

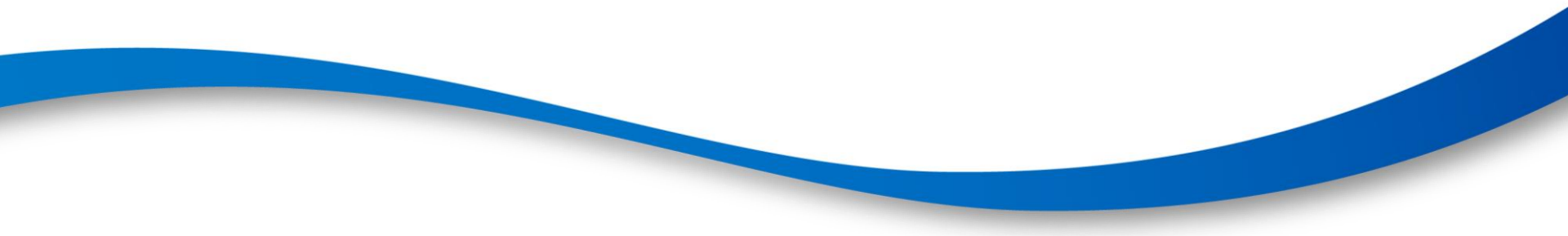
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FBC Interpretation and Transfusion Triggers

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NEY NMA Course March 24

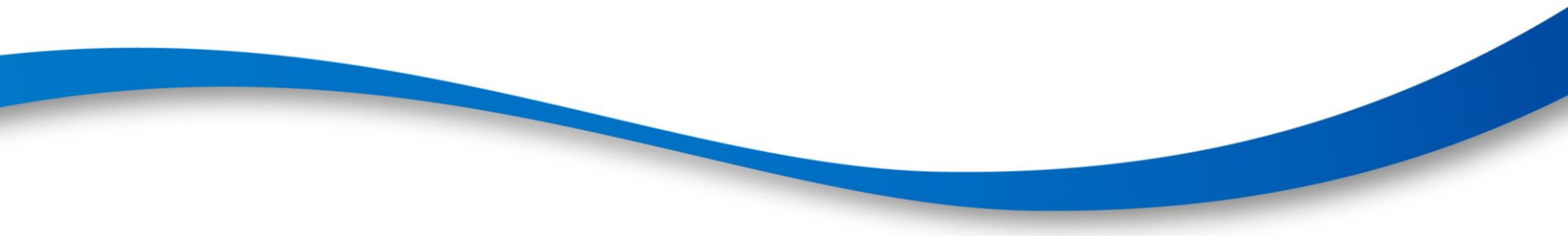
Learning objectives

- Indicate the normal ranges for full blood count
 - Recognise how to detect abnormal results and list possible causes
 - Give tools to help decision making around transfusing blood products (red cells and platelets)
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Full blood count

Parameter	Male	Female
Haemoglobin g/l	135 - 180	115 - 160
WBC x10 ⁹ /L	4.00 - 11.00	4.00 - 11.00
Platelets x10 ⁹ /L	150 - 400	150 - 400
MCV fL	78 - 100	78 - 100
MCH pg	27.0 - 32.0	27.0 - 32.0
Neutrophils	2.0 - 7.5	2.0 - 7.5
Lymphocytes	1.0 - 4.5	1.0 - 4.5
Monocytes	0.2 - 0.8	0.2 - 0.8
Eosinophils	0.04 - 0.40	0.04 - 0.40
Basophils	< 0.1	< 0.1

