Technoleg Iechyd Cymru
Health Technology Wales

HEALTH TECHNOLOGY WALES (HTW) GUIDANCE 039
March 2022

Electronic blood management systems for blood transfusion

HTW Guidance:

The evidence supports the routine adoption of electronic blood management systems (EBMS) to support blood transfusions.

Compared with paper-based systems, EBMS reduces rates of sample rejection and blood wastage.

A cost analysis estimates that the use of EBMS would lead to cost savings of £0.32 per person receiving a blood transfusion in the first year and £19.92 per person in subsequent years compared with a paper-based system. If applied to all people receiving blood transfusions in NHS Wales, it is estimated that there would be savings of £1.9 million over a two year period.

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

Blood transfusion is a process whereby blood components (red blood cells, white blood cells, plasma, clotting factors, or platelets) are given intravenously to a patient. Errors in this process (misidentification of a patient, their blood sample, or the blood component intended for them) pose significant risks to patients and in cases where blood is incompatible with a patient's blood type, can result in severe, sometimes even fatal, adverse reactions. Patient identification, and the verification of samples and blood components from/intended for the right patient, has traditionally used manual and written checks but EBMS carries out some or all of these checks electronically instead, using unique identifiers (such as barcodes). Work has commenced on a Discovery and Scoping project to explore in greater detail how EBMS could be implemented in Wales.

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 039 (EAR039) for a full report of the evidence supporting this Guidance.

We searched for evidence that could be used to answer the review question: What is the clinical and cost effectiveness of electronic blood management systems (EBMS) compared to standard methods of blood management? For the purposes of this appraisal, EBMS describes any electronic system used to check and/or verify identification of patients, blood samples, or blood units at any stage of the transfusion process.

We identified ten studies comparing the effectiveness of EBMS to alternative blood tracking and verification processes during transfusions, usually 'manual' processes, such as use of written documentation and verification of identification/samples by a second staff member. Two studies were multicentre comparisons of EBMS to manual processes; the remainder were single centre studies measuring outcomes before and after implementation of EBMS.

There is some evidence to suggest that EBMS is associated with lower rates of incorrect transfusions, 'wrong blood in tube' errors, sample rejection and blood wastage. However, many of the studies did not report any statistical measures of effect sizes, and for some outcomes events rates are very low, meaning it is difficult to accurately quantify the possible benefits of EBMS. Potential risks of bias within the included studies also reduces the certainty of the evidence.

No health economic studies were included in Evidence Appraisal Report 039. We developed a cost analysis, from the Welsh NHS perspective, which compared EBMS with a paper-based system, based on estimates of staff resource use to which the unit costs staff time were applied. The base case results of the cost analysis estimated that EBMS could save £0.32 per person in the first year and £19.93 per person in each subsequent year compared with a paper-based system. The results are sensitive to changes in the population size and in staff time using EBMS.

The appropriate mechanism for patient engagement was determined and the patient perspective was considered where possible.

Appraisal Panel considerations

- The appraisal panel heard from experts that errors during transfusion, whilst rare, are potentially serious and life threatening events and therefore represent a significant clinical risk to patient safety. In addition, when they occur, they are resource intensive and investigating the root causes is time consuming. Patient and public involvement representatives welcomed any technology that could improve patient safety during transfusion, and also minimise the need for sample rejection, since resampling can be inconvenient and unpleasant for patients, especially those with a needle phobia.

- In considering the evidence available, some important perspectives were acknowledged by the HTW researchers and Appraisal Panel members. Some of the outcomes measured are rare events, which makes it difficult to measure the effectiveness of EBMS with certainty, andthe 'before and after' study design that was adopted in most of the studies reviewed leads to an unavoidable introduction of the risk of bias. On the other hand, EBMS is a digital health technology, and it was noted that according to the widely accepted NICE Evidence Standards Framework for Digital Technologies, the level of evidence available is appropriate for the clinical situation and for this type of digital health technology.

- The Appraisal Panel concluded that the evidence available is of sufficient quality and certainty to inform their decision-making processes and that the use of EBMS is likely to reduce the rate of sample rejection and blood wastage as compared with a conventional paper-based system. When considering the evidence on rates of incorrect transfusions, the Appraisal Panel agreed that because these occur infrequently, a reduction in these resulting from the introduction of EBMS could not be demonstrated definitively in the clinical studies.

- The Appraisal Panel considered the results of the HTW cost consequence analysis and discussed the feasibility of model inputs and estimated costs with the clinical experts. It was agreed that the clinical and laboratory staff time estimates in the model are likely to be feasible, given that one nurse rather than two is required at the bedside for obtaining blood samples, and that the base case population size (which did not include people receiving 'group and save' samples) is likely to be a conservative assumption. An expert commented that the cost for Bloodtrack hardware that was used in the cost analysis may be overestimated, since hardware costs have decreased since the publication of the study from which the cost was sourced. The Appraisal Panel also noted that the results of the cost analysis depend on the exact EBMS modules that are required in Wales and that, since the cost of the system used in the model was based on the introduction of a full 'vein-to-vein' system in Oxford University Hospitals, it is likely to be more expensive that the one that is relevant to this appraisal. The Appraisal Panel further acknowledged that the model employed a pragmatic approach which focused on implementation costs and potential savings in staff time. No consideration was given to the costs of other outcomes such as incorrect transfusions and wrong blood in tube events, due to the difficulties in obtaining data relating to the clinical impact of these rare events. Overall, the Appraisal Panel agreed with the approach taken in the HTW cost consequence analysis and judged that the adoption of EBMS is likely to be cost saving when compared with a paper-based system and, if anything, may be under-estimated in the current cost consequence analysis.

- The Appraisal Panel concluded that improvements in patient safety from the use of EBMS are likely, that the costs savings estimated by HTW's health economic analysis are plausible and that the case for routine adoption is therefore supported by the evidence.

- The Appraisal Panel heard from experts that a laboratory information management system, Laboratory Information Network Cymru (LINC), is due to be introduced in Wales, which will include blood ordering capabilities. To extend this system to deliver a full 'vein-to-vein' service, additional EBMS modules would need to be introduced at the start and end of the process. It was concluded that consideration of all aspects of such a 'vein-to-vein' system was beyond the scope of the evidence considered in this appraisal, which focussed on blood transfusion delivery and potential improvements in patient safety.

- The Appraisal Panel noted the following issues which will require careful consideration in the adoption of EBMS in NHS Wales:

    - The need for appropriate staff training, both during the initial roll-out of the system and during ongoing establishment.

    - The need to ensure compliance and integration with existing standards used in blood transfusion management.

    - The consideration of a 'pilot' project before proceeding to 'country-wide' adoption in order to mitigate possible risks such as incompatibility or redundancy with existing systems (such as LINC).

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.

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