Technoleg Iechyd Cymru
Health Technology Wales

Health Technology Wales (HTW) Guidance 062
November 2024

Non-antibiotic antimicrobial anticoagulant catheter locking solutions for the prevention of catheter-related complications

HTW Guidance:

The evidence partially supports the use of non-antibiotic, antimicrobial, anticoagulant catheter locking solutions for the prevention of catheter-related complications.

TauroLock should be considered for children receiving home parenteral nutrition, chemotherapy or stem cell transplantation and for adults receiving home parenteral nutrition or dialysis. TauroLock is associated with fewer catheter-related bloodstream infections compared with either saline or heparin in these populations. Economic modelling suggests that TauroLock is cost effective in these comparisons and populations.

The evidence does not support the case for routine adoption of TauroLock-U25.000. There is greater uncertainty in the evidence for KiteLock 4%, and, while it shows promise, the current evidence is insufficient to support routine adoption.

HTW recommends that data are collected on clinical outcomes and local experience when devices are used.

Why did Health Technology Wales (HTW) appraise this topic?

Central venous catheters are used to deliver many different therapies, such as chemotherapy, parenteral nutrition and haemodialysis. However, their use can lead to serious complications including infections and blockages. Catheter locking solutions may be used to fill the empty space in a catheter between treatments and are one of several available strategies aimed at reducing the risk of catheter-related complications. Current NICE guidelines recommend that catheters are locked with saline and recommend against the routine use of antibiotic locks. It has been suggested that non-antibiotic catheter locking solutions that have antimicrobial and anticoagulant properties may further reduce the incidence of catheter-related complications, which would benefit patients and reduce costs to the NHS.

This topic was suggested by the Managing Director of ScottMed Distribution UK Ltd.

The status of HTW guidance is that NHS Wales should adopt this guidance or justify why it has not been followed. HTW will evaluate the impact of its guidance.

Evidence summary

Refer to Evidence Appraisal Report 062 (EAR062) for a full report of the evidence supporting this Guidance.

The review aimed to summarise published evidence on the clinical and cost effectiveness of non-antibiotic, antimicrobial and anticoagulant catheter locking solutions in the prevention of catheter-related complications.

In total, seven randomised controlled trials (RCTs) and seven non-RCT studies were identified that compared non-antibiotic, antimicrobial and anticoagulant catheter locking solutions against other locking solutions. Four RCTs and two non-RCT studies were identified for TauroLock. Two RCTs were identified for TauroLock-U25.000. One RCT and five non-RCT studies were identified for KiteLock 4%. No studies were identified that compared KiteLock 4% against TauroLock or TauroLock-U25.000.

Populations, comparators and study designs varied across the studies identified. The evidence included statistically significant outcomes supporting the effectiveness of the intervention compared with the respective control or pre-intervention group. However, there were also many outcomes showing no statistically significant difference between the groups.

For TauroLock, there was evidence of lower rates of central-line associated bloodstream infection (CLABSI), catheter removal, and hospital admissions. For TauroLock-U25.000, there was evidence of lower rates of thrombotic dysfunction, catheter replacement, and the use of recombinant tissue plasminogen activators (rt-PA). For KiteLock 4%, there was evidence of lower rates of CLABSI, occlusion and rt-PA use from non-RCT studies. However, the one RCT identified for KiteLock 4% favoured the control arm for thrombolytic outcomes. There was no evidence of statistically significant differences in the incidence of serious adverse events between any of the interventions and respective control or pre-intervention groups.