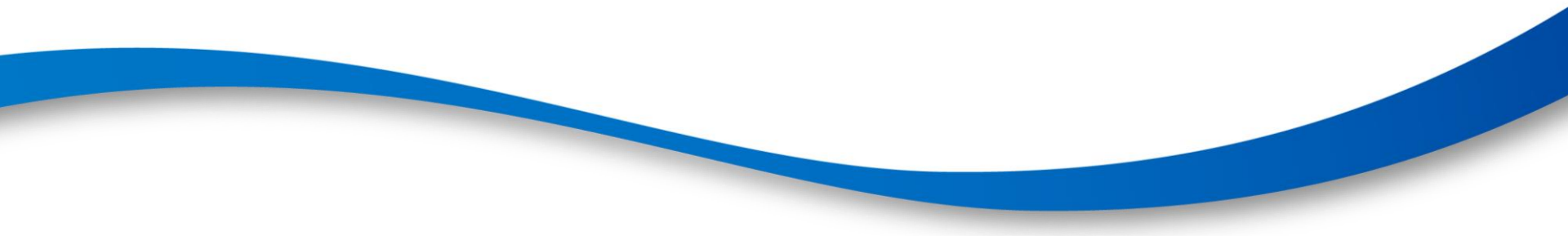
Interpretation of Results

- FBCs, like all lab results, are like photos
 - They are only valid for the time at which they were taken and may lag behind the clinical picture
 - GIGO principle (Garbage In, Garbage Out)
 - If the sample was not taken properly and handled correctly, the results may be inaccurate
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Interpretation of Results

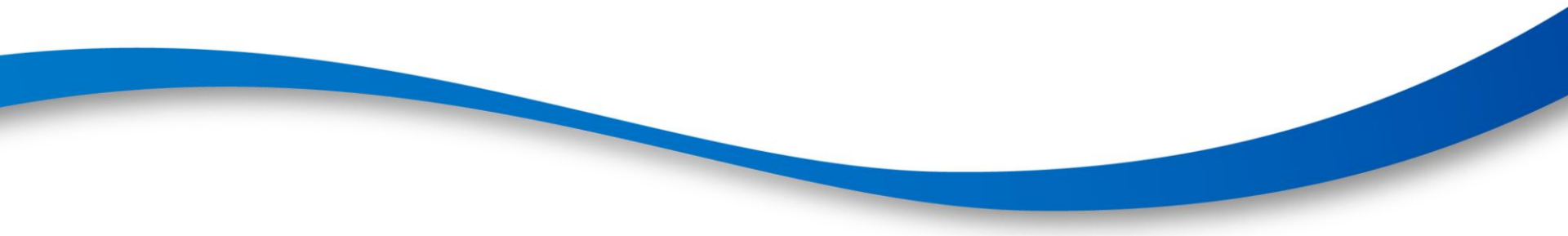
- Is the result expected?
 - Has the count been dropping on previous blood tests
 - Can we identify a cause
 - e.g. recent history of bleeding/surgery/chemotherapy
 - Is the patient symptomatic?
 - Anaemia
 - Fatigue
 - Shortness of breath
 - Palpitations
 - Thrombocytopenia
 - Bleeding/bruising

Interpretation of Results

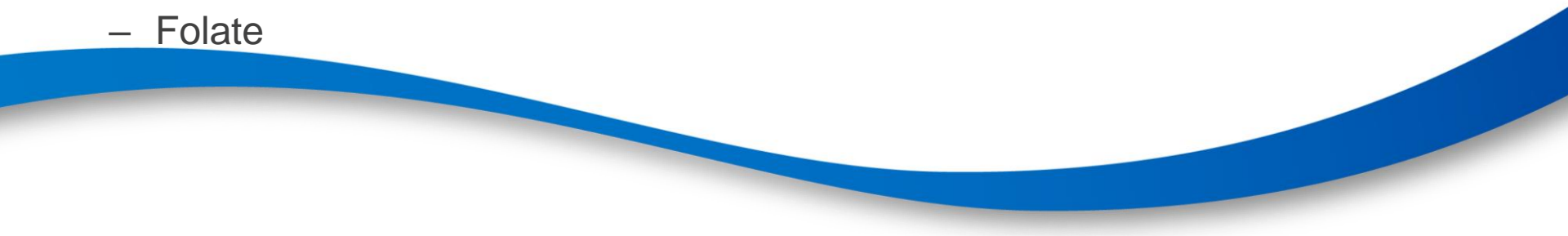
- If a result looks strange and does not fit the way the patient looks, check again!
 - (presuming it is not urgent)
 - And tell the lab you think it might be wrong
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Results confirmed..

