




Opportunities to improve feedback to reduce blood component wastage: Results of a national scheme evaluation

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Abstract

Background: Blood components are costly and scarce. The Blood Stocks Management Scheme (BSMS) was established in the United Kingdom (UK) to support hospital transfusion services and national blood services through collection, analysis, and monthly feedback of data on blood component inventory and wastage management. There is a growing evidence base on how best to deliver feedback for quality improvement. We assessed the quality and utility of the monthly BSMS component reports.

Methods: We assessed the content of BSMS reports issued in March 2023 against established criteria for effective feedback. Two researchers independently rated whether criteria spanning the five domains of goal setting, data collection, feedback content, feedback display and feedback delivery were fully, partially or not met. Disagreements were resolved through discussion. We conducted an online questionnaire survey of recipients of BSMS reports during March 2023 to assess their use of reports and seek suggestions for improvement.

Results: Five out of 20 criteria for effective feedback were fully met. Areas for improvement included placing more emphasis in the feedback on positive change, linking data and summary messages, and including specific

Abbreviations: BSMS, Blood Stocks Management Scheme; CRYO, cryoprecipitate; FFP, fresh frozen plasma; NHS, National Health Service; NHSBT, NHS Blood & Transplant; NIHR, National Institute for Health and Care Research; PLT, platelets; RBC, red blood cells; UK, United Kingdom; WAPI, wastage as a percentage of issue.

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suggestions for action. Respondents highlighted the value of benchmarked comparisons with other hospital transfusion services.

Conclusion: There is scope for enhancing the effectiveness and utility of BSMS feedback reports and hence reducing wastage of blood components. This methodology for evaluation of feedback could be utilized to improve other areas of transfusion practice.

KEYWORDS

blood management, health research methodology, operations, transfusion service

1 | BACKGROUND

There is considerable interest in how to minimize wastage of blood and support effective stock management. Blood donors strongly express a wish to see low levels of wastage for their product donated altruistically. There are on-going initiatives to better understand wastage given concerns about security of supply of blood for many blood transfusion services. Many published studies reporting on causes of wastage are single center in hospitals or in the context of specific products.¹⁻⁷ In the United Kingdom, the Blood Stocks Management Scheme (BSMS) was established in partnership with NHS Blood & Transplant (NHSBT) over 20 years ago to improve national blood stock management and reduce blood component wastage at all hospitals.⁸

The scheme continues to collect data on blood component stock, issues and wastage for red blood cells (RBC), platelets (PLT), fresh frozen plasma (FFP), and cryoprecipitate (CRYO) through automated and manual submission from hospitals in England, Wales, and Northern Ireland. Together with data on blood supplied to hospitals by the UK national blood services, these inventory data allow the evaluation of stock management in hospitals and identification of areas for improvement. These data also enable trends to be identified on a national scale, for example, the largest proportion of RBC wastage is due to time expiry, and there is a strong correlation between good stock management practices and reduction in time expired wastage.⁹

The BSMS provides monthly comparative feedback reports to hospital transfusion laboratories, which has remained largely unchanged in format but with on-going refinements to content and presentation designed by the organizers. Typically, relevant blood component data are displayed in a number of ways including bar charts, color coded scales, a snapshot summary, and a 12-month data summary for RBC,

PLT, FFP, and CRYO (Figure 1). The reports also focus on key supply chain priorities (e.g., blood group O D negative RBC) and include a benchmarking feature allowing comparative analysis with hospitals with similar blood component issue activity subdivided into 'BSMS user groups', corresponding to the blood component and volume of annual issues. The reports were developed with the expertise of core staff involved in hospital transfusion laboratory stock management activity. However, there has been no previous evaluation of report content and utility.

These monthly BSMS reports are an example of audit and feedback, which is the most common tool used in health services for changing practice. Audit and feedback generally has modest if worthwhile effects on healthcare delivery.¹⁰ The use of feedback in transfusion practice is not a novel approach and is utilized in different forms across multiple organizations in the United Kingdom to improve patient safety and transfusion outcomes (e.g., The UK National Haemovigilance Scheme, Serious Hazards of Transfusion [SHOT] and the National Comparative Audit for Blood Transfusion).^{11,12}

However, the field of implementation science has led a critical review of feedback and developed evidence and theory-informed ways of enhancing effectiveness, such as providing repeated feedback and incorporating action planning.¹³ It is also important to optimize, where feasible, all components of the full feedback cycle-goal setting, data collection, feedback content, feedback display, and feedback delivery.^{14,15} Previous work has demonstrated scope for strengthening the design and delivery of national clinical audit programs in the United Kingdom,^{16,17} and led to the design of a toolkit to assess the extent to which audits are consistent with best practice for feedback.¹⁸ We applied this toolkit to evaluate and identify opportunities for enhancing the BSMS feedback reports. We also assessed how report recipients perceive and act upon feedback.

