

# Haematology Handbook

Division of Specialty Medicine

Author:	Dr Jamie Maddox
Issue Date:	01/11/2016
Review Date:	31/10/2018



# Haematology Handbook

Although this document is designed for use in General Practice, it can also be used in hospital medicine as a tool for investigating common haematological abnormalities and for guiding appropriate referral.

Within hospital practice, the causes for haematological abnormalities will be skewed towards acute causes (e.g. acute illness, medications) rather than chronic conditions. Comorbidities should also be taken into account.

Further guidance on thrombosis and anticoagulation can be found on the South Tees Intranet.

**'Policies' > 'Clinical Guidelines & Protocols' > 'Haematology'**

The handbook can also be accessed via the internet:

<https://www.southtees.nhs.uk/services/pathology/haematology-lab/>

The [NICE Clinical Knowledge Summaries](#) also provide a very thorough and useful summary of several of the topics in this handbook, including [iron deficiency](#), [B12/folate deficiency](#), [bruising](#), [referral of suspected haematological malignancy](#), [neck lumps](#), [suspected myeloma](#), [erythrocytosis](#)...

# Contents

<b>Section</b>	<b>Page</b>
<a href="#">Anaemia</a> .....	3-4
<a href="#">High haemoglobin</a> .....	5
<a href="#">Iron deficiency</a> .....	6-7
<a href="#">High ferritin</a> .....	8
<a href="#">Macrocytosis</a> .....	9
<a href="#">Low white cell count</a> .....	10
<a href="#">High white cell count</a> .....	11
<a href="#">Lymphocytosis</a> .....	12
<a href="#">Newly diagnosed early CLL</a> .....	13
<a href="#">Low platelet count</a> .....	14
<a href="#">High platelet count</a> .....	15
<a href="#">Paraprotein</a> .....	16-17
<a href="#">Polyclonal immunoglobulins</a> .....	18
<a href="#">Raised ESR / plasma viscosity</a> .....	19
<a href="#">Lymphadenopathy</a> .....	20
<a href="#">Splenomegaly</a> .....	21
<a href="#">Antibiotic prophylaxis and vaccination following splenectomy</a> .....	22-23
<a href="#">Sweats</a> .....	24
<a href="#">Easy bruising</a> .....	25
<a href="#">Abnormal coagulation</a> .....	26
<a href="#">Thrombophilia</a> .....	27-28
<a href="#">VTE Prevention in travellers</a> .....	29

## Clinical Problem: Anaemia

The most common cause of anaemia will be iron deficiency presenting with a low MCV/MCH and low serum ferritin (see [separate protocol](#)). There are however many other possible causes of anaemia so co-morbidities, medication, diet, ethnicity and family history are all potentially relevant.

Initially consider the MCV as this can help narrow down the cause of anaemia:

- *Low MCV*- iron deficiency, some anaemia of chronic disease (otherwise MCV normal) or haemoglobinopathy. Rare sideroblastic anaemia or lead poisoning.
- *Normal MCV*- some anaemia of chronic disease, acute bleeding, mixed iron and B12/folate deficiency and most non-haematonic causes of anaemia.
- *High MCV* – B12/folate deficiency, liver disease, hypothyroidism, some bone marrow disorders (e.g. myelodysplastic syndrome) or increased red cell destruction. A mildly increased MCV can also be seen in pregnancy (~4fl).

### Differential Diagnosis:

- *Iron deficiency*- low MCV/MCH. Low serum ferritin, although this can be masked by inflammation. Usually due to chronic blood loss, but consider diet and malabsorption (e.g. coeliac disease).
- *Acute bleeding*, even if not yet iron deficient. May have increased reticulocytes.
- *Anaemia of chronic disease*- normal or low MCV/MCH (often normal MCV, low MCH). Normal or increased ferritin with low serum iron, transferrin & transferrin saturation. True iron deficiency should have increased transferrin. Raised inflammatory markers due to underlying infection, inflammation, malignancy or autoimmune disease.
- *Megaloblastic anaemia* (B12, folate or anti-metabolite drugs) - high MCV and megaloblastic features on blood film. Low serum B12 or folate. See NICE Clinical Knowledge Summary <https://cks.nice.org.uk/anaemia-b12-and-folate-deficiency>
- *Increased red cell destruction*- inherited or acquired haemolytic anaemia with raised reticulocytes, bilirubin and LDH. Positive Direct Coombs test if autoimmune. Blood film may show spherocytes.
- *Bone marrow disorder*- blood film appearances may be suggestive. May also have low WCC and PLT.
- *Drugs*- e.g. GI bleeding with NSAIDs; bone marrow suppression with chemotherapy, azathioprine or methotrexate; red cell haemolysis with dapsone or sulphasalazine.
- *Renal impairment*- often with normal MCV. Incidence increases as renal function declines, although the cause of renal impairment is also relevant (e.g. diabetic nephropathy tends to be more anaemic than expected from eGFR alone).
- *Liver disease*- often with high MCV, although could be normal or low if concurrent iron deficiency, e.g. GI bleeding due to varices.
- *Endocrine*- thyroid, parathyroid, pituitary or adrenal dysfunction.
- *Physiological* - a mild drop in haemoglobin is normal in pregnancy and with increasing age (e.g. if age 70+ then the lower end of the normal 95% range drops to 105g/L in females and 115g/L in males).

**Examination:**

- Depends on suspected cause.
- Include abdominal examination and rectal exam if considering iron deficiency anaemia or occult bleeding (rectal exam if tenesmus or history of bleeding).
- Include examination for lymphadenopathy, splenomegaly and hepatomegaly if considering haematological disorder.

**Baseline investigations:**

- Depending on suspected cause, additional investigation may include:
  - *Low MCV*: blood film, U+E, LFT, ferritin / iron studies, CRP. Screening for a haemoglobinopathy is normally carried out automatically by the laboratory if the red cell indices and ethnic origin are suggestive.
  - *Normal MCV*: blood film, reticulocytes, U&E, LFT, ferritin, B12/folate, CRP.
  - *High MCV*: blood film, reticulocytes, U+E, LFT, TSH, B12/folate.
- Serum immunoglobulins and urinary Bence-Jones protein if myeloma is being considered (normal or high MCV).
- Consider HIV serology in patients with unexplained anaemia.