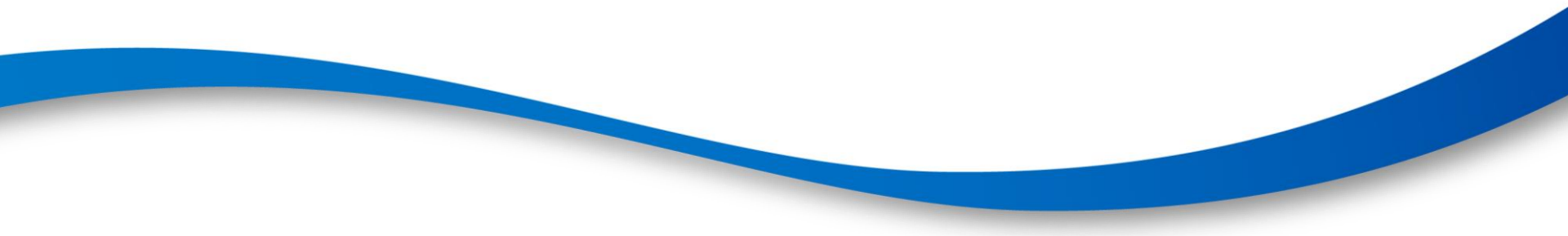
What would you do now?



Management

- **Blood transfusion**
 - Immediately rises Hb/platelets – good symptomatic relief
 - Good in acute loss/symptomatic patients
 - Some patients transfusion dependent e.g. bone marrow failure/thalassaemia
 - **Replace the materials – blood can't be made if the ingredients aren't there**
 - Iron
 - B12
 - Folate
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Management

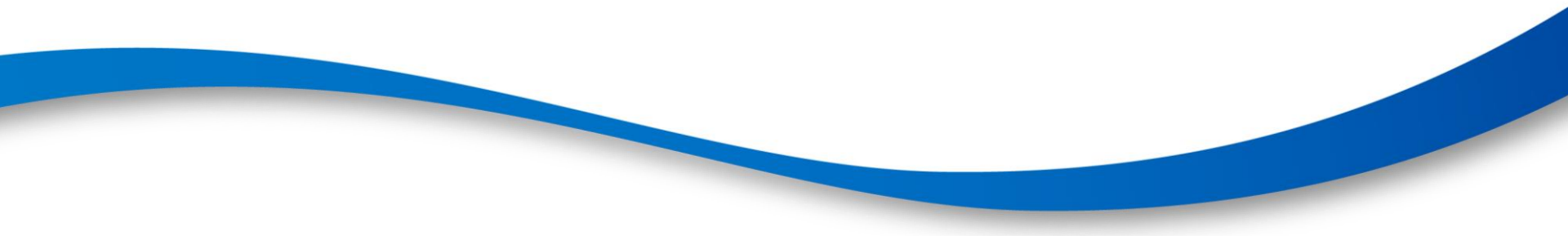
- **Stop losses**
 - Bleeding: GI, PU, PV
 - Red cell breakdown/haemolysis
 - **Help supporting acts**
 - Optimise renal function
 - Check for chronic diseases/inflammatory conditions
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Management

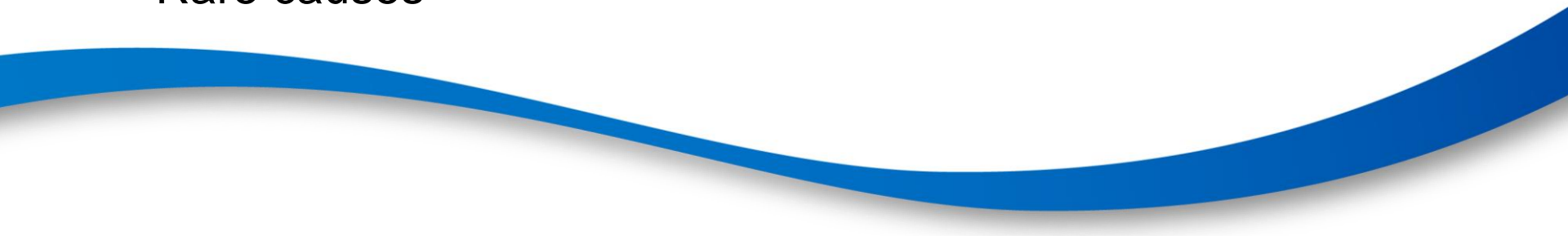
- **Help the factory (bone marrow) – blood can't be made if the factory doesn't work**
 - Cancer – treat the cancer
 - ? Haemoglobinopathies
 - ? Bone marrow transplant in suitable situations
- **Help the factory to be more efficient**
 - Erythropoietin stimulating agent (SC injection) used in Myelodysplasia/renal failure

