The Queen Elizabeth Hospital
King's Lynn
NHS Foundation Trust

# Patient Blood Management

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**Honorary Lecturer UEA**

# Where were we?

'The mass of literature on the subject of Blood Transfusions accumulated during the past 25 years is so great, and most of it so readily available, that one shows lack of temerity at least to attempt a discussion of this subject before this audience. The transfusion of blood may be a life-saving procedure under certain circumstances. It may be a necessary supportive measure under others, but it is too often undertaken when the doctor can think of nothing else to do after all other therapy has failed. My objective today is to discuss briefly the common surgical and medical conditions for which transfusion of blood is indicated in which we can obtain good physiological results and to point out those conditions in which it is little more than a gesture done as it were to satisfy the urge to do something.'

NEJM

The New England
Journal of Medicine

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## The Massachusetts Medical Society

### SECTION OF MEDICINE

**Lower Section Room, Municipal Auditorium, Springfield, Tuesday, June 9, 1936, 2 p. m.**

PRESIDING:
Dr. William D. Smith, Boston, Chairman.
Dr. Laurence B. Ellis, Boston, Secretary.

CHAIRMAN SMITH: Will the meeting please come to order.

The first duty of the Section is the selection of the Chairman and the Secretary for the coming year, and, in accordance with the usual custom, the Chair will appoint as the Nominating Committee to suggest names Dr. Dwight O'Hara, Chairman, Dr. George R. Minot and Dr. Chester M. Jones. They will report later and abide the pleasure of the Section.

I do not see Dr. Hamilton here. Apparently she is delayed, so we will pass on to the second paper. To those of us who have had our moments of indecision whether to transfuse or not to transfuse in some of our medical problems, Dr. Bock's paper should be of interest. His subject is "The Use and Abuse of Blood Transfusions."

### THE USE AND ABUSE OF BLOOD TRANSFUSIONS*

BY ARLIE V. BOCK, M.D.†

THE mass of literature on the subject of blood transfusions accumulated during the past twenty-five years is so great and most of it so readily available that one shows lack of temerity at least to attempt a discussion of the subject before this audience. The transfusion of blood may be a life-saving procedure under certain circumstances, it may be a necessary supportive measure under others, but it is too often undertaken when the doctor can think of nothing else to do after all other therapy has failed. My objective today is to discuss briefly the common surgical and medical conditions for which transfusion of blood is indicated, in which we can expect good physiological results, and to point out those conditions in which it is little more than a gesture, done, as it were, to satisfy the urge to do something.

#### SURGICAL INDICATIONS

1. *Shock.* Many theories of the cause of primary and secondary shock have been offered by able investigators, most of them recently reviewed briefly by Blalock.[1] Because of the complexity of the events no theory yet proposed can be considered the final answer as to the etiology of shock. We know that if treatment of the condition is to be successful it must accomplish two things, restoration of diminished blood volume and elevation of low blood pressure. Blood volume may be reduced by gross hemorrhage or it may be reduced by blood lost in the periphery of the body, as suggested by Freeman,[2] or by extravasation of serum through damaged capillaries. If hemorrhage has occurred, transfusion of blood, together with such supportive measures as heat, is the immediate indication. No other therapy is so successful. In shock without much or any hemorrhage, 6 per cent gum acacia in normal saline may be just as effective as blood, and has the advantage of greater availability. Repeated transfusions of blood or infusions of acacia may be necessary but, are usually not, if no delay has occurred in the first instance. Acacia may be used as a supportive measure until transfusion can be arranged. Prolongation of the shock state results in tissue asphyxia, capillary damage, petechial hemorrhages, and rapid change in general to an irreversible state.

One of the common accompaniments of shock is dehydration, a state associated with loss of water, base, chloride and increase of nonprotein nitrogen. When such a state exists, transfusion alone is not adequate therapy but normal salt solution, often in large quantities, should be administered intravenously, or it may be given in eight-ounce quantities by rectum every half hour. When facilities permit, serum chloride

*Read at the Annual Meeting of the Massachusetts Medical Society, Section of Medicine, Springfield, June 9, 1936.

†Bock, Arlie V.—Physician, Massachusetts General Hospital. For record and address of author see "This Week's Issue," page 469.

With thanks to Aryer Shander

# And where are we?

'The anaemia as I mentioned in a previous letter is chronic anaemia which can not be corrected without blood transfusion and I leave it to you to organise that pre-operatively. I think once you have done that you will be safe to go ahead with surgery'.

