NICE National Institute for Health and Care Excellence

Putting NICE guidance into practice

Costing statement: Blood transfusion

Implementing the NICE guideline on blood transfusion (NG24)

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Summary

This costing statement looks at the resource impact of implementing the NICE guideline on blood transfusion in England.

This statement focuses on the recommendations that are likely to have the greatest resource impact. These are:

- Offer iron before and after surgery to patients with iron-deficiency anaemia.
- Offer tranexamic acid to adults and children undergoing surgery who are expected to have at least moderate blood loss (greater than 500 ml). Consider tranexamic acid for children undergoing surgery who are expected to have at least moderate blood loss (greater than 10% blood volume)
- Consider intra-operative cell salvage with tranexamic acid for patients who are expected to lose a very high volume of blood (for example in cardiac and complex vascular surgery, major obstetric procedures, and pelvic reconstruction and scoliosis surgery)
- Consider using a system that electronically identifies patients to improve the safety and efficiency of the blood transfusion process.

It is anticipated that the cost of implementing the recommendations may be offset by a reduction in the number of blood transfusions, and a reduction in the amount of blood transfused when they are still needed. More appropriate use of blood transfusion will reduce risk and make better use of a scarce and costly resource.

Blood is provided by NHS Blood and Transplant (NHSBT), a Special Health Authority. Blood transfusion services for adults are commissioned by NHS trusts but paid for by clinical commissioning groups as part of national tariff. These services are delivered in secondary and tertiary care.

1 Introduction

1.1.1 This costing statement aims to help organisations plan for the financial implications of implementing NICE guidance.

1.1.2 We anticipate that the guideline will have resource implications. Organisations are encouraged to evaluate their own practices against the recommendations in the guideline and assess costs and savings locally.

1.1.3 Blood is provided by NHS Blood and Transplant (NHSBT), a Special Health Authority. Blood transfusion services for adults are commissioned by NHS trusts but paid for by clinical commissioning groups as part of national tariff. These services are delivered in secondary and tertiary care.

1.1.4 The guideline aims to avoid unnecessary blood transfusions and their associated risks, and to make the best use of blood supplies, which are a scarce and costly resource.

1.1.5 The guideline covers both elective and non-elective care.

1.1.6 The guideline contains recommendations about general principles of blood transfusion, and applies to a range of conditions and different settings. It does not make recommendations relating to specific conditions. A number of the recommendations have been considered applicable to children following extrapolation from evidence in adults. However the guidelines do not cover transfusion for neonates and infants less than a year of age due to the difficulties in extrapolating adult evidence to very young children.

2 Background

2.1 Current service provision

2.1.1 Blood transfusions are common in clinical practice. In 2014/15 NHS Blood and Transplant issued 1.7 million units of red blood cells, 275,000 units of platelets, 215,000 units of fresh frozen plasma and 165,000 units of cryoprecipitate to hospitals in England and North Wales.

3 Analysis of the potential resource impact

3.1 Recommendations on alternatives to blood transfusion for patients having surgery

Intravenous and oral iron

Offer oral iron before and after surgery to patients with iron-deficiency anaemia. (Recommendation 1.1.2)

Consider intravenous iron before or after surgery for patients who:

- have iron-deficiency anaemia and cannot tolerate or absorb oral iron, or are unable to adhere to oral iron treatment (see the NICE guideline on medicines adherence)
- are diagnosed with functional iron deficiency
- are diagnosed with iron-deficiency anaemia, and the interval between the diagnosis of anaemia and surgery is predicted to be too short for oral iron to be effective. (Recommendation 1.1.3)

Cell salvage and tranexamic acid

Offer tranexamic acid to adults undergoing surgery who are expected to have at least moderate blood loss (greater than 500 ml). (Recommendation 1.1.5)

Consider tranexamic acid for children undergoing surgery who are expected to have at least moderate blood loss (greater than 10% blood volume). (Recommendation 1.1.6)

Do not routinely offer cell salvage without tranexamic acid. (Recommendation 1.1.7)

Consider intra-operative cell salvage with tranexamic acid for patients who are expected to lose a very high volume of blood (for example, in cardiac and complex vascular surgery, major obstetric procedures, and pelvic reconstruction and scoliosis surgery). (Recommendation 1.1.8)

Background

3.1.1 Iron is not currently being offered consistently, and it is anticipated that there will be an increase in iron prescribing. Increasing iron use should result in a decrease in transfusions.