Abnormal Results - Haemoglobin

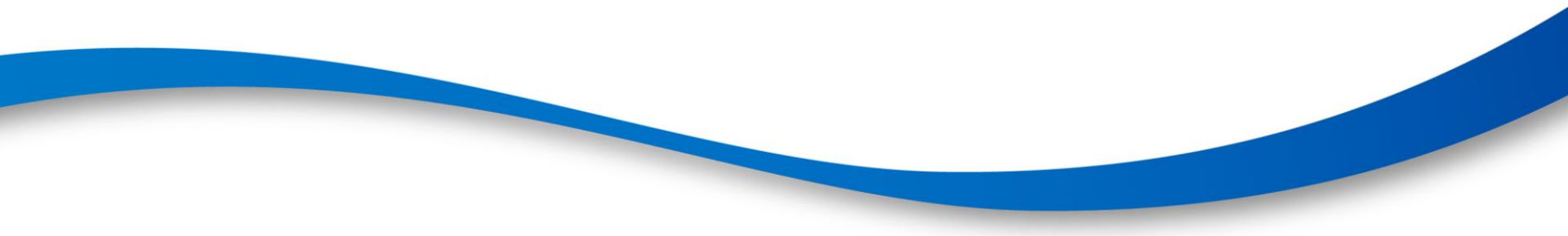
Anaemia

- How quickly do I need to act?
 - Is this a haemorrhage situation?
 - How symptomatic is the patient
 - Can I identify a cause
 - Review the patient and the history
 - Look at the size of the red cells (MCV)
- 

Anaemia

- **Low MCV (small red cells)**
 - Iron deficiency (by far the likeliest cause)
 - Dietary
 - Bleeding (e.g. Gastrointestinal)
 - Haemoglobinopathy (thalassaemias mainly) – these people can also be iron deficient
 - Anaemia of chronic disease
 - Thyroid abnormalities
 - Rare causes
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Anaemia

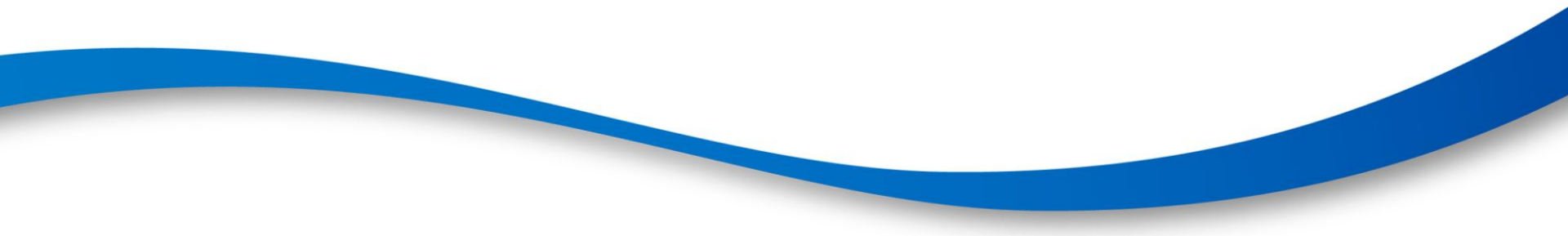
- High MCV (enlarged red cells)
 - B12 / folate deficiency
 - Excessive alcohol intake (chronic)
 - High red cell turnover (eg haemolysis, bleeding)
 - Myelodysplastic Syndrome (MDS)
 - Certain drugs (eg hydroxycarbamide, azathioprine)
 - Thyroid abnormalities
- 