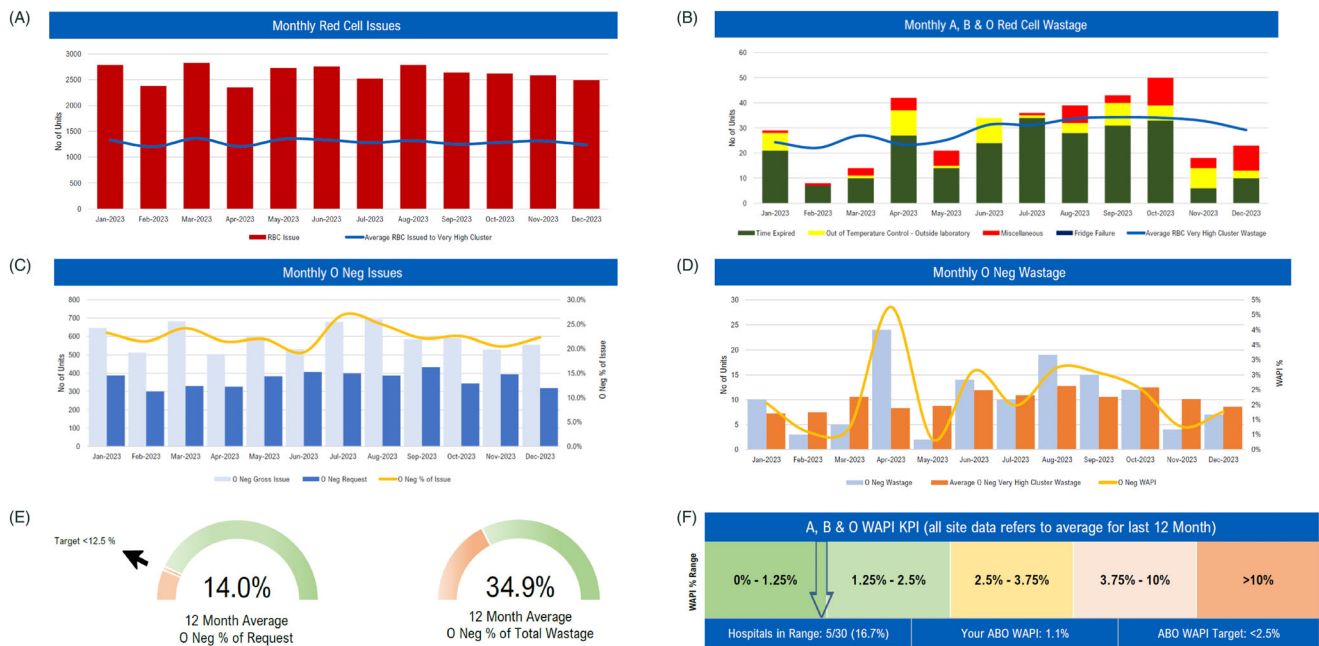


FIGURE 1 Example figures from a typical BSMS monthly component report including (A) Monthly RBC issues with benchmarking position, (B) monthly RBC wastage trend and type of wastage with benchmarking position, (C) O Negative RBC issues, (D) O Negative wastage as a percentage of issue (WAPI) (%) with benchmarking position, (E) proportion of O Negative RBC requests and O Negative % wastage, and (F) RBC WAPI (%) scale with comparative benchmarking position. [Color figure can be viewed at wileyonlinelibrary.com]

2 | METHODS

We undertook a criterion-based assessment of BSMS feedback reports and a national survey of report recipients. This work was a collaboration between BSMS and the National Institute for Health and Care Research (NIHR) funded Data Driven Blood Transfusion Research Unit.¹⁹

2.1 | Criterion-based assessment

The assessment toolkit incorporates 20 criteria spanning the five domains of goal setting, data collection, feedback content, feedback display, and feedback delivery.¹⁸ Consistency with each criterion is assessed and rated as red, amber, or green.

- Green: fully met; these areas are well covered and should be maintained in future iterations of feedback reports.
- Amber: partially met; these areas are partially addressed and should be further developed in future iterations of feedback reports.
- Red: not met; these areas are not or only minimally fulfilled and should be considered for incorporation into future iterations of reports.