GP to Ortho Consultant January *2013*

Shander A et al. Br. J. Anaesth. 2012;bja.aes139

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# A multimodal approach to PBM (or blood conservation).

| | 1st Pillar<br>Optimise haemopoiesis | 2nd Pillar<br>Minimise blood loss and bleeding | 3rd Pillar<br>Harness and optimise tolerance of anaemia |
|---|---|---|---|
| Preoperative | • Screen for anaemia<br>• Identify underlying disorder(s) causing anaemia<br>• Manage underlying disorder(s)<br>• Refer for further evaluation if necessary<br>• Treat iron deficiency, anaemia of chronic disease, iron-restricted erythropoiesis<br>• Note: anaemia is a contraindication for elective surgery | • Identify and manage bleeding risk (past/family history, current medications, etc)<br>• Minimise iatrogenic blood loss<br>• Procedure planning and rehearsal<br>• Preoperative autologous blood donation (in selected cases or when patient choice) | • Assess/optimise patient's physiological reserve and risk factors<br>• Compare estimated blood loss with patient-specific tolerable blood loss<br>• Formulate patient-specific management plan using appropriate blood-conservation modalities to minimise blood loss, optimise red cell mass and manage anaemia<br>• Restrictive evidence-based transfusion strategies |
| Intraoperative | • Timing surgery with haematological optimisation | • Meticulous haemostasis and surgical techniques<br>• Blood-sparing surgical techniques<br>• Anaesthetic blood-conserving strategies<br>• Autologous blood options<br>• Pharmacological/haemostatic agents | • Optimise cardiac output<br>• Optimise ventilation and oxygenation<br>• Restrictive evidence-based transfusion strategies |
| Postoperative | • Treat anaemia/iron deficiency<br>• Stimulate erythropoiesis<br>• Be aware of drug interactions that can cause/increase anaemia | • Vigilant monitoring and management of post-operative bleeding<br>• Avoid secondary haemorrhage<br>• Rapid warming – maintain normothermia (unless hypothermia specifically indicated)<br>• Autologous blood salvage<br>• Minimising iatrogenic blood loss<br>• Haemostasis/anticoagulation management<br>• Prophylaxis of upper gastrointestinal haemorrhage<br>• Avoid/treat infections promptly<br>• Be aware of adverse effects of medication | • Optimise tolerance of anaemia<br>• Treat anaemia<br>• Maximise oxygen delivery<br>• Minimise oxygen consumption<br>• Avoid/treat infections promptly<br>• Restrictive, evidence-based transfusion strategies |

# It's all in the planning.

- Plan for the worst and hope for the best
- Thorough structured pre-assessment
- Work in a larger team
- Manage underlying disorders
- Treat possible abnormalities such as anaemia – do you know why they are anaemic?
- Review of drugs
  - Stop what needs to be stopped or plan cover
- Formulate an individual plan
- Use appropriate savage equipment
- Decide on minimum blood loss strategies and how this will be monitored
- Look at the evidence for restrictive blood loss policies

# What should happen in an ideal world?

- Patients have a date for surgery and the names of the ward they will be admitted to and the Ward Manager.
- They have a couple of weeks notice before their Pre-assessment clinic appointment which is 4 weeks before their date of surgery.
- They can park the car (we are rural. What buses?).
- They are seen at their appointment time.
- The blood results will already be available to the staff.
- If they need seeing then the Anaesthetist is the one that will gas them.
- They will have their fears assuaged and feel confident in all the staff.
- A plan will be made for any further treatments or investigations that are required.
- These extras will happen either the same day or at a mutually convenient time.
- They will be admitted on the morning of surgery as stated and planned.
- Their surgery will go like a dream with minimal blood loss.
- They will be discharged in a few days as planned having had no complications
- They will write a letter to the local paper and the CEO praising their care and expressing their delight at feeling better.

# The reality–ish

- Patients get 24 hours notice, there is nowhere to park and they are not sure where they are going.
- They are still not sure when they will have their op.
- No Anaesthetist is available
- They forgot to have their bloods done or they couldn't get an appointment at the surgery with the phlebotomist or nurse.
- The history taken appears quite different from the one in the referral letter. Nothing in the OP notes or letter from the surgeon
- There is no capacity to do extra ECGs, Chest x-rays and no blood results are available before they leave
- They have 3 further hospital visits for further investigations.
- They still don't know when they are scheduled for surgery
- Their surgery is cancelled until further notice.
- They still don't know anyone's name.