3.1.2 Tranexamic acid is an antifibrinolytic agent used to prevent, stop or reduce unwanted bleeding. Using tranexamic acid reduces the likelihood of a transfusion being needed, and reduces the average volume of blood transfused when transfusions are needed. Clinical opinion is that tranexamic acid may currently only be given to 10–20% of patients having surgery who are at risk of at least moderate bleeding. Therefore the use of tranexamic acid is expected to increase.

3.1.3 Intra-operative cell salvage is a medical procedure in which blood lost during surgery is recovered and re-infused into the patient. It is currently used in patients having surgery who are at moderate or high risk of bleeding. The guideline recommends intra-operative cell salvage only for patients who are expected to lose a very high volume of blood. Therefore there will be reduced use of cell salvage.

Potential costs

3.1.4 An increase in the use of iron and tranexamic acid is anticipated.

3.1.5 The weighted average cost of oral iron is estimated to be £1.51[1] per person. Intravenous iron is more expensive, with the most widely prescribed intravenous iron costing £79.70[2] per person. However, it is anticipated that most people will receive oral iron. This will be an additional cost to the provider. For commissioners, the cost will depend on how the iron is administered. For intravenous iron people will need a separate appointment, and in some instances this may be a day case.

3.1.6 Tranexamic acid is estimated to cost £1.19[3] for surgical procedures with a high risk of bleeding and £0.60[3] for surgical procedures with a moderate risk of bleeding. This will be an additional cost to the provider. For commissioners, the cost will be included in the surgical tariff.

Potential savings

3.1.7 An increase in the use of iron and tranexamic acid is anticipated to result in a decrease in the number of transfusions, and reduce the amount of blood transfused when transfusions are still needed.

3.1.8 Therefore it is anticipated that providers may purchase less blood following implementation of the guideline. It is estimated to cost providers £170 for the first unit of blood transfused and

[1] Weighted average cost based on number of ferrous fumarate 210 mg tablets and ferrous sulfate 200 mg tablets prescribed, which according to Prescription Cost Analysis 2014 account for 82% of oral iron. Costs are from the electronic drug tariff (accessed October 2015). A dosage of 3 tablets daily for 2 weeks has been taken from the guideline's health economic analysis.

[2] Based on the cost of CosmoFer, which according to Prescription Cost Analysis 2014 accounts for 90% of intravenous iron prescribed. Costs taken from the eMC Dictionary of Medicines (accessed October 2015). A dose of 2 vials has been taken from the guideline's health economic analysis.

[3] Costs taken from the electronic drug tariff, accessed October 2015. High risk: 1 g every 6–8 hours followed by a continuous intravenous infusion of 25–50 mg/kg over 24 hours, with a total dose of 6000 mg. Moderate risk: 1 g every 6–8 hours, total dose 3000 mg.

£162 for subsequent units (see Appendix 1 for the breakdown of this cost). Depending on the reduction in the number of units of blood transfused, there may be a saving in the range of £146-£689 per person[4].

3.1.9 It is not anticipated that reducing the use of intra-operative cell salvage will result in short-term savings for commissioners, because it is assumed that the cost will be included in the surgery tariffs. Future tariffs are expected to reduce as the reference cost falls. The saving for providers when cell salvage is not used is estimated to be £297[5] per surgery (see Appendix 2 for the breakdown of this cost). Part of this saving relates to staff time and is likely to be a productivity saving only rather than cash-releasing.

3.1.10 Studies show that using tranexamic acid may also reduce the length of a patient's hospital stay. This will result in an efficiency saving for providers. If length of stay is still within the trimpoint then there will be no saving for the commissioner.

3.2 Recommendations on patient safety

Electronic patient identification systems

Consider using a system that electronically identifies patients to improve the safety and efficiency of the blood transfusion process. (Recommendation 1.7.3)

Background

3.2.1 Accurate patient identification is crucial. Giving a patient the wrong blood transfusion is an avoidable serious hazard.

[4] The upper limit is based on a transfusion being avoided, assuming that standard treatment is 4.2 units of blood (where there is a high risk of bleeding). The lower limit is based on a transfusion still being needed, but the use of tranexamic acid reduces the number of units by 0.9 (for patients at both high and medium risk). These figures have been taken from the guideline's health economic analysis.

[5] This has been taken from the guideline's health economic analysis.