Six economic studies were identified, whose results suggest that KiteLock 4%, TauroLock and TauroLock-U25.000 may be cost-neutral or cost-saving. However, these studies were only partially applicable because they considered non-UK settings. HTW developed a new cost-utility analysis for Wales. TauroLock was estimated to be less costly and more effective (dominant) compared with saline for adults receiving home parenteral nutrition. The same conclusion was reached when compared with heparin for adults receiving haemodialysis and children receiving home parenteral nutrition, chemotherapy or stem cell transplant. TauroLock-U25.000 was not estimated to be cost effective compared with TauroLock-HEP500 for adults receiving haemodialysis. KiteLock 4% was more costly and less effective (dominated) compared with heparin for adults receiving haemodialysis. KiteLock 4% was estimated to be less costly and at least as effective as the other comparators modelled for adults receiving haemodialysis or home parenteral nutrition and for children receiving home parenteral nutrition.

The appropriate mechanism for patient engagement was determined and the patient perspective was considered where possible. Five studies were identified on patient experiences with catheters and related infections. No information was identified on patients' attitudes towards methods to reduce catheter-related complications.

Appraisal Panel considerations

- The Appraisal Panel confirmed that KiteLock 4% and TauroLock are CE marked as medical devices. Experts agreed with this classification of catheter locking solutions as medical devices, rather than medicines, because they should not reach the systemic circulation. Their intended use is it be instilled into the lumen of the catheter and remain there for a period of time, before being aspirated before the next treatment session. The Panel heard from experts that although these products are not medicines, they may be procured through pharmacies.
- The Appraisal Panel discussed the place of catheter locking solutions within a group of strategies that aim to prevent catheter-related complications. They agreed that the use of catheter locking solutions should be considered alongside national action plans and guidance on antimicrobial resistance, site care and the use of other interventions, such as antimicrobial caps.
- The Appraisal Panel considered evidence on patient and family perspectives on the use of central lines and noted the impact of catheter-related complications and fear of infections. They understood that patients may not be aware of the type of catheter locking solution used between treatments.
- The Appraisal Panel noted considerable heterogeneity across the clinical effectiveness studies. The Panel discussed the complexity of the clinical context, which includes multiple interventions, comparators and population groups in different clinical settings. They agreed that there are limits to the conclusions that can be drawn from the available evidence and that guidance should focus on areas with the highest quality and quantity of evidence.
- Experts suggested that several factors influencing the risk of infection were sometimes unclear from the evidence in the EAR. For example, whether devices were newly inserted, how long catheter locks were in place, methods of site care and the use of other interventions such as antimicrobial caps.
- Experts noted that the sustainability of the products used should be considered.
- The Appraisal Panel considered the quantity and quality of the clinical evidence and agreed that the evidence base for TauroLock was more robust than for KiteLock 4%. RCT evidence showed statistically significant benefits for some outcomes of both TauroLock and TauroLock-U25.000 compared with the respective controls, while no RCT evidence was identified for statistically significant benefits of KiteLock 4%.
- The Appraisal Panel noted several ongoing studies for KiteLock 4%, including three RCTs. During expert review, the topic proposer highlighted the potential importance of future studies for KiteLock 4%. The Appraisal Panel agreed that further development of the evidence base would be welcomed and may address some of the uncertainties identified in this review.
- The Appraisal Panel considered the generalisability of the published evidence and noted that only two effectiveness studies were conducted in the UK. They heard from experts that practice may differ between settings.
- Experts described variation in the current use of catheter locking solutions in Wales, between services, clinical units and even within an individual patient's care. For example, the choice of catheter locking solution for haemodialysis catheters differs between renal units in Wales and some patients may alternate between TauroLock-HEP500 and TauroLock-U25.000 at different points in their weekly treatment cycles.
- The Appraisal Panel heard from experts that TauroLock, TauroLock-HEP500 and TauroLock-U25.000 are all in current use for some patients in Wales and that the greatest benefit of

intervention may be for people with problematic lines or those who are at greatest risk of complications.