**Referral:**

Consider Haematology referral if:

- Suspected haematological disorder (bone marrow disorder, haemolytic anaemia).
- Unexplained anaemia with haemoglobin <100g/L (female) / <110g/L (male), especially if progressive.
- We do not routinely see haemoglobinopathy carriers, however an information sheet is sent to the patient's General Practice.
- Other specialty referrals based on suspected cause. If anaemia of chronic disease but no obvious explanation for the inflammatory process then consider referral to General Medicine.

## Clinical Problem: High haemoglobin / haematocrit

Investigation is suggested if the haematocrit is persistently (>2 months) >0.52 (male) or >0.48 (female). This may be due to increased red cell mass (true polycythaemia) or reduced plasma volume (relative polycythaemia). If the haematocrit is >0.6 (male) or >0.56 (female) then it can be assumed that there is a true increase in red cell mass. Below this value, a relative polycythaemia is more likely.

### Differential Diagnosis:

- Relative polycythaemia – may be due to a variety of causes such as stress, dehydration, diuretics, oedema, hypertension, obesity, cigarettes or alcohol.
- True polycythaemia
  - *Reactive to hypoxia*- e.g. pulmonary disease, carbon monoxide / heavy smoking, sleep apnoea or congenital cyanotic heart disease.
  - *Abnormal high erythropoietin*- e.g. secondary to various tumours (e.g. renal carcinoma or hepatoma), renal transplant or renal artery stenosis.
  - *Polycythaemia vera*- bone marrow disorder with uncontrolled red cell proliferation. Usually positive for JAK2 V617F mutation. Associated with thrombotic and haemorrhagic complications. May be associated with itch, splenomegaly or raised WCC / PLT.
  - *Endocrine*- Cushing's syndrome, Conn's syndrome, phaeochromocytoma or androgens (including testosterone supplements and anabolic steroids).
  - *Inherited* erythropoietin or haemoglobin variants (rare).

### Examination:

- Features of cardiac or pulmonary disease.
- Features of hyperviscosity (fatigue, headache, retinal haemorrhage, blurred vision, paraesthesia, slowed thought, chest / abdominal pain, myalgia).
- Splenomegaly suggests polycythaemia vera although this is not a consistent finding.

### Baseline investigations:

- FBC, U+E, LFT, ferritin (a high haematocrit despite low ferritin suggests polycythaemia vera. DO NOT give iron replacement).
- Review cardiovascular risk factors, although primary aspirin not recommended unless PRV.
- Further tests as indicated by history, e.g. oxygen saturations, PFT, CXR.
- Approximately 98% of patients with polycythaemia vera will have a JAK2 V617F mutation or a JAK2 exon 12 mutation (testing performed by Haematology Department).

### Referral:

- Haematocrit persistently >0.52 (male) or >0.48 (female) without obvious cause or if suspicion of polycythaemia vera.
- URGENT referral if features of hyperviscosity.
- Other referrals as directed by suspected cause, e.g. may benefit from long-term oxygen therapy if chronic hypoxia.

### References:

- McMullin MF, et al. [Guidelines for the diagnosis, investigation and management of polycythaemia / erythrocytosis](#). Br J Haematol 2005; 130: 174-195.
- NICE Clinical Knowledge Summary. Polycythaemia / Erythrocytosis (July 2010). <https://cks.nice.org.uk/polycythaemiaerythrocytosis>

## Clinical Problem: Iron deficiency

Iron deficiency often shows as a hypochromic microcytic anaemia (low MCH and MCV) with a low ferritin value.

Diagnostic problems can occur in the presence of an acute or chronic inflammatory condition. This can cause a falsely elevated ferritin despite true iron deficiency. It can also cause anaemia of chronic disease with a mildly low MCV/MCH and low serum iron despite normal iron stores. This picture may become easier to interpret if the underlying disease can be controlled.

Anaemia with a markedly low MCV/MCH can also be seen with a haemoglobinopathy. Consider if the MCV/MCH is lower than expected, normal ferritin and non-Caucasian ethnic origin. The laboratory will normally automatically add on haemoglobinopathy screening in this situation.

### Differential Diagnosis:

- *Blood loss*- most commonly gastrointestinal (NSAIDs or pathological lesion) or gynaecological / menstrual. Unusual causes such as hookworm after travel.
- *Malabsorption*- such as coeliac disease, gastrectomy / gastric bypass.
- *Poor intake*- unusual as a sole cause, except with extreme diets.
- *Pregnancy* – common, although ferritin falls in 2-3<sup>rd</sup> trimesters due to dilution and redistribution. A ferritin value <30ug/L should prompt replacement therapy.

### Examination:

- Abdominal examination, including rectal exam if tenesmus or bleeding.
- Gynaecological examination as appropriate.