# But what if the patients refuse blood?

- Much more structured - pathway
- Always see an Anaesthetist – usually their own
- Plenty of notice
- Visit to the anaemia clinic – no surgery date until seen
- Clinicians have access to drugs they can't always get otherwise.
- Plan of care
- Bleeding plan
- Advanced directive
- Date of surgery tends to be rigid-ish

- Why cant everyone have this?

# Enhanced Recovery After Surgery

NHS

*Enhanced Recovery Partnership Programme*

## Delivering enhanced recovery

Helping patients to get better sooner after surgery



First published 31 March 2010

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### Optimising patients with anaemia prior to surgery

| What should be done and why? | | Where and when is best? |
|---|---|---|
| **General health check including full blood count**<br>• If anaemic (haemoglobin in females below 12g/dL and males below 13g/dL) look for a cause.<br>• If iron deficient, treat with oral iron and look for cause. | BEST PRACTICE | **GP surgery**<br>• Optimise prior to referral.<br>• Early detection of anaemia.<br>• Time to treat iron deficiency or refer other anaemias. |
| **Benefits of detecting anaemia prior to surgery**<br>• Earlier detection, more opportunity to treat anaemia and raise haemoglobin.<br>• Higher haemoglobin at surgery, lack of symptoms of anaemia. Less likely to need blood transfusion. Own red cells physiologically better than transfused red cells. | EARLY + RESOURCES | **Pre-op clinic**<br>• Optimise prior to surgery.<br>• Treat iron deficiency.<br>• Identify those who might need transfusion; counsel.<br>• Specialist referral for cause of anaemia. |
| **Cost of detecting anaemia prior to surgery**<br>• Detection of anaemia may lead to delay or cancellation of surgery to investigate and manage anaemia.<br>• Investigation of anaemia may be costly and require specialist input.<br>• Treatment of iron deficiency takes time (iv iron quicker than oral).<br>• Detecting another illness causing anaemia may change priorities but patient remains symptomatic from joint disease. | TOO LATE | **Admission for surgery**<br>• Anaemic patients likely to be transfused or cancelled.<br>• Can still target blood. |

# Enhanced Recovery After Surgery

NHS

*Enhanced Recovery Partnership Programme*

## Delivering enhanced recovery

Helping patients to get better sooner after surgery

**Impact of potential improvements in length of stay assessed using 2008-09 HES data**

| Procedure group | Current mean LOS | Current median LOS | No. major providers | Total no. patients | Potential mean LOS (1) | Potential mean LOS (2) | Potential median LOS (3) | Potential bed days saved (4) |
|---|---|---|---|---|---|---|---|---|
| Colectomy | 10.2 | 8 | 152 | 10,300 | 7.9 | 8.4 | 6 | 17,900 |
| Excision of rectum | 12.4 | 9 | 148 | 9,500 | 9.1 | 10.0 | 7 | 23,600 |
| Primary hip replacement | 6.3 | 5 | 157 | 55,100 | 5.1 | 5.6 | 4 | 58,900 |
| Primary knee replacement | 6.1 | 5 | 156 | 64,500 | 5.0 | 5.5 | 4 | 63,200 |
| Bladder resection | 16.5 | 14 | 56 | 1,200 | 12.5 | 13.7 | 11 | 4,000 |
| Prostatectomy | 4.7 | 4 | 71 | 3,000 | 3.1 | 3.6 | 2 | 3,800 |
| Hysterectomy | 4.3 | 4 | 153 | 36,500 | 3.1 | 3.5 | 3 | 34,800 |
| | | | | | | | | **206,200** |