Two researchers independently rated an example of the BSMS reports according to each criterion. Discrepant ratings were resolved through discussion and, if needed, with reference to a third team member if necessary.

2.2 | Survey of report recipients

Our sampling frame was based on 271 known recipients of BSMS component reports. Although primarily targeted at hospital transfusion laboratory managers, the survey was open to anyone involved in hospital transfusion with an interest in reviewing BSMS reports. The opportunity to take part in the survey was advertised via multiple channels, including the BSMS website, X (formerly Twitter), NHSBT transfusion service communications to all hospitals in England, and word of mouth at relevant events.

The 21-question survey was voluntary and anonymously answered. It included a range of question and answer types including multiple choice selection, free-text, and 6-point Likert scale responses to assess opinions from respondents about the BSMS reports. The survey included questions about how the reports are used, and which types of information are considered useful to recipients to manage their blood component inventory. Recipients were able to submit further free-

TABLE 1 The key criteria from the audit method for effective audit and feedback.

Self-Assessment Audit criteria	BSMS monthly component report rating		
	Green	Amber	Red
Goal Setting			
1. Make audit criteria clinically meaningful.		✓	
2. Feedback should target goals within the control of recipients.		✓	
Data collection			
3. Automate data collection if feasible.		✓	
4. Data collection and analysis should produce a true representation of clinical performance.		✓	
5. Minimise delays between data collection and feedback.		✓	
Feedback content			
6. Focus feedback on areas where there is most room for improvement.			✓
7. Link feedback to details of individual patients where feasible.			✓
8. Report performance at the lowest level feasible.	✓		
9. Choose comparators that reinforce desired behaviour change.	✓		
10. Feedback should emphasise positive change.			✓
11. Provide short, actionable messages followed by optional detail			✓
12. Incorporate 'the patient voice'.			✓
Feedback display			
13. Closely link the visual display and summary messages.			✓
14. Provide feedback in more than one way.		✓	
15. Minimise extraneous cognitive load for feedback recipients.		✓	
Feedback delivery			
16. Actively 'push' feedback to recipients.	✓		
17. The organisation or person delivering feedback should be perceived as clinically or methodologically credible.	✓		
18. Provide multiple instances of feedback.	✓		
19. Include specific suggestions for action at clinician and organisational levels.			✓
20. Engage with organisations to confirm their arrangements for responding to feedback.		✓	
Total	5	8	7

Note: The areas for effective feedback are given in more detail below, including the category of the feedback mechanism that these criteria are related to.¹⁸

text comments and suggestions for improving the reports. The survey was open for responses for 4 weeks from March 2023.

We analyzed the survey using frequency counts. When evaluating question statements regarding the report, the 'strongly agree' and 'agree' responses were

considered positive responses, 'disagree' and 'strongly disagree' were considered negative toward the statement regarding the report. 'Don't know' responses were excluded. Free-text responses on how the reports could be improved for the recipients were summarized and categorized into key themes.

TABLE 2 A selection of responses to questions from the BSMS Monthly component reports survey.

Question	Number (%)
Responses (<i>n</i> = 47)	
What is your role?	
Transfusion laboratory manager	26 (55)
Senior/lead for transfusion	15 (32)
Transfusion practitioner	2 (4)
Biomedical scientist	2 (4)
Pathology manager	1 (2)
‘Other’	1 (2)
How long have you been involved in blood component inventory management?	
>10 years	18 (38)
6–10 years	11 (23)
1–5 years	16 (34)
<1 year	2 (4)
How often do you refer to the BSMS monthly component reports?	
Monthly	40 (85)
Quarterly	6 (13)
Weekly	1 (2)
In terms of overall usefulness for the management of blood stocks the reports are:	
Always useful	11 (23)
Frequently useful	20 (43)
Sometimes useful	15 (32)
Rarely useful	1 (2)
What percentage of the report information would you estimate is useful to you?	
0%–25%	2 (4)
25%–50%	12 (26)
50%–75%	17 (36)
75%–100%	16 (34)
During the recent blood shortage how helpful were the reports to allow you to reduce stock and/or wastage?	
Always useful	5 (11)
Frequently useful	13 (28)
Sometimes useful	17 (36)
Rarely useful	7 (15)
Not useful	5 (11)
Do you share these reports with anyone else in your organization?	
Yes, always	31 (66)
Sometimes	10 (21)
Rarely	4 (9)
Never	1 (2)
Other	1 (2)
I would like the reports to contain...	
More information	4 (9)
The same amount of information	36 (77)
Less information	5 (11)
Other	2 (4)