### Baseline investigations:

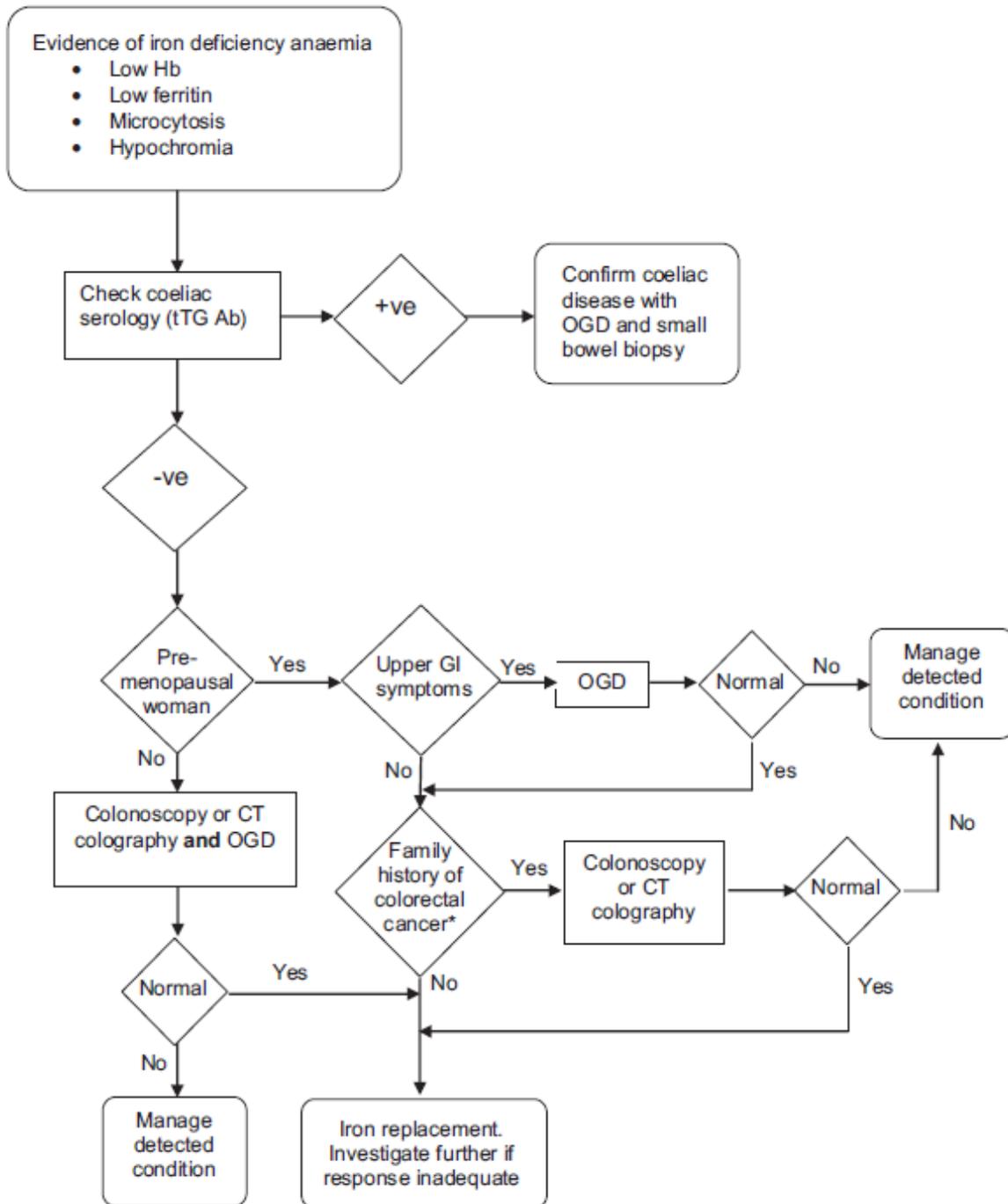
- FBC, blood film (elliptocytes or pencil cells suggest iron deficiency), ferritin. Check inflammatory markers if ferritin unexpectedly normal (if concurrent inflammation, a ferritin >100ug/L normally excludes iron deficiency except in severe inflammation, while a value <50ug/L is suspicious but not diagnostic).
- Coeliac serology
- Urinalysis
- Consider the possibility of atrophic gastritis (anti-parietal cell / anti-intrinsic factor antibodies) or *H. pylori* infection (faecal antigen test) as a cause of unexplained or refractory iron deficiency anaemia.
- Faecal occult blood testing neither confirms or excludes gastrointestinal pathology. Stool parasite testing may be suggested based on travel history.

### Treatment:

- Standard treatment is ferrous sulphate 200mg tds or ferrous fumarate 210mg tds until anaemia resolves (Hb should rise by 20g/L in 3-4 weeks), then a further 3 months to build iron stores. Afterwards, monitor blood count 3 monthly for 1 year.
- If intolerant of ferrous sulphate / fumarate then try alternate iron preparations (e.g. ferrous gluconate). These may be better tolerated although the iron content may be lower.

### Referral:

- The majority of patients will require referral to Gastroenterology to look for an underlying cause ([see chart](#)). 2WW if unexplained IDA and Hb <110g/L (male) or 100g/L (female) or suspicious clinical features
- Consider Gynaecology referral based on symptoms.
- Haematology referral if considering parenteral iron therapy- i.e. unresponsive or intolerant of oral iron. Patients will still need referral to Gastroenterology / Gynaecology to identify and treat the underlying cause.



Note that above chart is solely about gastrointestinal investigations and does not include recommendations for gynaecological investigation or other specialty referrals as per bleeding symptoms. May not need GI investigation if healthy young person with obvious cause for iron deficiency (e.g. regular blood donor), menstruating or pregnant young woman with no gastrointestinal symptoms, or if frail / terminally ill and unable to tolerate investigation – discuss with patient and family.

#### References:

- Goddard AF, *et al.* [British Society of Gastroenterology: Guidelines for the management of iron deficiency anaemia](#). 2011
- NICE Clinical Knowledge Summary. Anaemia- iron deficiency (Feb 2013). <https://cks.nice.org.uk/anaemia-iron-deficiency>

## Clinical Problem: High ferritin

In healthy subjects the serum ferritin concentration correlates with iron stores, however high levels do not necessarily reflect iron overload. Ferritin behaves as an acute phase reactant in many inflammatory diseases. Tissue damage, particularly to the liver, can also release large amounts of ferritin into the plasma.

### Differential diagnosis:

- *Acute phase reaction*- infection, inflammation or malignancy.
- *Release of ferritin by tissue damage, especially to iron rich organs*- e.g. chronic liver disease (including alcoholic liver disease and cirrhosis) or splenic infarction.
- *True iron overload*: genetic haemochromatosis, iron overload secondary to repeated blood transfusions, massive ineffective erythropoiesis (thalassaemia, sideroblastic anaemia), porphyria cutanea tarda or rare genetic causes of iron overload (e.g. aceruloplasminaemia).

### Baseline investigations:

- FBC, LFT, CRP, iron studies (in particular fasting transferrin saturation). Repeat serum ferritin levels >3 months apart. If the fasting transferrin saturation is normal then this strongly suggests a falsely elevated ferritin rather than true iron overload.
- Genetic screening for haemochromatosis is indicated if positive family history OR if persistently raised ferritin with high transferrin saturation. [This test can be sent from General Practice.](#)
- If persistently raised ferritin with raised CRP and / or normal transferrin saturation then consider alternate causes.