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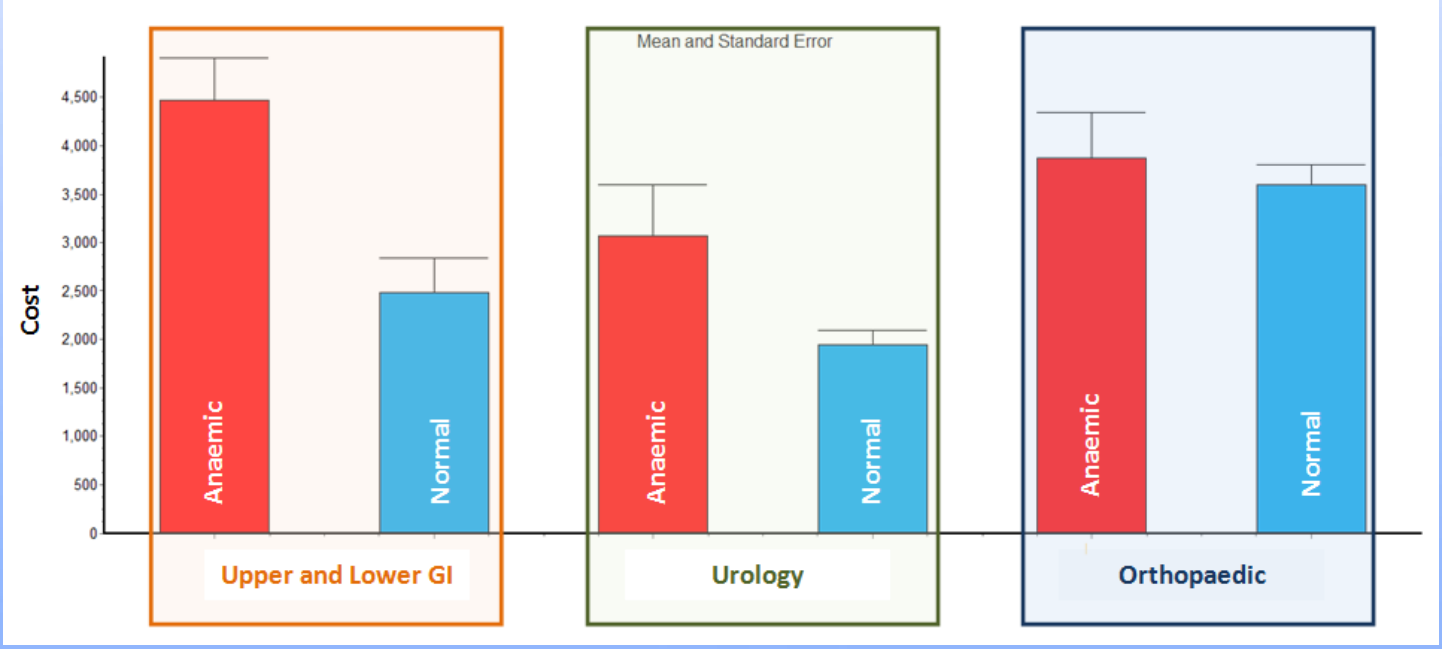
# Cost of Anaemia on outcome

- Increased length of hospital stay (median 9 v 6 days, p=0.001)
- Increased post operative complications (25-35%)



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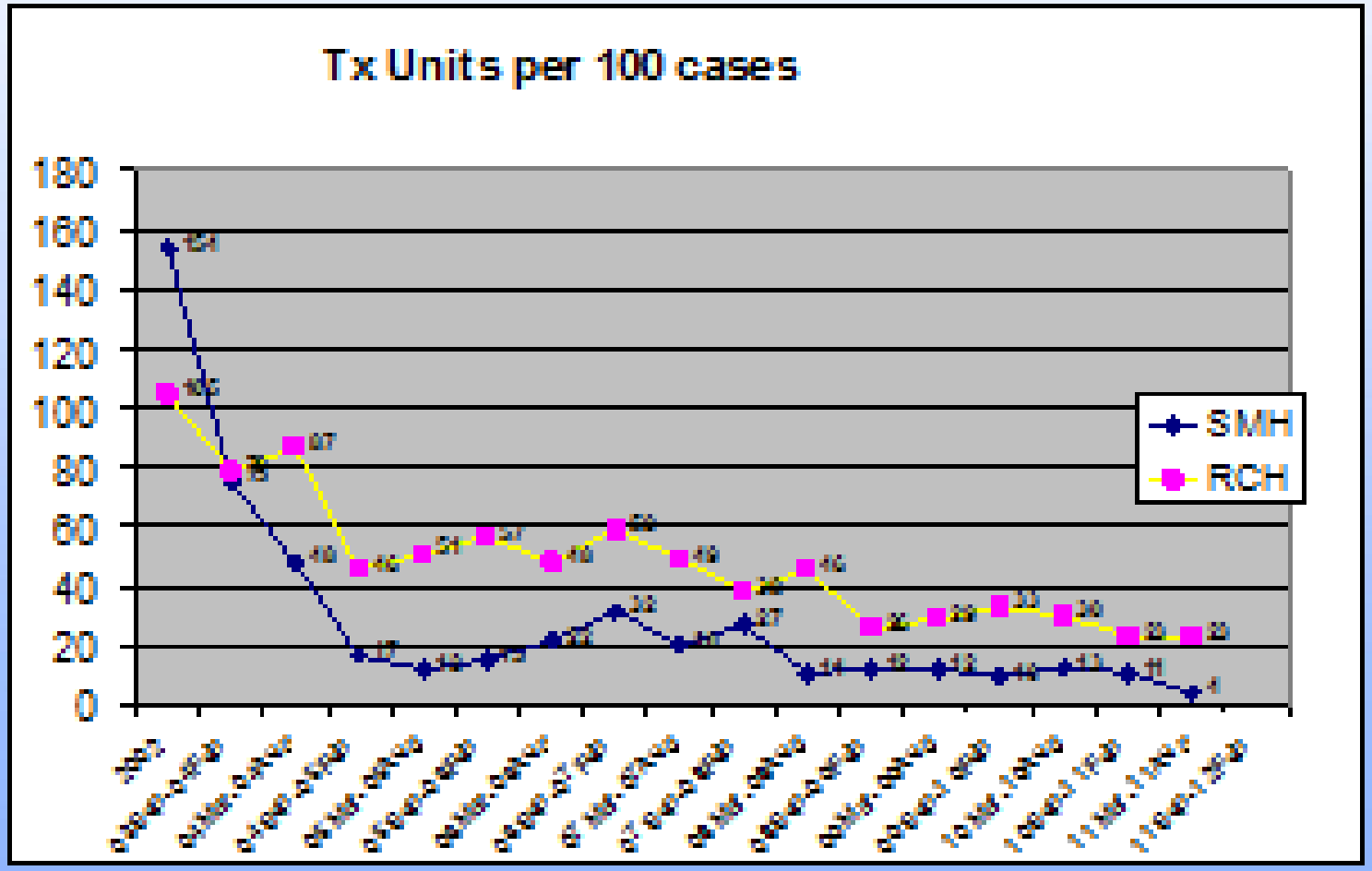
# PMB in Orthopaedics - Truro



