professionals/clinical-guidelines/flush-volumes-for-central-venous-access-devices-cvads/>