Anaemia

- Normal MCV (red cell size normal on average)
 - Can happen with any of the previous causes
 - ‘Mixed’ picture of low/high MCV
 - Traditionally said to be likeliest with ‘anaemia of chronic disease’ or ‘renal anaemia’

Anaemia

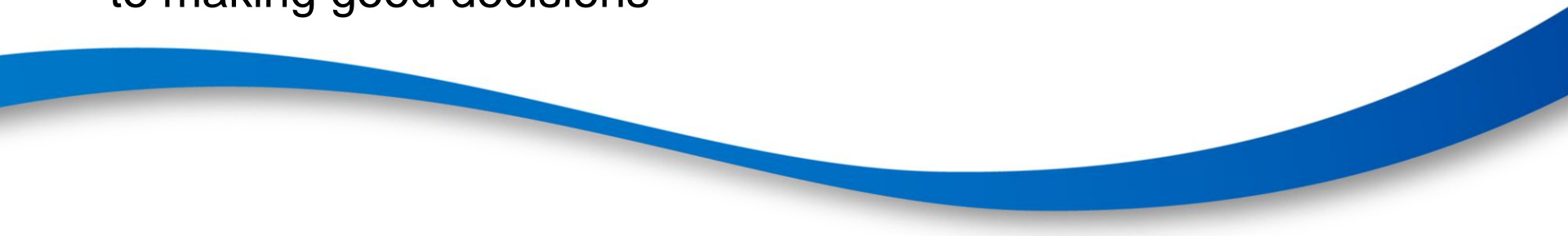
- Other (possibly) useful investigations:
 - Ferritin, B12, folate levels
 - U&Es, LFTs, TFTs
 - Blood film
 - Reticulocyte count (and haemolysis screen)

 - Always look for the trend – is this new or old? Is it falling quickly or slowly?
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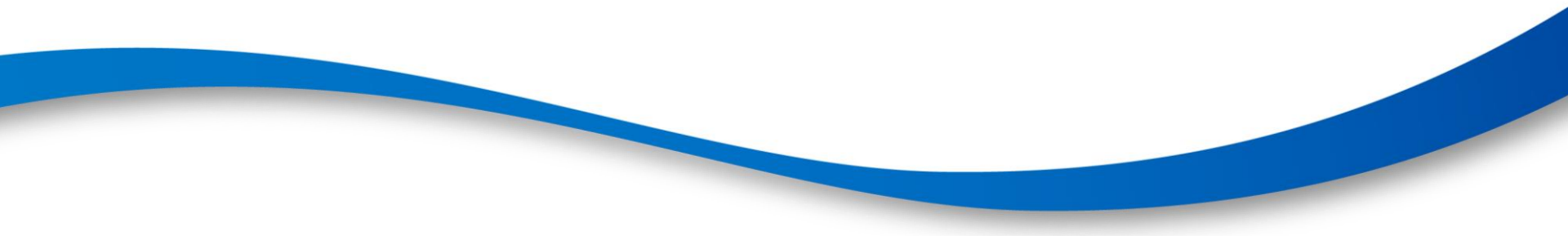
What triggers would make you transfuse the anaemic patient?