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# PREVENTT RCT

**Preoperative intravenous iron to <u>PREVENT</u> blood <u>T</u>ransfusion in major surgery**

**Primary Outcome**: Frequency of blood transfusion

**Secondary Outcomes**:

- Post operative complications
- Patient reported QALYs
- Length of hospital stay
- Cost effectiveness
- Change in haemoglobin levels
- Safety profile
- Mortality during follow up

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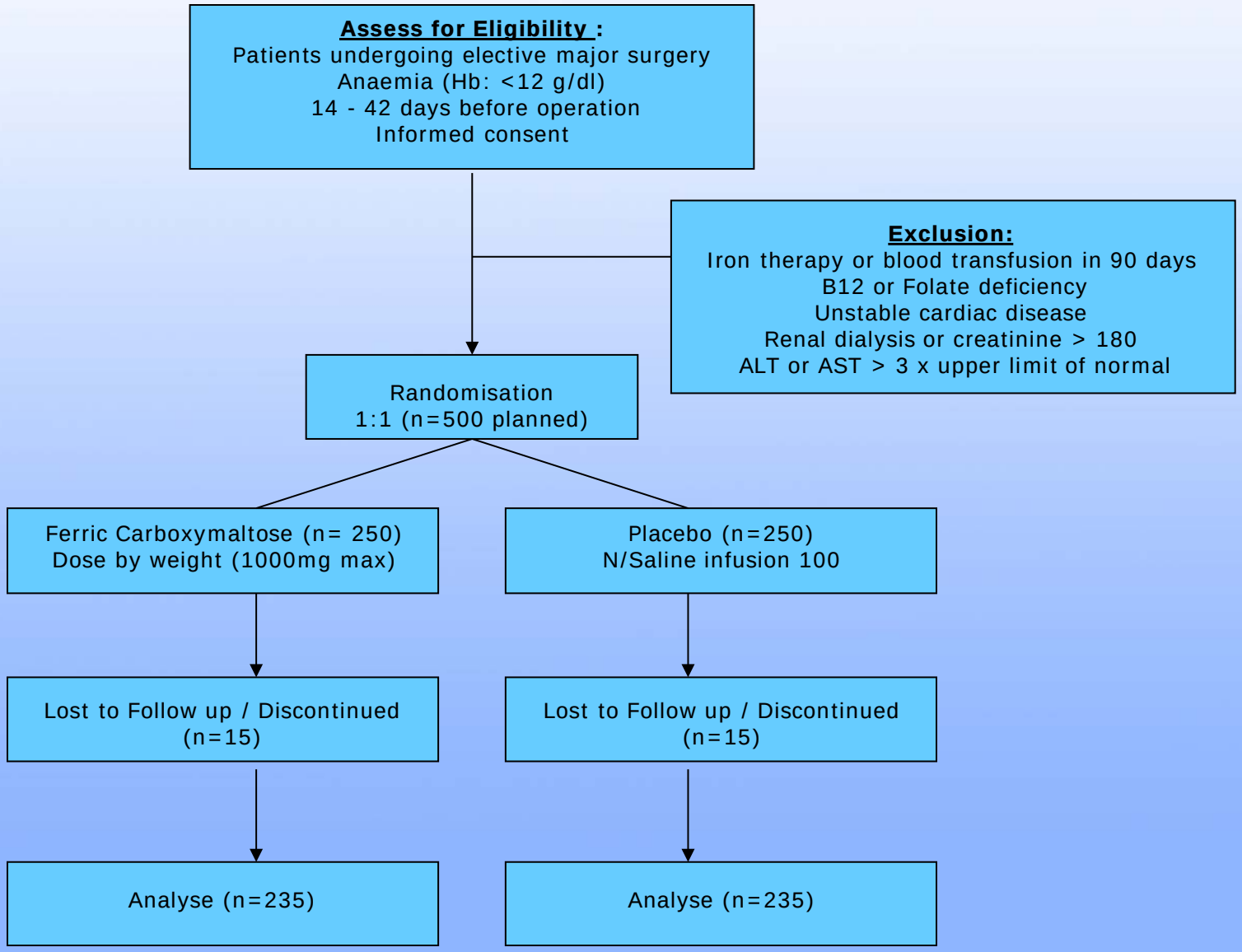
# PREVENTT RCT