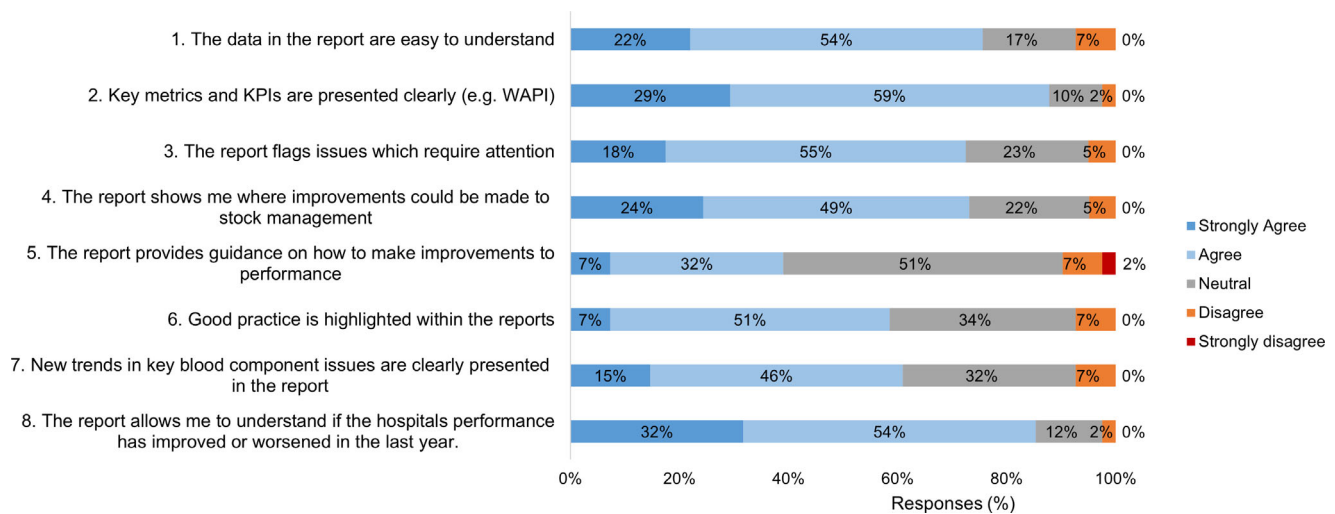


FIGURE 2 Survey Likert scale statements and responses (%). [Color figure can be viewed at wileyonlinelibrary.com]

3 | RESULTS

3.1 | Criterion-based assessment

The 20-point assessment process identified five areas where the reports met the criteria (green), eight where criteria were partially met (amber) and seven where criteria were not met (red) (Table 1). The criteria that were fully met (green) were related to feedback content and delivery including the active ‘push’ of multiple instances of feedback to those performing the tasks related to inventory management, utilizing data comparators that reinforce behavior change, and the feedback is given by an organization perceived as credible.

The criteria that were partially met (amber) included aspects related to feedback methods of goal setting, data collection, and feedback display such as automation of data collection, minimizing delay between data collection and feedback, providing feedback in more than one way, and minimizing extraneous cognitive load for recipients. The criteria that were considered not met (red) were related to feedback content and display such as focusing feedback on areas where there is most room for improvement, emphasizing positive change in feedback, providing short, actionable messages followed by optional detail and including specific suggestions for action. Some audit criteria were categorized as red but are unattainable for the BSMS monthly component reports such as linking feedback to details of individual patients, because BSMS data are not collected at a patient level.

3.2 | Survey of report recipients

We received 47 responses out of 271 known recipients of BSMS reports and an unknown number of others

with interests in blood stocks management, giving an estimated response rate of 17%. Respondents’ main roles were transfusion laboratory managers (26/47, 55%), senior/lead for transfusion (15/47, 32%) or other roles within the hospital transfusion laboratory. Respondents indicated a range of experience with blood component inventory management from under 1 year (2/47, 4%) to over 10 years’ experience (18/47, 38%) (Table 2).

Respondents indicated that most refer to the BSMS monthly component reports at least monthly. Nearly all respondents indicated that the overall usefulness of the reports was sometimes, frequently, or always useful and the majority of the report content is useful to respondents. During the recent UK blood shortage (October 2022 to November 2023) respondents reported that reports were sometimes, frequently, or always useful. The majority of responses confirmed that they would like the report to contain the same amount or more information (36/47, 77%) (Table 2).

