

Information for clinicians

Tranexamic acid use in the management and prevention of blood loss

Minimising blood loss is one of the three founding pillars of patient blood management. Pharmacological measures are a key tool to achieve this in clinical practice. Tranexamic acid (TXA) is a synthetic antifibrinolytic drug and a lysine analogue. Its mode of action is to bind to the lysine receptor of plasminogen, preventing its activation to plasmin (a factor essential for fibrinolysis causing the dissolution of blood clots). By inhibiting fibrinolysis, breakdown of clots is reduced and the likelihood of needing a transfusion of blood components and the risks associated with transfusion are reduced^{1,2}.

Indications for use:

Surgery

NICE Quality Standard QS138 – Statement 2:

Recommends the use of TXA in patients undergoing surgery where there is expected moderate blood loss (>500mls in line with WHO surgical checklist)³.

NB: For children over 1 year old the recommended threshold is 10% blood volume.

NICE Guideline NG24:

Recommends TXA is used concomitantly where perioperative cell salvage is used.

Specifically suggests considering intraoperative cell salvage with TXA for patients who are expected to lose a very high volume of blood (cardiac and complex vascular surgery, major obstetric procedures, pelvic reconstruction, and scoliosis surgery)⁴.

Dosing guidance for general fibrinolysis should be applied.

Orthopaedic surgery

NICE Guideline NG157:

Primary elective hip or knee replacement: Recommends IV TXA with additional topical (intra-articular) TXA diluted with saline before wound closure. Total dose should not exceed 3g.

NB: For patients with renal impairment, a reduced IV dose should be given on its own⁵.

Primary elective shoulder replacement: Recommends considering IV TXA with additional topical (intra-articular) TXA diluted with saline before wound closure. Total dose should not exceed 3g.

NB: For patients with renal impairment, if used, a reduced IV dose should be given on its own⁵.

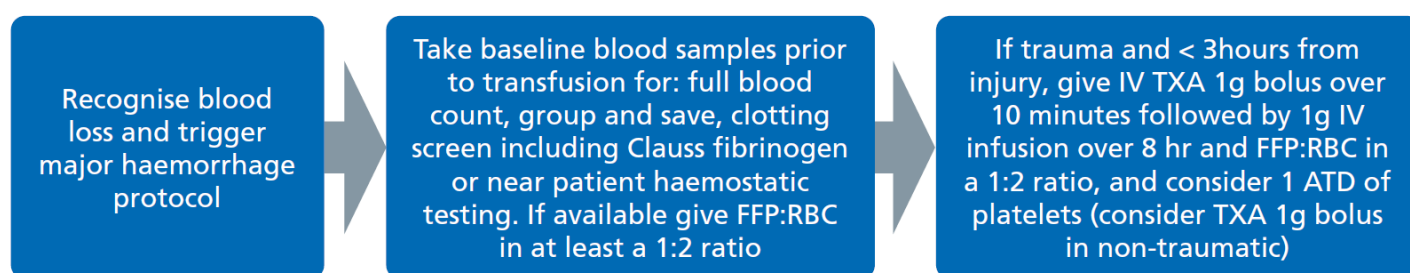
Trauma

CRASH 2 & 3:

CRASH 2 demonstrated TXA is effective and safe in bleeding trauma patients, significantly reducing the risk of mortality. CRASH 3 established a reduction in head injury-associated mortality in patients with mild to moderate traumatic brain injury. Both studies showed no apparent thrombotic side effects or increase of vascular occlusive events. Efficacy is greatly improved the closer to time of injury TXA is administered, the studies therefore recommended administration <3 hours post injury^{6,7}.

Major haemorrhage

The British Society for Haematology (BSH) guidelines (Hunt et al, 2015) recommend the use of TXA for management of non-traumatic major haemorrhage to reduce blood loss and reduce the need for blood component use⁸. However, it was found in the HALT-IT trial that tranexamic acid did not reduce death from gastrointestinal bleeding⁹.



Obstetrics and gynaecology

Post-partum haemorrhage

The WOMAN trial demonstrated a reduction in death due to bleeding in women with post-partum haemorrhage without significant increase in adverse effects. The benefit was most notable when TXA was given within 3 hours of birth and the authors recommended it should be given as soon as possible after bleeding commenced¹⁰.

Menorrhagia

Oral TXA is indicated for use in managing menorrhagia independently or as part of a surgical plan¹¹.

Paediatrics

NICE Guideline NG24⁴ recommends the use of TXA in paediatric surgery where blood loss of 10% blood volume is expected.

BSH Guideline: Transfusion for Fetuses, Neonates and Older Children (2016) suggests TXA is used where massive blood loss is expected in children presenting with major traumatic injuries. Dosing and timing should be in accordance with Royal College of Paediatrics and Child Health recommendations (2012)¹². Use of antifibrinolytic therapy should be considered for neonates and children undergoing cardiac surgery at high risk of significant bleeding¹².