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Anaemia

- Patients may tolerate extremely low Hb levels if it has fallen slowly and they have had time to compensate
 - Conversely, rapidly falling Hb levels can make people feel ill even at moderately low levels
 - So history and examination / clinical picture is critical to making good decisions
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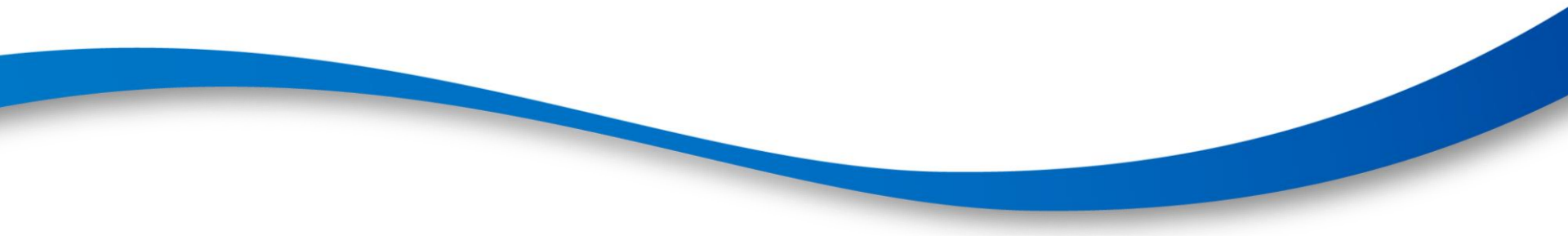
Transfusion Dependent Patients

- These patients behave slightly differently to 'acute' or 'chronic' anaemia from other causes
 - Decisions to transfuse tend to be based on a particular Hb threshold established over time by the patient and their caring team
 - Some patients see marked benefit from transfusion, others very little
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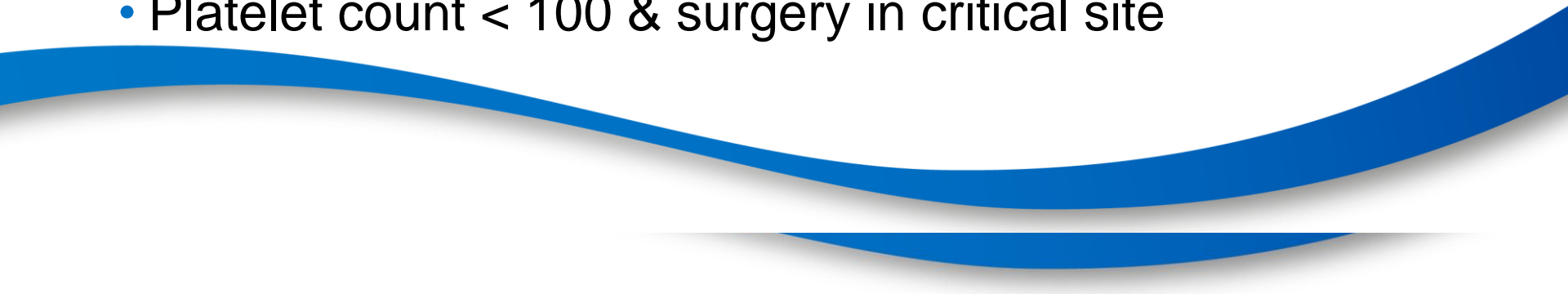
Abnormal Results - Platelets

- Low (thrombocytopenia)
 - Failure of production
 - Infection
 - Malignancy
 - Haematinic deficiency
 - Liver failure / alcohol / big spleen
 - Medications / Chemo
 - Destruction
 - Mechanical (eg bypass / dialysis / CVVH etc)
 - Idiopathic thrombocytopenic purpura (ITP)
 - Disseminated intravascular coagulation (DIC)
 - Thrombotic thrombocytopenic purpura (TTP – rare)
 - Heparin induced thrombocytopenia (HIT)
 - Vaccine-induced thrombosis and thrombocytopenia (VITT)

Further Investigations

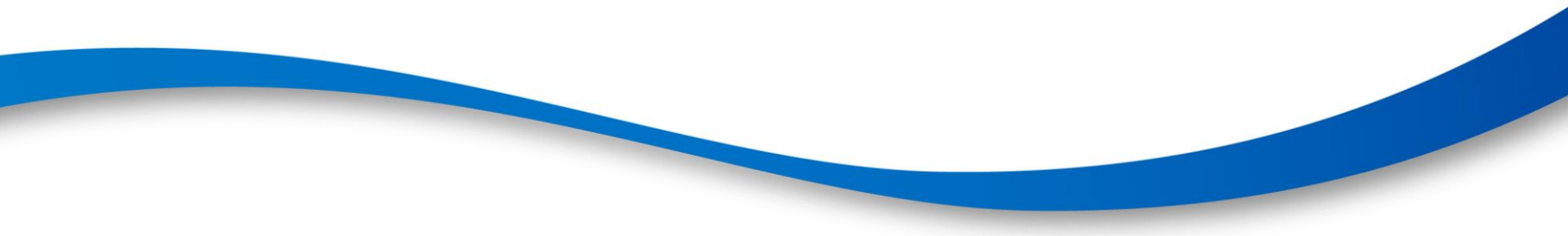
- Check trend – has it always been low?
 - Revisit history and examination
 - Investigate for underlying cause
 - Blood film is always useful!
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Triggers for platelet transfusion BSH 2016 Platelet Guidelines