### Referral:

- If genetic haemochromatosis suspected / confirmed then patient management is usually overseen by Gastroenterology, although venesections are undertaken by Haematology. A referral to Gastroenterology would also be appropriate in patients found to have liver disease on investigation of a high ferritin value.
- If family screening is required for genetic haemochromatosis (parents, siblings, children) then this can be undertaken in General Practice. Screen includes ferritin, transferrin saturation and possibly genetic studies. If genetic counselling is required then we suggest refer to the Clinical Genetics service.
- For raised serum ferritin associated with an acute phase response then the underlying condition may require further investigation and management.
- Refer to Haematology if true iron overload (raised ferritin and transferrin saturation) with uncertain cause (e.g. negative tests for genetic haemochromatosis) or known haemochromatosis to commence venesection.

### References

- British Committee for Standards in Haematology. [Guidelines on diagnosis and therapy. Genetic Haemochromatosis.](#) 2000

## Clinical Problem: Macrocytosis (high MCV)

The most common cause of a high MCV is alcohol excess, however other causes should be considered.

### Differential diagnosis:

- *Artefact* – e.g. delayed sample processing or cold haemagglutinins.
- *Physiological* – mild macrocytosis normal in pregnancy (approx. 4fl rise from baseline).
- *Reticulocytosis* – reticulocytes are ~25% larger than normal RBC. High count suggests a marrow response to red cell destruction or blood loss.
- *Excess alcohol intake* - target cells or stomatocytes on a blood film report suggests alcohol excess or liver dysfunction.
- *Abnormal liver function* – often anaemic and can have low platelets
- *Hypothyroidism* - can also give a normocytic anaemia
- *Vitamin B12 or folate deficiency* - hypersegmented neutrophils and / or oval macrocytes on a blood film report suggest a megaloblastic anaemia.
- *Drugs* e.g. hydroxycarbamide, azathioprine and many chemotherapy agents. Can give the appearances of a megaloblastic anaemia.
- *Bone marrow disorder*, e.g. myelodysplastic syndrome – blood film may be suggestive and may also have leucopenia or thrombocytopenia.

### Baseline investigations:

- Repeat FBC (ensure sample gets to laboratory on same day), blood film, reticulocytes, LFT, TFT, B12 / folate.
- Note that a mild reduction in vitamin B12 levels can be seen as an artefact in pregnancy or women taking OCP / HRT. There is also significant overlap in vitamin B12 levels between those with true deficiency and those with a level at the lower end of the normal range.

### Vitamin B12 / folate:

- NICE have produced a very useful Clinical Knowledge Summary.  
<https://cks.nice.org.uk/anaemia-b12-and-folate-deficiency>

### Referral:

- Further management / referral based on suspected cause.
- Consider haematology referral if suspected red cell haemolysis or bone marrow disorder.
- We do not see patients with an unexplained macrocytosis but an otherwise normal blood count. These patients can be monitored in General Practice with 6-12 monthly blood counts. Refer if develop cytopenias.

## Clinical Problem: Low White Cell Count (<4 x10<sup>9</sup>/L)

A low white cell count (WCC) is most commonly seen as a transient feature following viral infection. Where there has been no recent history of infection, or where the low WCC is persistent, then other causes should be considered.

### Differential Diagnosis

Neutropenia:

- *Constitutional* – Ethnic variation in Black Africans and some Arab or Mediterranean patients includes a neutrophil count down to 0.8 x10<sup>9</sup>/L.
- *Congenital* – uncommon but consider in young patients if no previous normal blood counts. Variable inheritance and severity.
- *Post-viral* – may persist for several weeks and be followed by a prolonged autoimmune neutropenia lasting for several months.
- *Drug-induced* – long list of possibilities: especially chemotherapy; phenothiazines and other anti-psychotics; anti-epileptics; anti-arrhythmics, anti-thyroid drugs; antibiotics; ACE-inhibitors; sulphasalazine and NSAIDs.
- *Autoimmune* – may be seen alone or in association with other autoimmune disease.
- *Bone marrow failure* – may give isolated neutropenia but more commonly associated with anaemia and / or thrombocytopenia.
- Unusual causes such as Felty's syndrome.

Lymphopenia, has many possible causes including:

- *Infection* – acute or chronic infection, especially HIV or TB
- *Autoimmune disease / connective tissue disease*
- *Steroid therapy*
- *Cardiac failure*
- *Malignancy*

### Examination:

- Should include baseline observations. Examine for hepato-splenomegaly and for lymphadenopathy. Local signs of infection

### Baseline investigations:

- Blood film should be examined. Consider autoimmune screen or viral serology (including HIV) as appropriate.

### Management:

- Consider switching non-essential medications if suspicion of drug-induced neutropenia. Neutrophil count should begin to recover within a few days / weeks depending on the medication. If neutrophils >1.0 x10<sup>9</sup>/L with no increase in infections then I would not suggest changing important medications.
- If neutrophil count <1.0x10<sup>9</sup>/L then patients should report any fever or symptoms of infection immediately and may need hospitalisation for intravenous broad spectrum antibiotics.

### Referral:

- Consider Haematology referral if:
  - Unexplained neutropenia <1.0x10<sup>9</sup>/L.
  - Unexplained neutropenia <1.5 x10<sup>9</sup>/L if persistent or with other cytopenias.
- We do not routinely investigate isolated lymphopenia.

## **Clinical Problem: Raised White Cell Count** (see separate sheet for [lymphocytosis](#))

Note the particular cell line increased, i.e. neutrophilia, monocytosis, eosinophilia or lymphocytosis.

### **Differential Diagnosis:**

#### Neutrophilia

- *Reactive* - most commonly seen as a reactive feature secondary to infection, inflammation, trauma or malignancy. May have increased monocytes and platelets. May develop anaemia of chronic disease.
- *Medication* - e.g. corticosteroids or G-CSF.
- *Chronic myeloid leukaemia* (CML) – rare condition, often very high white cell count with coexisting splenomegaly, eosinophilia, basophilia and primitive cells in the peripheral blood. These characteristic features will usually be picked-up by the haematology laboratory.

#### Monocytosis

- *Reactive* - most commonly seen as a reactive feature, often with a neutrophilia.
- *Chronic myelomonocytic leukaemia* (CMML) – often with cytopenias and dysplastic features on a blood film.

#### Eosinophilia

- Most common causes are allergy / atopy or drug reaction.
- Less common causes are wide-ranging, including parasitic infection, tuberculosis, HIV, malignancy, connective tissue disease / vasculitis, sarcoidosis, skin disease or pulmonary disease (e.g. allergic bronchopulmonary aspergillosis, Loeffler's syndrome). Can be seen in haematological malignancies.