- The Appraisal Panel considered the results of the economic analysis and agreed that TauroLock is likely to be cost effective compared with either saline or heparin for the populations considered in the analysis. They agreed that there was greater uncertainty for KiteLock 4%, which was estimated to be cost effective against most but not all comparators and relied more heavily on effectiveness evidence from non-RCT data. They agreed that TauroLock-U25.000 was not likely to be cost effective compared with TauroLock-HEP based on the model estimates.
- The Appraisal Panel heard from experts that the cost of catheter locking solutions differs depending on the procurement method used. HTW's economic conclusions were drawn based on prices provided by UK distributors of the intervention products. The Appraisal Panel agreed that the greatest value for money would be achieved if everyone in NHS Wales had access to the lowest prices that can be agreed nationally.
- The Appraisal Panel noted that the difference in unit costs between catheter locking solutions was modest compared to the high cost of managing catheter-related bloodstream infections. They heard from experts that the time taken to resolve catheter occlusions causes significant delays to patients' scheduled care and has a negative downstream impact on staffing and the efficiency of clinical units.
- The Appraisal Panel discussed gaps in the current effectiveness and cost effectiveness evidence and agreed that further research would be valuable. They noted that no evidence was identified comparing KiteLock 4% against TauroLock or TauroLock-U25.000, or on the long-term effectiveness of interventions. The Panel suggested that further comparisons against saline would be useful, given its use within standard care and clinical guideline recommendations.
- The Appraisal Panel noted that the review did not identify any real world evidence despite the routine collection of data on infections in the UK. They discussed the challenges of establishing the effect of catheter locking solutions and other interventions aimed at reducing the risk of infection from national-level statistics and surveillance data. The Panel encourages local and national networks to collect data on infections and other catheter-related complications, such as thrombosis and occlusion.
- The Appraisal Panel concluded that the evidence partially supports the use of non-antibiotic antimicrobial anticoagulant catheter locking solutions for the prevention of catheter related complications.

Appraisal Panel considerations: November 2024

Publication of guidance: January 2025

Responsibilities for consideration of this Guidance

Health Technology Wales (HTW) was established by Ministerial recommendation[1,2] to support a strategic, national approach to the identification, appraisal and adoption of non-medicine health technologies into health and care settings. The HTW Appraisal Panel comprises senior representation from all Welsh boards with delegated authority to produce guidance 'from NHS Wales, for NHS Wales'. The status of HTW guidance is 'adopt or justify'. There is an expectation from Welsh Government that HTW guidance is implemented with adoption regularly audited by HTW.[3]

The guidance in this document is intended to assist Welsh care system decision makers to make evidence-informed decisions when determining the place of health technologies and thereby improve the quality of care services.

The content of this HTW guidance was based upon the evidence and factors available at the time of publication. An international evidence base was reviewed and external topic experts and HTW committee members consulted to contextualise available evidence to Wales. Readers are asked to consider the generalisability of the evidence reviewed to NHS Wales and that new trials and technologies may have emerged since first publication and the evidence presented may no longer be current. It is acknowledged that evidence constitutes only one of the sources needed for decision making and planning.

This guidance does not override the individual responsibility of health professionals to make decisions in the exercise of their clinical judgment in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

No part of this guidance may be used without the whole of the guidance being quoted in full. This guidance represents the view of HTW at the date noted. HTW guidance is not routinely updated. It may, however, be considered for review if requested by stakeholders, based upon the availability of new published evidence which is likely to materially change the guidance given.

Standard operating procedures outlining HTW's evidence review methods and framework for producing its guidance are available from the HTW website.

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Declarations of interest were sought from all reviewers. All contributions from reviewers were considered by HTW's Assessment Group. However, reviewers had no role in authorship or editorial control and the views expressed are those of Health Technology Wales.

Chair, Health Technology Wales Appraisal Panel

1. National Assembly for Wales, Health and Social Care Committee. Access to medical technologies in Wales. December 2014.
2. Response to Recommendations from the Health & Social Care Committee: Inquiry into Access to Medical Technologies in Wales. February 2015.
3. Gething, V. Letter to all Health Board Chairs re Funding for Sacral Nerve Stimulation in Wales. VG_01655_17. September 2017.