# Projections – 3 (180K patients)

- 14% reduction blood transfusion
- One day reduction in LOS in 4.51%
- Reducing complications in 5397 pts

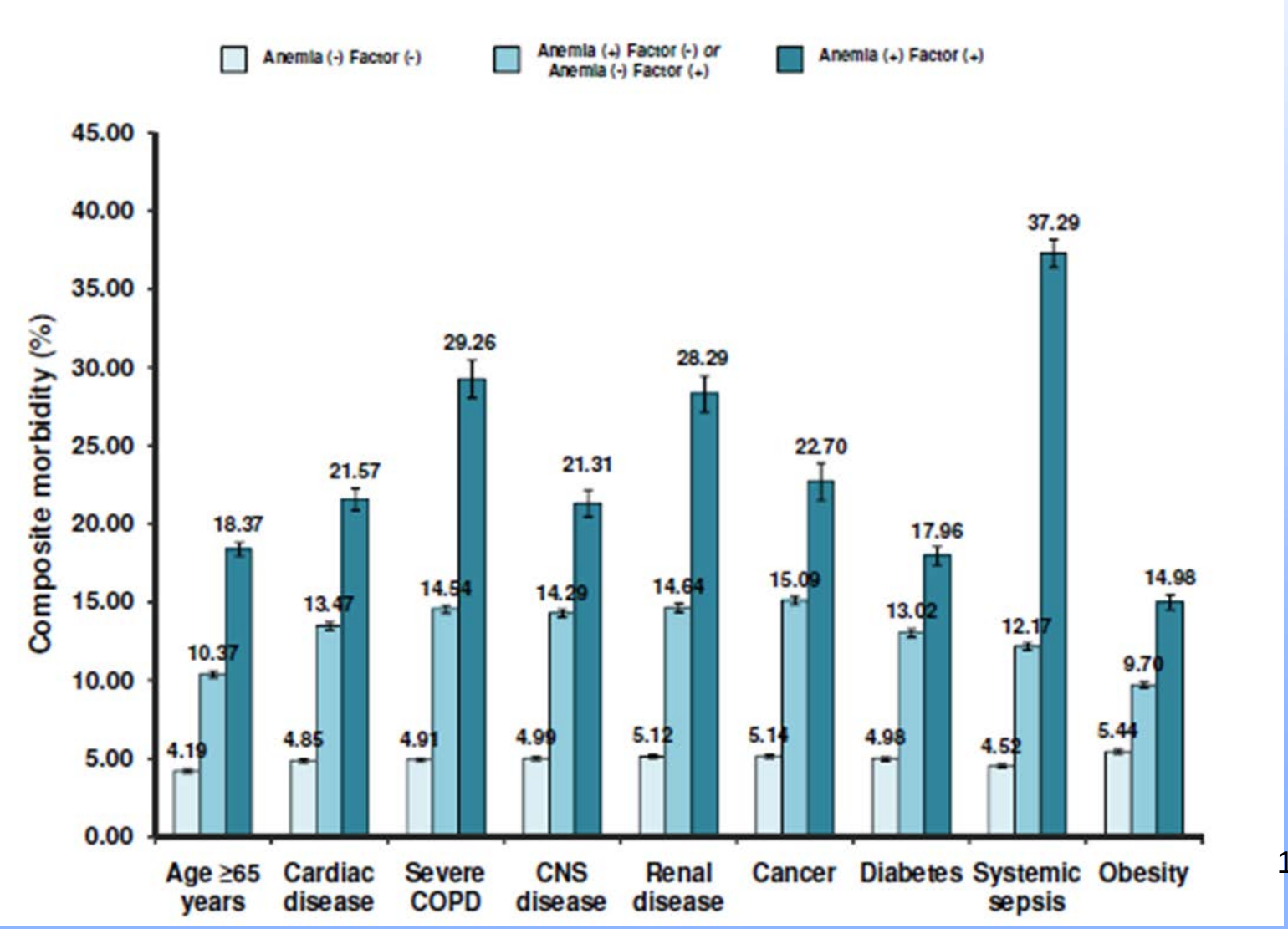
- Total

# Projections – 3 (180K patients)

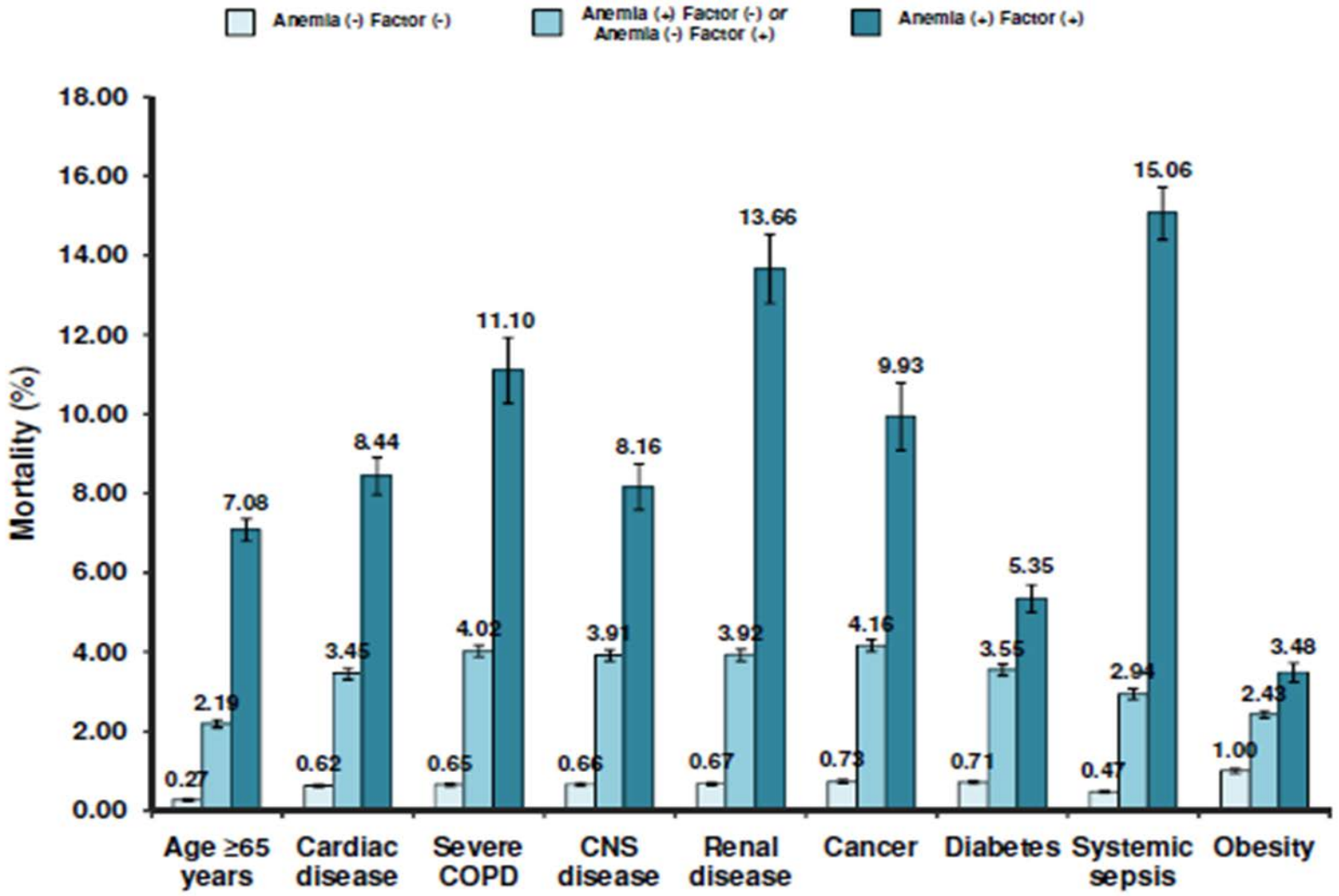
| | |
|---|---|
| • 14% reduction blood transfusion | £3,782,552 |
| • One day reduction in LOS in 4.51% | £14.3million |
| • Reducing complications in 5397 pts | £17.1million |
| • Total | £35.1 million |