Respondents reported that the monthly component reports are referred to monthly by the majority (40/27, 85%) and used to make decisions about inventory management, in combination with internally collected data, data from the BSMS online data platform²⁰ and personal experience.

Respondents gave strong positive responses indicating the data in the reports were easy to understand, key metrics are presented clearly, and the report allows understanding of whether hospital performance has changed in the last year (Figure 2). Respondents indicated slightly lower positive responses when asked whether the reports; flag issues which require attention or whether the report shows where improvements to stock management could be made.

TABLE 3 Respondents who confirmed that reports are shared within the hospital transfusion service were asked the roles of individuals that the reports are shared with and the methods used to disseminate the reports.

Question	Number (%)
Please state the roles of colleagues within the organization who you share the reports with: (<i>n</i> = 157) ^a	
Transfusion practitioner	27 (17)
Transfusion/hematology clinician	22 (14)
Senior/lead for transfusion	22 (14)
Specialist biomedical scientist	17 (11)
Biomedical scientist	15 (10)
Member of quality team	15 (10)
Transfusion laboratory manager	13 (8)
Other	11 (7)
Pathology manager	8 (5)
Nursing staff	4 (3)
Surgical teams	3 (2)
If you do share the reports how do you share them? (<i>n</i> = 72) ^a	
Internal meetings	30 (42)
Email	21 (29)
Word of mouth	9 (13)
Notice board	6 (8)
Other	6 (8)

^aMultiple responses were permitted, respondents (*n* = 47) supplied more than one answer indicating the range of roles and methods for sharing of reports.

The lowest rate of positive responses together with the highest neutral responses were found in responses to questions about whether the report offers guidance on how to make improvements, highlights good practice, and clearly presents new trends in component issues. There were low rates of negative responses to all Likert scale questions.

The responses indicated the majority of hospital transfusion services share the BSMS monthly component reports within their hospital, 66% (31/47) indicate they always share BSMS component reports with others (Tables 2 and 3).

There were 157 responses from the 47 respondents detailing who the reports were shared with. The most common colleague roles the reports are shared with are other members of the transfusion team – transfusion laboratory staff, transfusion practitioners/transfusion safety officers, hematology, or transfusion clinicians and seniors/leads for transfusion. However, there are other staff roles indicated that reports are shared with outside of the immediate

TABLE 4 Summary categories for the free-text suggestions for improvement obtained from respondents of the survey.

Category of free-text comment	Number of comments received
The addition of a clear summary of data to identify changes over time, to help with staff time or capacity issues when reviewing the reports so the key information is clear and to reduce the demand on the recipient.	4
Bespoke suggestions that were specific to a hospital transfusion service to monitor data locally but might not be applicable to all.	3
The report layout or format, request to retaining current features or including some to make the reports clearer.	3
Interpretation of the numerical data in the data table being difficult to understand and too busy.	2
Retaining benchmarking capability against similar hospitals within the reports	2

transfusion team performing the stock management task; quality team staff, surgical team staff, nursing staff, and ‘other’ roles were indicated.

There were 72 indications of the methods with which the reports are shared, demonstrating both digital and physical formats of the reports are necessary to allow for report sharing.

The addition of a summary section, improvements to the data display and retaining benchmarking capability were common improvements suggested by respondents (Table 4).

4 | DISCUSSION

This study evaluated the BSMS monthly component reports and identified areas where the reports are not meeting standards considered relevant to effective feedback to facilitate improvements in blood stock management and a reduction in blood wastage. The criterion-based assessment highlighted a need to improve areas in the reports related to data collection, feedback content, and display such as automation of data collection, emphasizing positive change within the feedback, and focusing on areas with the most room for improvement whilst providing short actionable messages, including specific suggestions for improvement with optional extra

TABLE 5 The summary of improvements identified from this work that will be addressed both short and long terms by future development of the BSMS monthly component reporting.