### **Examination:**

- Difficult to give specific recommendations given the wide-range of possible causes.
- Examine for hepatomegaly and splenomegaly if suspect CML or CMML.
- If unexplained eosinophilia then consider eosinophil related organ damage which can cause cardiac, pulmonary, gastrointestinal, renal, musculoskeletal, neurological and skin damage.

### **Baseline investigations:**

- FBC, blood film, U&E, LFT, inflammatory markers.
- Other investigations as directed by symptoms and suspected underlying cause.

### **Referral:**

- Consider Haematology referral if:
  - Suspicion of haematological malignancy - chronic myeloid leukaemia or chronic myelomonocytic leukaemia.
  - Sustained eosinophilia ( $>1.5 \times 10^9/L$ ) in absence of a secondary cause or with suspicion of associated end organ damage.
- If unexplained inflammatory process then consider referral to General Medicine, or other speciality based on any localising features.

## Clinical Problem: Lymphocytosis (>4 x 10<sup>9</sup>/L)

A mild lymphocytosis has two main causes, either reactive (especially in children) or related to a lymphoproliferative disorder (especially in the elderly).

### Differential Diagnosis:

- *Normal* - mild lymphocytosis normal post-splenectomy or in children <5 years.
- *Viral infection*
- *Bacterial infection* - especially pertussis or chronic tuberculosis.
- *Low-grade lymphoproliferative disorder* – blood film report comment such as ‘smear cells’ or ‘small, mature lymphocytes’ may point towards this diagnosis.

### Examination:

- Look for evidence of recent infection.
- Check for lymphadenopathy, hepatomegaly or splenomegaly.

### Baseline investigations:

- Consider likelihood of viral aetiology and relevance of viral serology.
- If isolated lymphocytosis with no other disturbance in blood counts then repeat in 6-8 weeks to see if resolved.
- If persisting lymphocytosis >10 x10<sup>9</sup>/L, or if blood film comments suggest a lymphoproliferative disorder, then consider sending a second EDTA (purple) tube to haematology marked ‘immunophenotyping – chronic panel’ to assess for a clonal population.

Note that the diagnosis of an asymptomatic early-stage lymphoproliferative disorder (e.g. CLL) generally requires no immediate treatment and often does not influence the life expectancy of an elderly patient. Therefore consider the possibility of monitoring the blood count 6-12 monthly in General Practice rather than causing undue concern to the patient by confirmatory testing. See following [letter](#) for recommendations on monitoring and referral.

### Referral:

Consider Haematology referral if:

- Immunophenotyping confirms lymphoproliferative disorder.
- Associated anaemia or thrombocytopenia.
- Lymphadenopathy, hepatomegaly or splenomegaly.
- B symptoms – weight loss, fevers, drenching night sweats, recurrent infections, extreme lethargy. It would be unusual to have significant symptoms with a lymphocyte count <20-30 x10<sup>9</sup>/L and no palpable lymphadenopathy.

## Letter regarding patient with newly diagnosed early CLL

Dear Dr ...,

Your patient has been found on peripheral blood immunophenotyping (cell marker studies) to have evidence of **B cell chronic lymphocytic leukaemia (CLL)**. This is a common incidental finding, and having early CLL does not always indicate the need for referral to the Haematology Department.

The decision to refer needs to take in to account a number of factors. As a guide, the following may suggest that it is acceptable to monitor your patient in Primary Care:

- Being asymptomatic (e.g. unexplained weight loss, fevers or night sweats)
- No, or minimal, lymphadenopathy
- Normal haemoglobin, neutrophil and platelet counts
- Known, or long-standing, relatively stable lymphocytosis
- Mild to moderate lymphocytosis (e.g.  $< 30 \times 10^9/l$ )
- Significant symptomatic co-morbidities or advanced age

If you are happy to monitor the patient in Primary Care, we would suggest:

- Initially 3 monthly FBC, and if lymphocytosis is stable, reduce to 4-6 monthly
- Monitor haemoglobin and platelet count as well as the lymphocyte count
- Monitor and document any lymphadenopathy or hepato-splenomegaly (6 monthly exam)

The following may suggest the possible need to refer:

- Progressively falling haemoglobin or platelet count
- Progressive lymphadenopathy or hepato-splenomegaly
- Enlarging or symptomatic lymphadenopathy
- Lymphocyte count doubles in less than one year
- Systemic symptoms such as unexplained weight loss or drenching night sweats
- Patient anxiety and request for referral

If you wish to offer literature on CLL to your patient, you may consider the info sheet provided by MacMillan:

- <http://www.macmillan.org.uk/Cancerinformation/Cancertypes/Leukaemiachroniclymphocytic/CLL.aspx>

We hope the above guidance is helpful. Non-urgent advice can be obtained via an Advice request on the Choose & Book service.

Yours sincerely,

## Clinical Problem: Low platelets (platelets $<150 \times 10^9/L$ )

A low platelet count is defined a count  $<150 \times 10^9/L$ . This is usually asymptomatic until the platelet count falls  $<50 \times 10^9/L$ , with spontaneous bleeding being more common once  $<20-30 \times 10^9/L$ .

Symptoms tend to include bruising, petechiae and mucosal bleeding, however more serious bleeds, e.g. intra-cerebral, can also occur. Due to the risk of bleeding, drugs such as NSAIDs or anticoagulants should generally be avoided when the platelet count is  $<70 \times 10^9/L$ .

### Differential diagnosis:

- *Spurious*: e.g. platelet aggregation in blood sample.
- *Infection related*, especially viral, including HIV.
- *Alcohol excess*
- *Liver disease / splenomegaly*.
- *Autoimmune*, especially if history of autoimmune disease, e.g. SLE.
- *Chronic DIC*, e.g. malignancy.
- *Drug effect*
- *Bone marrow failure*- for example haematological malignancy or metastatic solid tumour. Often with low haemoglobin / white cell count and suspicious blood film features.

**Examination** should include assessment of haemorrhagic features, e.g. bruising, petechiae or mucosal bleeding. Also check for lymphadenopathy, hepatomegaly or splenomegaly.

