

Heparin versus 0.9% sodium chloride intermittent flushing for prevention of occlusion in central venous catheters in adults

NICE has developed the Cochrane Quality and Productivity topics to help the NHS identify practices that could be significantly reduced or stopped completely, releasing cash and/or resources without negatively affecting the quality of NHS care. Each topic has been derived from a Cochrane systematic review that has concluded that the evidence shows that the practice is harmful or ineffective and should not be used, or that there is insufficient evidence to support widespread use of the practice.

Unless otherwise stated, the information is taken with permission from the Cochrane systematic review.

NICE summary of Cochrane review conclusions

There is no good evidence that flushing central venous catheters (CVCs) with heparin is better than flushing with normal saline solution (sodium chloride 0.9%). Heparin may cause undesirable side effects and gives no benefit over normal saline, which has virtually no side effects. Heparin did not offer additional protective effects against complications associated with CVC use; namely, sepsis, thrombosis and haemorrhage. Therefore, intermittent flushing of CVCs with heparin is not recommended.

The 'Implications for practice' section of the Cochrane review stated:

'Currently, heparin flushing of central venous catheters (CVCs) is a recommended practice in many guidelines and is standard practice in many clinical care settings, notwithstanding the fact that it is not supported by any strong evidence. The present systematic review confirms that no conclusive evidence shows important differences when heparin intermittent flushing was compared with 0.9% normal saline flushing in central venous catheter maintenance, in terms of efficacy or safety. As heparin is more expensive than normal saline, our findings challenge its continued use in CVC flushing outside the context of clinical trials.'

Details of Cochrane review

Cochrane review title

Heparin versus 0.9% sodium chloride intermittent flushing for prevention of occlusion in central venous catheters in adults (Review)

Citation

[López-Briz E, Ruiz Garcia V, Cabello JB, Bort-Martí S, Carbonell Sanchis R, Burls A. Heparin versus 0.9% sodium chloride intermittent flushing for prevention of occlusion in central venous catheters in adults. Cochrane Database of Systematic Reviews 2014, Issue 10. Art. No.: CD008462. DOI: 10.1002/14651858.CD008462.pub2.](#)

Cochrane Quality and Productivity topics

When the review content was assessed as up to date

19 December 2013.

Quality and productivity category

Medicines optimisation

Relevant codes

N/A

N/A

N/A

Programme budget:

Problems of circulation.

Evidence

Relevance to the NHS

An updated Cochrane review compared the use of heparin instead of normal saline solution for the intermittent flushing of CVCs in adults to aid in the prevention of occlusions.

CVCs are temporary devices implanted into patients when frequent intravenous access is required. They can be used when monitoring patients in intensive care or providing chemotherapy or nutrition intravenously. However, catheters can cause blood clots, blocking the line, along with an increase in the risk of infection and thromboembolism. CVC-related thrombosis is an important source of morbidity and mortality in those patients affected (Mermel 2000).

Heparin is a drug that helps to prevent blood clots, which has been employed in an attempt to prevent these adverse consequences (Bishop 2009). Significant variations of heparin use exist in nursing practice because current guidelines provide conflicting recommendations about flushing frequency, heparin concentration and volume (Mitchell 2009). However, heparin can result in some serious adverse effects, including bleeding, allergic reactions and fall in platelet count. The review set out to determine if the benefits of heparin as an alternative to normal saline solution outweighed its risks.

Six studies with a combined total of 1433 participants were included. Heparin concentrations used in these studies were very different (10-5000 IU/mL), and follow-up varied from 20 days to 180 days. The overall risk of bias in the studies was low. The quality of the evidence ranged from very low to moderate for the main outcomes.

The review found no compelling evidence of a decrease in the rate of blocking of CVCs flushed with heparin compared with CVCs flushed with sterile normal saline solution, nor of differences in the number of days the catheter lasted, the rate of thrombosis, the rate of infection, mortality, bleeding rates or heparin-induced fall in platelet count.