Improvements identified	Benefit to hospital transfusion services
Short-term recommendations	
Develop summary section	Include key recommendations, pieces of relevant data/trends, guidance and benchmarking. Using plain language will help with understanding and reach a wider audience.
Highlight good practice	Positive changes in the data should be highlighted to encourage behavior to be maintained.
Highlight and clearly present new trends that require attention	Displaying data together with corresponding key messages will reduce extraneous cognitive load, clearly indicating to recipients the area of stock management that requires attention in order to drive improvement.
Provide guidance on how to make improvements to performance	Including specific suggestions for action will reduce extraneous cognitive load, clearly indicating to recipients the actions that may be taken in order to drive improvement.
Long-term recommendations	
Engage with large organizations and reduce widespread variation in practice	Improve transparency and engagement with blood component inventory management data. Ensure relevant key performance indicators and benchmarking parameters are reported that can galvanize change and promote culture of continuous improvement e.g., projected economic savings
Automated data collection and reporting	Reduced workload, reduce delay between data collection and reporting, improved quality and accuracy of data, allow remote monitoring, and add value for blood services when predicting component demand and responding to demand changes.

detail. Survey responses from hospital transfusion services indicated that it was not clear that the BSMS monthly component report offers guidance on how to

make improvements, highlighted good practice, or clearly presents new trends in component issues.

Best practice audit criteria could be met by incorporating a summary section in the reports, something also suggested by survey respondents. A summary section would enable areas of specific interest to the hospital to be highlighted, with an emphasis on positive change, enable inclusion of short actionable messages specific to changing practice based on the data and better linkage of the visual display and summary messages reducing extraneous cognitive load. In addition, the survey highlighted reports get disseminated to a wider group within the hospitals and that not all those reviewing the report may have high levels of experience in blood component inventory management and a summary section with enhanced clarity can help extend the reach of this important information. Table 5 summarizes our recommended improvements that will be incorporated into future versions of the BSMS feedback. These suggestions may be relevant to others delivering feedback for inventory management, with some local amendments depending on arrangement for feedback or could be of value for broader applications in other areas of transfusion.

We highlight four main study limitations. First, our method to assess how the BSMS reports met the best practice criteria often depended on subjective judgments. We attempted to improve reliability of ratings by having two independent raters and an expert arbitrator if required. Second, not all criteria for effective feedback were applicable. For example, it is impracticable to link feedback to individual patient care as BSMS data are aggregated at an organizational level. Third, our survey response rate was modest, and therefore prone to selection bias, whereby individuals with stronger views or greater familiarity with reports may have been more likely to respond. Fourth, we are likely to have overestimated the true survey response rate given that other staff with an interest in BSMS reports were invited to participate.

Supporting blood stock management processes within hospital transfusion services in the United Kingdom is critical at a time when blood shortages and challenges to the supply chain are becoming more frequent.^{21,22} Good blood component inventory practice has been demonstrated to support a reduction in component wastage.²³ Whilst the BSMS includes a dedicated team including biomedical, clinical scientists and data analysts who utilize their expertise in the use of data, blood component stock management and transfusion, advising hospitals on best practices to optimize stock utilization—the quality of blood stock management activities at different

hospitals varies, indicating there is room for improvement in stock management practice. Having a feedback and reporting mechanism enables hospitals to obtain the necessary data to review stock management performance regularly and make the changes that are required for good inventory practice.⁸ This in turn would reduce overall costs to hospitals and ultimately the UK National Health Service (NHS). Whilst the United Kingdom has the benefit of the established BSMS and a feedback facility dedicated to stock management, it would be possible to use the toolkit on a smaller scale in a region or group of hospitals to develop effective feedback to address areas of transfusion practice that require improvement.

If component stock and wastage data were to be automatically collected from hospitals, this would eliminate error and missing data associated with manual data submission, so the data could be reported back more accurately and in near to real time. This mechanism would also allow for other improvements to feedback to be incorporated such as providing tailored guidance for improvement. Automated data collection could also have scope to collect a wider hospital dataset (e.g., including component utilization data at a clinical specialty level) which would assist with demand planning for blood services and would reduce the burden on the time of hospital staff required to submit inventory management data, enabling staff to spend more time on improvement activities for good blood component stock management and reducing wastage. Improving the data collection process through automated and real-time data collection, is feasible, as pilots have demonstrated, however, current barriers to large scale utilization are the interconnectivity of transfusion information systems and ultimately the cost associated with software changes to permit interconnectivity.

In conclusion, our assessment has identified scope for improving BSMS feedback reports, which have already been adopted by the scheme. Survey respondents valued the reports, sharing and using them in a number of ways to improve stocks management. There is increased recognition of the value of implementation science in informing behavior change; our work illustrates a method for optimizing feedback reports, based on current evidence and theoretical principles, that may be transferable to other areas of transfusion practice currently utilizing feedback reporting or that may benefit from adoption of a feedback scheme.

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CONFLICT OF INTEREST STATEMENT

There are no conflicts of interest.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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