# It's not about the money money money……..

# Morbidity


Anemia (-) Factor (-)
Anemia (+) Factor (-) or Anemia (-) Factor (+)
Anemia (+) Factor (+)
Composite morbidity (%)
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
4.19
10.37
18.37
4.85
13.47
21.57
4.91
14.54
29.26
4.99
14.29
21.31
5.12
14.64
28.29
5.14
15.09
22.70
4.98
13.02
17.96
4.52
12.17
37.29
5.44
9.70
14.98
Age ≥65 years
Cardiac disease
Severe COPD
CNS disease
Renal disease
Cancer
Diabetes
Systemic sepsis
Obesity

# Mortality


Anemia (-) Factor (-)
Anemia (+) Factor (-) or Anemia (-) Factor (+)
Anemia (+) Factor (+)
Mortality (%)
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.27
2.19
7.08
0.62
3.45
8.44
0.65
4.02
11.10
0.66
3.91
8.16
0.67
3.92
13.66
0.73
4.16
9.93
0.71
3.55
5.35
0.47
2.94
15.06
1.00
2.43
3.48
Age ≥65 years
Cardiac disease
Severe COPD
CNS disease
Renal disease
Cancer
Diabetes
Systemic sepsis
Obesity

# So where next?

- Talk to the CCGs
- Change how bloods are requested for anaemia if possible
- Use pathways in conjunction with CCGs for different groups of patients that include guidance on anaemia
- Keep training and supporting staff in primary and secondary care
- Tighten up the structure of pre-assessment (not pre-admission)
- Get the evidence they need – are you part of a pre-assessment group?

# Case study

- 48 year old female. Married no children.
- Works in HR in the NHS – highly stressful job
- Psoriatic Arthritis for 10 years
- Possible IBD
- Continuously iron deficient
- 'Homeopathic' doses of IV Iron (Venofer)
- Exhausted all the time – cannot walk up the road to the post office.
- Still at work
- Often had to beg for more Iron from Rheumatologist
- Referred to Anaemia clinic at patient request for maintenance

# Anaemia Clinic

- Results post last course of Venofer (sub therapeutic dose)prior to Anaemia Clinic
  - Hb 10.1, WBC 10.2, Plts 525 , TSAT 16%, Iron 7.5, Ferr 525, CRP 28
- Seen in clinic one month later
  - Hb 9.4, WBC 9.65, Plts 358, TSAT 5%, Iron 3.5, Ferr 358, CRP 25 $B_{12}$ Folate, Thyroid, DAT all normal
  - Plan

1. Switch to Ferinject
2. Aim for Hb 13.5
3. Maintain every 6-8 weeks
4. Weekly bloods to follow drop in Hb

# The best laid plans….

- Diagnosed with Crohn's Disease
- Reacted to Ferinject → Yellow card to MHRA (Serum Sickness)
- Tells us she will not have blood
- Having Venofer 200mg TIW, 3 weeks out of 4 Hb never above 9.5, TSAT never above 10%
- Crohn's drugs not working – BO x10 per day – frank blood
- Sick leave
- Surgical opinion ⟶ Theatre in 3 weeks needs Hb >12
- EPO (600mgs/Kg) and IV Iron
- Extended Transverse /Ascending Colectomy yesterday – on HDU. Open surgery Hb post op 114g/l

# Always apply the "Granny test"

# Thank You!