**Baseline testing:** FBC, blood film, coagulation screen (PT, APTT, fibrinogen), U+E, LFT, TSH. Patients should be considered for HIV testing, especially if no other cause of thrombocytopenia is apparent.

### Referral:

Consider Haematology referral if:

- Co-existing anaemia or leucopenia.
- Unexplained platelet count  $<50 \times 10^9/L$  (repeat immediately to ensure not a sample error).
- Unexplained platelet count  $<100 \times 10^9/L$  for  $>3$  months.

Haematological referral is inappropriate where there is a known non-haematological cause, for example metastatic solid tumour or liver disease.

## Clinical Problem: High platelets (platelets $>450 \times 10^9/L$ )

A high platelet count is often reactive, in the same way that a plasma viscosity or ESR may be elevated. If there is no obvious underlying cause then other possibilities should be considered.

### Differential diagnosis:

- *Normal* – post-splenectomy
- *Reactive* to infection, inflammation or malignancy. May be associated with neutrophil leucocytosis and anaemia of chronic disease.
- *In response to blood loss or trauma*. If chronic blood loss may also see iron deficiency anaemia.
- *Related to a myeloproliferative disorder*, e.g. essential thrombocythaemia (isolated thrombocytosis); polycythaemia vera (also raised haematocrit); or proliferative phase myelofibrosis (splenomegaly often a feature).

### Examination:

- Examine for hepatomegaly or splenomegaly.

### Baseline investigations:

- FBC, blood film, U+E, LFT, calcium, inflammatory markers
- Ferritin if anaemia (may be falsely elevated if raised inflammatory markers)
- Chest x-ray
- Other investigations depending on history / examination and clinical suspicion

### Referral:

Consider haematology referral if:

- Persistently raised platelets with no obvious underlying cause / normal inflammatory markers.
- Splenomegaly or blood film suggestion of a primary bone marrow disorder.

If a raised platelet count is part of an unexplained inflammatory condition (e.g. raised WCC, anaemia of chronic disease, raised inflammatory markers) then consider referral to General Medicine.

### References:

- Harrison CN, *et al.* [Guideline for investigation and management of adults and children presenting with a thrombocytosis](#). Br J Haematol 2010; 149: 352-375.

## Clinical Problem: Paraprotein

A paraprotein is a monoclonal band of immunoglobulin found in the serum or urine. In the urine it is uncommon to find intact immunoglobulin as this is a large unfiltered protein, however immunoglobulin light chains can be identified if present above the renal threshold for reabsorption (Bence-Jones protein).

Monoclonal immunoglobulin is produced by a clonal B-lymphocyte population which can be benign (e.g. monoclonal gammopathy of undetermined significance [MGUS]) or malignant (e.g. multiple myeloma or B-cell lymphoma). An IgM paraprotein is extremely rare in myeloma but can be seen as a MGUS or in B-cell lymphomas.

Testing for a paraprotein is normally performed when there is a concern over underlying multiple myeloma (e.g. unexplained bone pain, pathological fracture, anaemia, renal impairment, hypercalcaemia, increased total protein or decreased immunoglobulins) or to investigate an unexplained raised plasma viscosity or ESR. Testing is performed by protein electrophoresis of the serum and urine (present in ~98-99% cases myeloma). Non-directed screening is not recommended.

### Differential Diagnosis:

- *MGUS*- benign condition found in 3% of the population over the age of 50 years or 5% of those over 70 years. Risk of progression ~ 1-2% per year.
- *Multiple myeloma* – 25% have no serum paraprotein (BJP only) and 1% have no serum paraprotein or BJP.
- *Solitary plasmacytoma* – solitary area of plasma cell infiltration which can be present in the bone or as an extramedullary mass.
- *Amyloidosis*- rare disorder but poor outlook and often diagnosed late due to non-specific symptoms. More definite features include proteinuria, non-dilated cardiomyopathy, hepatomegaly and autonomic or peripheral neuropathy. Amyloid protein deposition in various organs including heart, liver, kidneys, gastrointestinal tract, peripheral nerves and spleen. Requires specialist investigation if suspected.
- *B-cell lymphoproliferative disorder*- usually presents with features such as lymphadenopathy, or systemic symptoms such as weight loss or drenching night sweats.
- Rare disorders such as osteosclerotic myeloma (POEMS syndrome) or heavy chain disease.

### Examination:

- Examine for lymphadenopathy and splenomegaly.

### Baseline investigations:

- FBC, plasma viscosity, U+E, calcium, immunoglobulins, urine BJP.
- Any symptoms of bone pain should be investigated by plain radiography.

Distinguishing MGUS from symptomatic multiple myeloma can largely be done with simple tests available in the community. This involves looking for signs of myeloma-related features such as anaemia, hypercalcaemia, renal impairment, bone lesions, symptomatic hyperviscosity or recurrent bacterial infections.

**Referral:**

- 2 week wait: symptoms or signs suggestive of a serious paraprotein-related disorder (e.g. myeloma, amyloidosis, plasmacytoma, lymphoma) rather than MGUS.
- Paraprotein with unexplained anaemia, renal impairment or hypercalcaemia.
- Lytic lesions or unexpected osteoporosis on plain radiography.
- IgG paraprotein >15 g/l, IgA or IgM paraprotein >10 g/l or any value of IgD or IgE paraprotein or Bence-Jones proteinuria >500 mg/ml. However we will happily review any patient with a newly discovered paraprotein, regardless of the absolute value.

URGENT REFERRAL if acute kidney injury, symptomatic hypercalcaemia (Ca >2.9 mmol/L), hyperviscosity or suspicion of spinal cord compression.

**Follow-up of MGUS:**

With time, MGUS may progress or the underlying condition may reveal itself, so long-term follow up is required. Progression is not just to multiple myeloma, but also to other paraprotein disorders (e.g. B-cell lymphoma, amyloidosis). The approximate yearly risk of disease progression is about a tenth of the paraprotein value in grams per litre (e.g. 10 g/l = about 1% per year) and the vast majority of patients will therefore die from unrelated conditions.

If patients are being monitored in the community, recommendations are for blood testing (FBC, U+E, LFT, calcium, immunoglobulins) initially 3-4 monthly, and up to 6-12 monthly if the paraprotein is stable.

Re-referral to haematology is advised if the paraprotein increases by >25% (absolute increase of >5 g/l), if there is unexplained anaemia, renal impairment or hypercalcaemia, or if there are any other concerning symptoms or signs of a paraprotein-related disorder.