3.2.2 There are several ways to implement this. According to expert opinion, currently it is usually part of a transfusion management system. An example of this from Oxford University Hospitals (Quality and Productivity Case Study 2013) is an electronic transfusion system that uses barcodes on patient wristbands, on blood samples and on blood units, which are encoded with the patient's core ID data. The patient is identified by the staff member scanning the barcodes using a handheld computer. The staff member is then prompted to follow the key steps of the transfusion process. This ensures that the correct protocol is followed and that the right patients receive the correct blood. Staff members also have to identify themselves on the system by scanning barcodes on their ID badges.

3.2.3 The Oxford University Hospitals system also uses an automated system for collecting blood from blood fridges. This ensures accurate blood tracking and a complete audit trail. A remote issue function at the fridges for the collection of previously unallocated blood speeds its delivery to patients. For this to work, the transfusion laboratory has to be linked with other IT systems and provide robust documentation and transfer of transfusion practice data at all stages of the process. This data includes: blood sample collection, laboratory testing, blood unit collection from fridges, and transfusion of blood to the patient. Full documentation is needed at every stage and all data are returned to the laboratory transfusion management system.

Potential costs

3.2.4 Costs will vary depending on the existing IT infrastructure, how the system is implemented, and each hospital's transfusion rates and processes. Users are encouraged to assess costs locally.

3.2.5 The electronic transfusion management system at Oxford University Hospitals costs £350,000 per year in a managed

service contract with the supplier for the hardware (including bedside handheld computers), software, and support with troubleshooting, training and ensuring the system is used correctly. In addition, the Trust employs a senior manager to ensure the correct day-to-day running of the system.

Potential savings

3.2.6 Savings will vary depending on current practice in individual hospitals. For example, if 2 nurses are currently doing the bedside checks then using an electronic patient identification would reduce this to 1 nurse. But if 1 nurse is currently completely the checks anyway then there will be no savings. Users are encouraged to assess savings locally.

3.2.7 Oxford University Hospitals report that they achieved a combination of cash-releasing savings and productivity savings. The Trust identified gross savings of £920,000, of which £420,000 are cash-releasing. Expenditure on blood has decreased by 10% because access to blood is much quicker, meaning less blood is ordered and then wasted. Productivity savings are through reduced nursing/laboratory time.

3.2.8 After taking account of the service contract and system manager the net realisable savings are £28,000, or £4,561 per 100,000 population. There are also productivity savings of £500,000.

3.2.9 There are also potential savings from avoiding very costly treatment associated with ABO incompatible blood transfusions (the most serious type of wrong blood transfusion event). There have been no ABO incompatible red cell transfusions at Oxford University Hospitals in the 4 years during implementation of electronic transfusion system and the 4 years after full implementation. Approximately 230,000 red cell units were

transfused in this period; the benchmark based on national data from the Serious Hazards of Transfusion (SHOT) scheme for the same period is 1 in 183,000 red cell units.

3.3 Other considerations

3.3.1 Although the recommendations for using the different blood products are generally to encourage restrictive use (and therefore are likely to lead to savings to the NHS), there may be a cost in educating healthcare professionals and encouraging them to follow these recommendations.

3.3.2 There is evidence from national audits of transfusion practice that some patients have unnecessary blood transfusions. Despite considerable efforts to ensure the safety of blood transfusions, they are associated with significant risks. There is evidence from several national audits that inappropriate overuse of all blood components is at around 20% (NHS Blood and Transplant 2013).

Appendix 1 Cost breakdown from the guideline's health economic analysis – blood transfusion

Cost of transfusion (first and subsequent units), less cost for those not having a transfusion					
Component	**Mean time (min)**	**Staff cost per min (£)**	**Mean cost 1st unit (£)**	**Mean cost subsequent unit (£)**	**Assumptions & source**
Staff time (blood bank)					
Computer issue (including blood issue)	5.38	£0.78	£4.22	£4.22	Staff time from Agrawal 2006. Staff unit costs for blood bank are from PSSRU 2013 ('science technical & therapeutic staff', other, qualified, band 6/7, £47/hour), except for collection and delivery, which are taken from PSSRU 2013 ('administration and estates staff', band 3, £23/hour).
Blood collection	5.00	£0.38	£1.92	£1.92	
Blood ordering	1.02	£0.78	£0.80	£0.80	
Blood delivery	10.00	£0.38	£3.83	£3.83	
Staff time (ward)					
Collection and patient administration	15.00	£0.68	£10.25	£10.25	Staff time based on GDG expert opinion. Staff unit costs are from PSSRU 2013 ('day or 24hr ward nurse', including qualifications, band 5, £41/hr).
Observations	25.00	£0.68	£17.08	£17.08	
Disposables (ward)					
Patient assessment			£2.55	N/A	From Agrawal 2006 (district general hospital). Costs are assumed to be incurred once only and so the cost is not included for subsequent units. 2004 values have been inflated to 2012–2013.
Transfusion preparation			£1.22	N/A	
Transfusion for 1st unit			£4.60	N/A	