In summary, there is no good evidence that heparin flushing of CVCs is better than flushing with sterile normal saline solution. As heparin is more expensive, the findings of the review do not support its use except in future clinical trials.

Relevant NICE guidance and products

[CG139](#) Infection: Prevention and control of healthcare-associated infections in primary and community care (Published: March 2012)

Recommendation 1.4.4.6: Preferably, a sterile 0.9 percent sodium chloride injection should be

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used to flush and lock catheter lumens.

Recommendation 1.4.4.7: When recommended by the manufacturer, implanted ports or opened-ended catheter lumens should be flushed and locked with heparin sodium flush solutions.

Other accredited guidance and products

No other accredited guidance was available at the time of publication (June 2015).

Potential productivity savings

Estimate of current NHS use

- There are approximately 238,000 adult critical care episodes recorded in England each year for patients admitted into intensive care units or other critical care settings (Health and Social Care Information Centre (2014)).
 - Based on clinical expert opinion approximately 95% (226,000) of the critical care episodes will require a CVC. The number could be more if other adult non critical care episodes are considered.
 - Usage levels of heparin sodium will depend on the number of episodes using CVCs and the number of days flushing needed. This data is not available.
 - Stopping the use of heparin sodium will save costs for the NHS. However, the potential savings cannot be estimated because of the unavailability of activity data on the usage of heparin sodium to maintain patency of catheters in the NHS.
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Level of productivity savings anticipated

- Single day use of heparin sodium is estimated at £3.30. This is based on 10–200 units flushed through every 4–8 hours to maintain patency of the catheter. The unit cost per day for 0.9% sodium chloride (normal saline solution) is £0.30 per 1 mL sachet ([British National Formulary, May 2015](#)).
 - A saving of £3.00 per day if those NHS Trusts using heparin sodium stop and switch to using 0.9% sodium chloride depending on local practice. This would be a 91% saving.
 - Total savings from stopping heparin sodium will depend on the level of activity (episodes using CVCs and the duration of use).
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Type of saving

- This will be actual cash saving if heparin is stopped.
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Any costs needed to achieve the savings

- There are no costs required to implement the change.
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Other information

- The change will impact on NHS Trusts medical and surgical budgets.
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Potential impact on quality of NHS care

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Impact on clinical quality

The use of heparin can result in some adverse events which could be avoided with the use of normal saline solution. Replacing heparin flushing in CVCs with normal saline solution is expected to represent an improvement in the quality of the care delivered to patients.

Impact on patient safety

Replacing heparin flushing in CVCs with normal saline solution is expected to result in an improvement in patient safety.

Impact on patient and carer experience

It is anticipated there might be an improvement in patient experience with the potential reduction in adverse events that is represented by a stop in the use of heparin in the flushing of CVCs.

Likely ease of implementation

Time taken to implement

It is anticipated that an elimination of heparin use in CVCs can be achieved quickly. The size of the change is NHS wide; as such it could take a while to get all Trusts on board.

Healthcare sectors affected

All NHS Trusts that employ the use of CVCs.

Stakeholder support

Likely to achieve good buy-in from all key stakeholders.

References

Bishop L (2009) Aftercare and management of central venous access devices. In: Hamilton H, Bodenham A, editors. Central venous catheters 1st Edition. Chichester: Wiley & Blackwell, p221-37.

[British National Formulary](#) (May 2015)

Health and Social Care Information Centre (2014) Adult Critical Care Data in [England](#) - April 2012 to March 2013.

Mermel LA (2000) Prevention of intravascular catheter-related infections. *Annals of Internal Medicine* 132(5): 391–402.

Mitchell MD, Anderson BJ, Williams K, Umscheid CA (2009) Heparin flushing and other interventions to maintain patency of central venous catheters: a systematic review. *Journal of Advanced Nursing* 65(10):2007-21.