**References:**

- Bird J, et al. [UK Myeloma Forum \(UKMF\) and Nordic Myeloma Study Group \(NMSG\): Guidelines for the investigation of newly detected M-proteins and the management of monoclonal gammopathy of undetermined significance \(MGUS\)](#). Br J Haematol 2009; 147: 22-24
- NICE Clinical Knowledge Summary. Multiple Myeloma. May 2016 <https://cks.nice.org.uk/multiple-myeloma>

## **Clinical Problem: Polyclonal immunoglobulins / hypergammaglobulinaemia**

Raised levels of immunoglobulins are a common finding as part of an acute phase response. If a distinct monoclonal protein is detected then refer to separate protocol for [paraprotein investigation](#).

### **Differential Diagnosis:**

The list of potential causes is vast and includes many infectious, inflammatory, malignant or autoimmune conditions.

Particularly high levels (IgG >30g/L) are most commonly associated with:

- *Liver disease* (~50%), inc. autoimmune hepatitis, viral hepatitis, primary biliary cirrhosis or alcohol induced liver disease
- *Connective tissue disease* (~25%), inc. Sjögren syndrome, rheumatoid arthritis or systemic lupus erythematosus
- *Solid tumour* (~5%)
- *Chronic infection* (~5%) including HIV
- *Haematological disorders* (<5%) such as lymphoma or leukaemia

### **Examination:**

Given the wide range of possible causes a thorough general examination should be performed. The finding of lymphadenopathy should raise concern over an underlying haematological malignancy, however, as shown above, these are not a common cause of a polyclonal gammopathy.

### **Baseline investigations:**

- It is difficult to give specific recommendations given the wide range of possible causes so investigations should be led by clinical features.
- If no obvious cause then as a baseline consider: FBC, U+E, LFT, calcium, CRP and autoimmune screen. Consider viral serology (hepatitis, HIV). Consider radiological imaging such as CXR and abdominal ultrasound.

### **Consider Haematology referral if:**

- Features suggesting haematological malignancy (laboratory results, signs or symptoms).
- If no obvious cause but systemically unwell then consider referral to General Medicine.

### **References:**

- Dispenzieri A, et al. Retrospective cohort study of 148 patients with polyclonal gammopathy. *Mayo Clinic Proc* 2001; 76: 476-487.

## **Clinical Problem: Raised erythrocyte sedimentation rate (ESR) or plasma viscosity (PV)**

A raised plasma viscosity (PV) or erythrocyte sedimentation rate (ESR) is a non-specific marker of underlying infection, inflammation, trauma or malignancy. Particularly high values are associated with multiple myeloma due to a serum paraprotein.

Note that the ESR, and less so the PV, are both affected by patient age and pregnancy. The ESR is also affected by the age of the sample (should be received within 4 hours) and by the haemoglobin value (can be falsely high if anaemia).

### **Differential diagnosis:**

- *Acute or chronic infection*, including tuberculosis or HIV.
- *Other inflammatory disorders*, e.g. inflammatory bowel disease, sarcoidosis.
- *Malignancy*- solid organ or haematological (esp. multiple myeloma).
- *Collagen disorders*, e.g. rheumatoid arthritis, SLE, temporal arteritis, vasculitis.

### **Baseline investigations:**

- Full history and examination to look for potential cause.
- If no obvious explanation then screen for multiple myeloma: FBC, U+E, serum calcium, serum immunoglobulins and paraprotein. Universal container of morning urine for Bence-Jones protein. Plain x-ray if bone pain.

Note that polyclonal raised immunoglobulins can be seen with an underlying inflammatory condition, but do not suggest multiple myeloma (see separate protocol for [polyclonal hypergammaglobulinaemia](#)).

- Consider occult infection, inflammation or malignancy. 'Routine' investigations such as CXR, autoimmune screen and urinalysis are often performed however investigations should be led by the clinical history.

### **Referral**

Haematology referral if:

- Features suggesting haematological malignancy / multiple myeloma (laboratory results, signs or symptoms).
- Monoclonal band / Bence-Jones protein or immunoparesis (reduction in uninvolved immunoglobulins). See [paraprotein investigation](#).
- Hyperviscosity symptoms – e.g. headaches, visual disturbance / retinal haemorrhages, breathlessness (often only seen if PV >4 cp).

Unexplained persistent raised PV without the above features may warrant referral to General Medicine.

## Clinical Problem: Lymphadenopathy

Palpable lymph nodes are most commonly noted in the neck, axillae or groin. The most common cause will be inflamed lymph nodes in response to a local infection, however if no obvious inflammatory cause is present or if nodes are persistent then other causes should also be considered. Concerning features include unexplained fever, night sweats, shortness of breath, pruritus, weight loss or alcohol-induced lymph node pain.

### Differential diagnosis:

- *Infection*: bacterial, viral, parasitic or fungal. Often tender. Can be acute or chronic e.g. tuberculosis, HIV.
- *Local skin disease*
- *Haematological malignancy*, esp. lymphoma or leukaemia
- *Metastatic solid tumour* e.g. Virchow's node in left supraclavicular fossa from lung or gastrointestinal malignancy
- Others: collagen disorder (SLE, RA), sarcoidosis, Kikushi disease and other rarer causes.

### Investigation:

- FBC (urgent <48 hours), blood film and inflammatory markers.
- Viral serology, if appropriate (e.g. EBV, CMV, toxoplasma, HIV)
- NICE guidelines also recommend as urgent chest x-ray with persistent cervical or supraclavicular lymphadenopathy.

### Examination:

- Look for local cause, e.g. infection, skin disorder.
- Examine for cervical, supraclavicular, axillary and inguinal lymph nodes.
- Palpate abdomen for hepatomegaly or splenomegaly.

### Referral:

- Features suggesting haematological malignancy may include drenching night sweats, fever, shortness of breath, weight loss (>10% within 6 months), cytopenias, generalised itch, alcohol-induced nodal pain (rare but associated with Hodgkin lymphoma) or hepato-splenomegaly.
- If suspicion of haematological malignancy then should be referred (2WW) to Haematology, however a node biopsy is almost always required and a more direct referral route is initially to ENT (localised neck lump) or the general surgeons (widespread nodes or localised nodes non-cervical nodes).
- An exception is if there is a peripheral blood lymphocytosis, in which case flow cytometry of peripheral blood lymphocytes may give a diagnosis without need for a biopsy (see separate protocol for investigation of [lymphocytosis](#)).

