Blood transfusion at the Nuffield Orthopaedic Centre

How we are reducing the need for blood transfusions in orthopaedic surgery

The Nuffield Orthopaedic Centre in Oxford

- Elective orthopaedic hospital
- Part of the Oxford University hospitals which includes the John Radcliffe, Churchill and Horton Hospitals
- We have 97 in-patient beds
- Theatres, recovery, high dependency unit, day surgery, admissions waiting area, OPD and Pre-op assessment plus a rheumatology day unit as well as diagnostic imaging and OT and physio departments

Surgical teams

- We currently have 35 orthopaedic consultants and around 8 medical consultants who treat patients with or needing

  - Bone infections
  - Bone tumours
  - Medical and surgical rheumatology
  - Specialised hip and knee replacements
  - Spinal surgery
  - Foot and ankle surgery
  - Upper limb surgery
  - Plastics and reconstructive surgery

Primary hip and knee patients

- For the purposes of this presentation I shall only be looking mainly at patients who have had a primary hip or knee replacement
- Primary joint replacement means that the diseased or arthritic native joint is replaced with an artificial one

2007 study (Sturdee et al)

- Found that orthopaedic patients use 10% of the UK red blood cells and 40% of these are having elective hip and knee surgery
- He also found that the cost to the NHS of 1 unit of red blood cells was £635.23

Transfusion Policy states

- A Blood transfusion is a potentially hazardous procedure which should only be given when the clinical benefits outweigh the potential risks the most important of which are acute haemolytic reactions and blood transmitted infections

Complications of blood transfusion

- Risk of transmission of infectious diseases
- Minor problems of urticaria, fever and fluid overload
- Some patients refuse to have blood transfusion because of religious or other reasons
- Transfusion errors i.e. transfusing the wrong blood

Three areas of practice

- Pre-operative
- Intra-operative
- Post-operative

NOC audit of pre-op management of anaemia prior to hip and knee surgery 2011 Williams, Mcdonnall and Jackson

- From data supplied by the blood bank and clinical coding for primary hip and knee replacements for a seven month period the audit showed that the transfusion rates were as follows
- Primary hip replacements 13.7%
- Primary knee replacements 12.1 %
- Unicompartmental knee replacements 0.5%

Pre-operatively anaemic (Hb of less than 12g/dl)

- 519 patients in a 6 month period were audited
- 11.3% of the primary hip patients were found to be anaemic pre-op. Of these one third were found on investigation to be anaemic due to chronic disease
- 12.1% of the primary knee patients were found to be anaemic pre-op on investigation half of these were found to be anaemic due to chronic disease

Anaemia in chronic disease is due to

- Infections
- Malignancies
- Autoimmune (RA, SLE, IBS)
- Chronic renal failure
- Chronic heart failure

Patient population

- Total joint replacement is a highly effective procedure that is frequent performed in elderly patients
- Substantial peri-operative blood loss is common and patients often become anaemic following surgery
- Elderly patients have a high prevalence of ischaemic heart disease

Results

- Around a third of the hip replacement patients who were transfused needed blood because they had a pre op Hb of less than 12 g/dl
- Around half of the knee replacement patients who were transfused needed blood because they had a pre-op Hb of less than 12 g/dl

Effect of pre-op iron supplement treatment on transfusion rate

- Of the patients who had primary hip replacements treated with iron supplement pre-operatively only 20% needed transfusion compared with 40% who did not have iron supplements
- Of the patients who had primary knee replacements treated with iron supplement pre-operatively 33% needed transfusion compared with 55% who did not have iron supplements

Conclusions

- Pre-operative anaemia means higher rates of post operative transfusion
- Allowing anaemic patients to go to surgery without increasing Hb levels pre-op increases transfusion risk
- Oral iron supplements provide a viable method of reducing post operative transfusion

Unicompartmental knee replacements

- A unicompartmental knee replacement uses a smaller incision and has a faster recovery than a total knee replacement.
- Only the most damaged areas of cartilage are removed leaving the healthier parts of the joint for continued use
- The blood transfusion rates at the NOC are 0.5%

Unicommpartmental knee replacements at the NOC

- At the NOC 30%-40% of primary knee surgery uses a unicompartmental replacement (uni knee) compared to 8% nationally
- If the average transfusion rate for a uni knee is 0.5% and the average transfusion rate for a total knee is 12.1% we are making a huge difference to transfusion rates but also patient safety as
- A uni knee replacement halves the risk of death at 60 days and halves the risk of infection at 60 days
- Information taken from the National Joint Registry

What we do – pre operative Hb

- Pre operative haemoglobin of less than 12g/dl increases the likelihood of transfusion 3 fold.
- For those patients who have an Hb of less than 12g/dl the hospital contacts the referring GP to investigate and/or treat the underlying anaemia
- When the patient arrives at the pre op assessment clinic, any pre existing anaemia should have been assessed and treated.
- A further blood count is performed at PAC and results are reviewed by the named nurse and medical staff to ensure that further investigation is carried out if necessary to declare the patient fit for surgery

What we do – Iron therapy

- Iron supplements are prescribed for those patients known to be anaemic

Intra-operative

- The most effective way to reduce the need for post-operative transfusion is to control the amount of blood loss during surgery

Surgical and anaesthetic technique

- Fluid replacement
- Careful monitoring
- Meticulous haemostasis

methods to reduce transfusion - Cell Saver

- The inter-operative salvage machine suction, washes and filters blood so that it can be given back to the patient.
- Advantages are that the patient receives their own blood so there is no risk of contracting outside diseases.
- As the blood is re-circulated there is no limit to the amount of blood that can be given back to the patient
- Cell saver at present is only used at the NOC for patients having major spinal surgery or revision hip surgery where blood loss is expected to be higher

Tranexamic acid

- Acts as a fibrinolytic inhibitor. It inhibits the activation of plasmin which is a molecule responsible for breaking down fibrin, a protein that forms the framework of a blood clot.
- In other words it inhibits the breakdown of blood clots reducing blood loss
- It is commonly used in joint replacement surgery as well as in trauma and obstetrics

Tranexamic acid (TXA)

- Is given IV during surgery
- Has an effect on the total blood loss and is most effective in reducing blood loss post operatively
- A study in 2011 (Alshryda et al) found that TXA reduces blood loss and need for transfusion in total hip replacement without increasing the adverse risks of DVT or PE

Other methods used to reduce the need for transfusion

- Post op Hb triggers
- It is no longer appropriate to transfuse patients post operatively using the Hb level alone however a level of below 8 g/dl is usually a good indication.
- Other factors must be taken into consideration such as the clinical status of the patient including the rate of change of the Hb level and development of cardio vascular symptoms such as shortness of breath, postural hypotension and dizziness as well as the amount of blood lost during surgery

Conclusions

- Identifying patients who are anaemic pre-op and treating with iron supplements significantly reduces the need for blood transfusion post-op
- Minimising blood loss during surgery reduces the need for transfusion post-op
- The use of tranexamic acid intra-op reduces the need for blood transfusion
- Carefully assessing the patients need for blood transfusion post-op reduces the need for transfusion