Transfusion for subsequent units	N/A	£0.24	From Agrawal 2006. Costs are only incurred for subsequent units. 2004 values have been inflated to 2012–2013.
Blood product			
Red blood cells per unit	£121.85	£121.85	From NHSBT 2014/2015. All transfusions in the model are assumed to be red blood cell.
Wastage per unit	£1.83	£1.83	Wastage is assumed to be equal to 1.5% of the cost of a unit of red blood cells, based on the reported rate from Agrawal 2006 (district general hospital).
Total cost (1st unit)	**£170.14**		
Total cost (subsequent unit)		**£162.01**	

PSSRU: Personal Social Services Research Unit.

Agrawal S, Davidson N, Walker M, Gibson S, Lim C, Morgan CL et al. Assessing the total costs of blood delivery to hospital oncology and haematology patients. Current Medical Research and Opinion. 2006; 22(10):1903-1909.

Appendix 2 Cost breakdown from the guideline's health economic analysis – intra-operative cell salvage

Item	Resource use	Unit cost	Total cost	Assumptions/ source
Staff time (hours)	3.5	£41.00	£143.50	Based on a surgery duration of 3 hours and 30 minutes clear-up time. Staff unit costs are from the PSSRU 2013/14 (Unit cost per hour for day ward nurse, including qualifications, Band 5).
Cell salvage collection kit	1	£68.52	£68.52	NHS Supply Chain Catalogue (accessed October 2015): Intra-operative autotransfusion kit Disposable set for Dideco Electa 745e/125 with 125ml bowl, £205.55 for 3.
Cell salvage re-infusion kit	1	£45.46	£45.46	NHS Supply Chain Catalogue (accessed October 2015): Intra-operative autotransfusion kit Disposable wash set for Dideco Electa 740e/125 with 125ml bowl, £272.74 for 6.
40 micron goccia filter	1	£7.85	£7.85	NHS Supply Chain Catalogue (accessed October 2015): Intra-operative autotransfusion accessory 40 micron goccia filter for Xtra, £94.14 for 12.
Heparin sodium (30,000 IU)	2	£10.60	£21.20	Based on the cost of a 1 ml ampoule of heparin sodium 25,000 IU/ml (£7.70) and a 1 ml ampoule of heparin sodium 5,000 IU/ml (£2.90), BNF (accessed October 2015).
Saline (L)	6	£0.70	£4.20	NICE guideline CG174: Intravenous fluid therapy in adults in hospital, Department of Health Commercial Medicines Unit (CMU).
Running costs	1	£6.00	£6.00	Taken from Crotty 2006. 2006 values have been inflated to

				2012/2013.
Total cost			£296.72	
PSSRU: Personal Social Services Research Unit.				

References

Wells AW, Llewelyn CA, Casbard A, Johnson AJ, Amin M, Ballard S et al. (2009) The EASTR Study: indications for transfusion and estimates of transfusion recipient numbers in hospitals supplied by the National Blood Service. Transfusion Medicine 19(6): 315–28.

NHS Blood and Transplant (2013) National comparative audit of blood transfusion.

Quality and Productivity Case Study (2013) Electronic blood transfusion: Improving safety and efficiency of transfusion systems

About this costing statement

This costing statement accompanies the NICE guideline on blood transfusion and should be read in conjunction with it. See terms and conditions on the NICE website.

This statement is written in the following context

This statement represents the view of NICE, which was arrived at after careful consideration of the available data and through consulting healthcare professionals. The statement is an implementation tool and focuses on the recommendations that were considered to have a significant impact on national resource use.

Assumptions used in the statement are based on assessment of the national average. Local practice may be different from this, and the impact should be estimated locally.

Implementation of the guidance is the responsibility of local commissioners and providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity and foster good relations. Nothing in this costing tool should be interpreted in a way that would be inconsistent with compliance with those duties.