Dosing

Dosing regimens vary. Below is a summary of some of the dosing recommendations from the above publication and BNF advice.

Published dosing regimens

Adult cardiac surgery	10 mg/kg intravenously (IV) immediately pre-op followed by IV infusion of 1 mg/kg/h
Adult trauma	1g IV within 3 hours of the event followed by 1g infused over 8 hours
Paediatric trauma	15 mL/kg (maximum 1000 mg) IV over 10 minutes followed by 2 mg/kg/h (max 125 mg/h) by IV infusion until haemorrhage is controlled
PPH	1g IV followed by a further 1g if bleeding continues or recurs

NB: BSH (2016)⁶ recognises a lack of evidence to guide dosing for TXA in paediatric cardiac surgery but acknowledges the findings by Wesley et al. (2015) that a bolus dose followed by an infusion may be the most effective method, that age may be a better determining factor than weight for dosing, and the use of cardiopulmonary bypass may also affect dosing requirements¹³.

References

1. Gibbs VN, Champaneria R, Novak A, Doree C, Palmer AJR, Estcourt LJ. Pharmacological interventions for the prevention of bleeding in people undergoing definitive fixation of hip, pelvis and long bone fractures: a systemic review and network meta-analysis. Cochrane Database of Systematic Reviews 2019, Issue 12. Art. No: CD013499. DOI: 10.1002/14651858.CD013499
2. Beverly A, Ong G, Wilkinson KL, Doree C, Welton NJ, Estcourt LJ. Drugs to reduce bleeding and transfusion in adults undergoing cardiac surgery: a systematic review and network meta-analysis. Cochrane Database of Systematic Reviews 2019, Issue 9. Art. No: CD013427. DOI: 10.1002/14651858.CD013427
3. National Institute for Health and Care Excellence (2016) Quality Standards for Blood Transfusion QS138.2016 <https://www.nice.org.uk/guidance/qs138>
4. National Institute for Health and Care Excellence (2015) Guidelines for Blood Transfusion {NG24}. 2015 <https://www.nice.org.uk/guidance/ng24>
5. National Institute for Health and Care Excellence (2020) Joint replacement (primary): hip, knee and shoulder. {NG157}. 2020 <https://www.nice.org.uk/guidance/ng157/chapter/Recommendations#tranexamic-acid-to-minimise-blood-loss>
6. CRASH-2 Trial: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4576020/>
7. CRASH-3 Trial: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(19\)32233-0/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)32233-0/fulltext)
8. Hunt et al. (2015) A practical guideline for the haematological management of major haemorrhage. British Journal of Haematology. 170, 778-803
9. The HALT-IT Trial Collaborators. Effects of a high-dose 24-h infusion of tranexamic acid on death and thromboembolic events in patients with acute gastrointestinal bleeding (HALT-IT): an international randomised, double-blind, placebo-controlled trial. Lancet 2020;395:1927–36.

10. WOMAN Trial: Lancet. 2017 May 27; 389(10084):2105-2116. DOI: 10.1016/S0140-6736(17)30638-4. E-pub 2017 Apr 26
11. Ray S, Ray A. Non-surgical interventions for treating heavy menstrual bleeding (menorrhagia) in women with bleeding disorders. The Cochrane Database of Systematic Reviews 2016, Nov 11: CD010338. DOI:10.1002/14651858.CD010338.pub3
12. New et al. (2016) Transfusion for Fetuses, Neonates and Older Children. British Journal of Haematology. 175, 5
13. Wesley MC, Pereira LM, Scharp LA, Emani SM, McGowan FX Jr, DiNardo JA. Pharmacokinetics of tranexamic acid in neonates, infants, and children undergoing cardiac surgery with cardiopulmonary bypass. Anesthesiology. 2015;122:746-758.

Contact us

We would welcome your feedback and comments on this leaflet. You can contact us:

By post to:

Customer Services, NHS Blood and Transplant

Part Academic Block – Level 2
John Radcliffe Hospital
Headley Way, Headington
Oxford OX3 9BQ

By email to: PBM.team@nhsbt.nhs.uk

Or by phone: **01865 381010**

This leaflet was prepared by NHS Blood and Transplant in collaboration with the National Blood Transfusion Committee.

Individual copies of this leaflet can be obtained by calling **01865 381010**

NHS Blood and Transplant (NHSBT) saves and improves lives by providing a safe, reliable and efficient supply of blood and associated services to the NHS in England. We are the organ donor organisation for the UK and are responsible for matching and allocating donated organs. We rely on thousands of members of the public who voluntarily donate their blood, organs, tissues and stem cells.

For more information

Visit nhsbt.nhs.uk

Email enquiries@nhsbt.nhs.uk

Call **0300 123 23 23**