- Platelet count < 10 reversible BM failure, Critical illness
 - Platelet count < 20 & additional defect e.g. sepsis and central venous line
 - Platelet count < 40 Lumbar puncture
 - Platelet count < 50 & invasive procedure and severe bleeding
 - Platelet count < 80 Epidural anaesthesia
 - Platelet count < 100 & surgery in critical site
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Why not transfuse everyone?

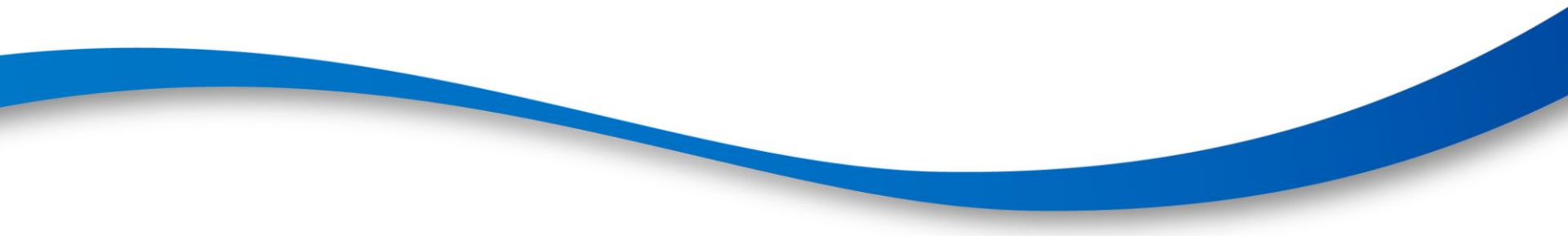
- Limit resource so need to prioritise
- Risks associated with transfusion



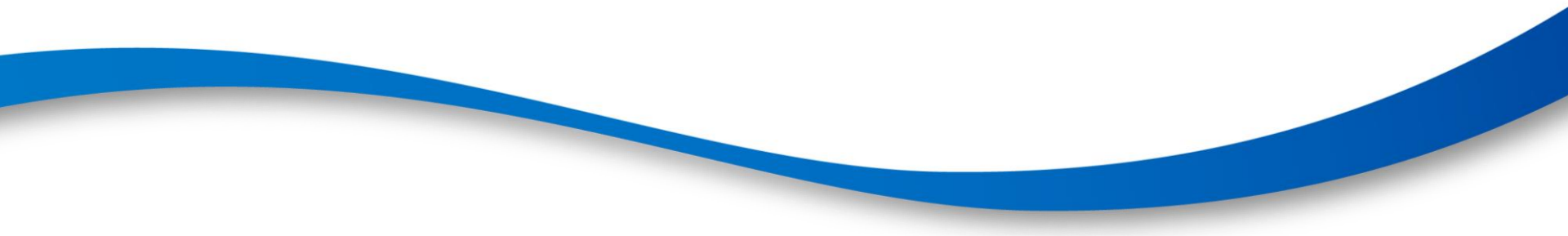
Risks of transfusion

- Transfusion associated infection
 - Transfusion reaction
 - Febrile
 - Anaphylaxis
 - Haemolytic
 - Generation of antibodies
 - Implication for pregnancy
 - Transfusion associated circulatory overload
 - Transfusion associated lung injury
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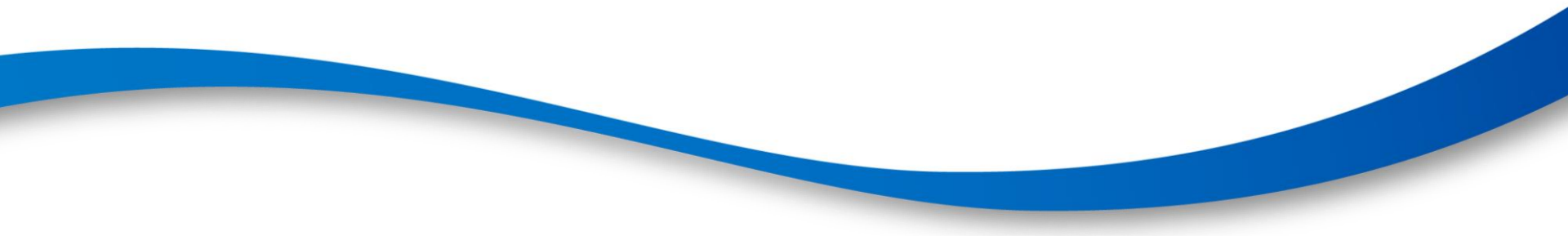
Case 1

- A 24 year old woman is admitted to MAU after attending her GP with tiredness and having a FBC check:
 - Hb 64g/L, MCV 62 (80-100), WCC 7, Plts 500 (150-450)
 - What is the likeliest cause of her anaemia?
 - What other blood tests should be done?
 - What other questions should you ask her?
- 

Case 1b

- You are asked to authorise a 2u red cell transfusion as she feels very tired, a bit breathless on climbing stairs, and has 3 young children to care for at home
 - How would you respond?
 - What are the options for treating her?
- 

Case 2

- A 78 year old man is an inpatient on the gastro ward in your hospital, with weight loss and not eating or drinking - ? a possible upper GI malignancy. He has his routine FBC done one morning and Hb has dropped from 123g/L (2 days ago) to 55g/L this morning
 - You rush to see him
 - He says he feels the same
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Case 2b

- Once you have established his ABC are ok and observations are normal, what should you look at next?

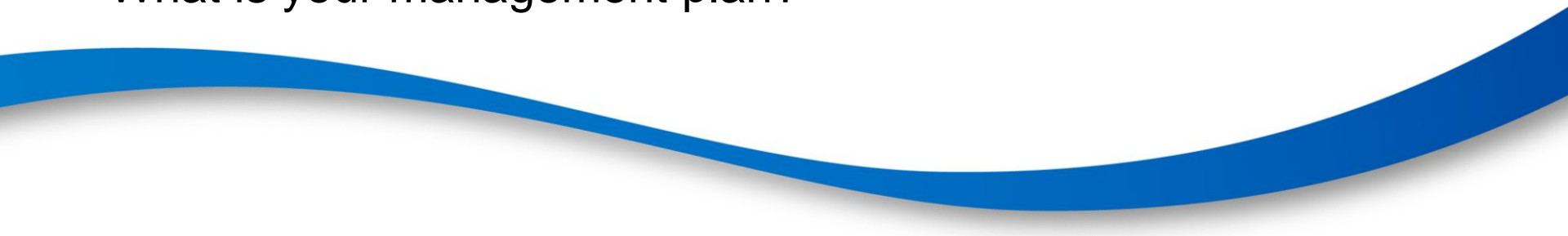
Case 2

- FBC today:
 - Hb 55g/L
 - MCV 82
 - MCH 20
 - Plts 127
 - WCC 2.2
 - Neuts 1.8
- FBC 2 days ago:
 - Hb 123g/L
 - MCV 97
 - MCH 34
 - Plts 400
 - WCC 8.4
 - Neuts 3.3

What is the likeliest cause?

What should you do next?

Case 3

- A 60 year old AML patient is 3 weeks out from induction chemo and attends the Day Unit for routine check FBC:
 - Hb 80g/L, Plts 11, Neuts 0.2
 - It's Friday afternoon and the Day Unit isn't open again until Monday
 - Is there anything else you want to know?
 - What is your management plan?
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