### References:

- NICE. [Suspected cancer: recognition and referral](#). June 2015
- NICE Clinical Knowledge Summary. Neck lump (January 2016) <https://cks.nice.org.uk/neck-lump>
- NICE Clinical Knowledge Summary. Haematological Cancers - Recognition and Referral (November 2015). <https://cks.nice.org.uk/haematological-cancers-recognition-and-referral>

## Clinical Problem: Splenomegaly

Splenomegaly may be detected due to local symptoms, such as left upper quadrant discomfort or early satiety, but more commonly it is an incidental finding on radiological imaging.

An enlarged spleen is >12-13cm length, although with mild splenomegaly (up to approximately 14cm) and no associated systemic symptoms we often find no underlying cause.

### Differential Diagnosis:

- *Liver disease with portal hypertension*
- *Haematological* (red cell destruction) - acquired haemolytic anaemia, red cell membrane disorder or **haemoglobinopathy**.
- *Haematological* (malignancy) – related to **myeloproliferative disorder, lymphoma or leukaemia** (may be related to systemic symptoms such as weight loss or fevers/drenching night sweats).
- *Autoimmune disease* – such as rheumatoid arthritis or systemic lupus.
- *Infection* – bacterial (e.g. endocarditis, tuberculosis), viral (e.g. HIV, EBV, CMV, hepatitis) or protozoal (e.g. tuberculosis, **malaria, leishmaniasis, schistosomiasis**).
- *Rare causes*, e.g. sarcoidosis, amyloidosis or storage disorders such as **Gaucher disease**.

Massive splenomegaly (>20cm) is only seen with the causes shown in **bold**.

### Examination:

Depends on suspected cause but include basic observations, stigmata of endocarditis, hepatomegaly / signs of liver disease and lymphadenopathy.

### Baseline investigations:

- Full blood count, blood film, reticulocytes, U+E, LFT, LDH, immunoglobulins, Direct Coombs test. Check HIV serology.
- Other testing depending on suspected cause, e.g. haemoglobinopathy screen, autoimmune screen, infection serology / cultures, serum ACE, etc.

### Referral:

Haematology referral (NICE suggest 2WW, especially if concern over malignancy – night sweats, fever, shortness of breath, itch or, weight loss):

- Suspected haematological disorder – red cell disorder or malignancy.
- Unexplained splenomegaly but systemic symptoms or clinical concern.
- Unexplained splenomegaly >14cm in size.

If systemically well, no obvious cause and only borderline splenomegaly then suggest repeat US scan in 4-6 months to look for evidence of further enlargement.

### References:

- NICE. [Suspected cancer: recognition and referral](#). June 2015
- NICE Clinical Knowledge Summary. Haematological Cancers - Recognition and Referral (November 2015). <https://cks.nice.org.uk/haematological-cancers-recognition-and-referral>
-

## Antibiotic prophylaxis and vaccination following splenectomy

Patients without a functioning spleen are at increased risk of severe life-threatening infection but this risk can be reduced by education, vaccination and antibacterial prophylaxis.

Patients may have had their spleen removed surgically or have poor splenic function from a variety of conditions (e.g. sickle cell disease, amyloidosis, tumour infiltration, chronic GVHD, splenic irradiation, coeliac disease, inflammatory bowel disease).

The lack of splenic function may be obvious (e.g. post splenectomy or congenital asplenia) or may be assumed from Howell-Jolly bodies on a blood film (specific but not completely sensitive). The radiological finding of a small spleen does not always indicate poor function so a blood film should also be examined.

The risk of severe infection comes from encapsulated bacteria (pneumococcus, haemophilus, meningococcus) as well as more unusual infections such as malaria, babesia (tick borne infection mainly seen in north-eastern USA and southern Europe) and capnocytophaga (dog or cat bites).

### Patient Education

- Patients should be aware that they have an increased risk of severe infection.
- They should know about the need for vaccination and antibacterial prophylaxis.
- They should know what actions to take if they suspect infection. They may wish to wear a Medic Alert bracelet and should carry a card with written information about their condition, relevant clinical details and contact telephone details.
- They should be aware of the risks from animal bites, mosquito bites and from tick bites. Travel advice should include appropriate malaria chemoprophylaxis and strategies to reduce mosquito bites.

### Vaccination (age 5 and above) *[for younger patients see details in BCSH guideline, referenced]*

Vaccines should preferably be given at least 2 weeks before splenectomy (or at least two weeks post-splenectomy if not done previously). Patients on a short-course of chemotherapy or immunosuppressants may get a better response if vaccines are given at least 3 months after completion.

#### *Pre-splenectomy:*

- Pneumococcal polysaccharide vaccine: Pneumovax-23 0.5ml i.m. or s.c.
- Combined haemophilus B and meningococcus C vaccine: Menitorix 0.5ml i.m.
- Meningitis B vaccine: Bexsaro 0.5ml i.m.

#### *Eight weeks later:*

- Conjugate meningococcus A, C, W125 and Y vaccine: Menveo 0.5ml i.m.
- Meningitis B vaccine: Bexsaro 0.5ml i.m.

*Long-term:*

- Annual influenza vaccine
- Booster pneumococcal vaccine – 5 yearly
- Booster meningococcal vaccine if travelling to high-risk area (e.g. sub-Saharan Africa or Saudi Arabia). Country specific recommendations at [www.travax.nhs.uk](http://www.travax.nhs.uk)

*\*JCUH pharmacy currently do not routinely stock Menveo however it should be available through the patients general practice. Otherwise a more narrow spectrum meningococcal vaccine can be given.*

### **Antibacterial prophylaxis**

Antibacterial prophylaxis should be offered to all patients. It should be actively encouraged in patients with high risk features, however patients without these features may decide not to use regular antibiotics after appropriate counselling. Regardless, all patients should have a supply of antibiotics at home to take in an emergency.

*High risk features:*

- Age less than 16 years or age greater than 50 years
- Inadequate response to pneumococcal vaccination
- Previous invasive pneumococcal infection
- Underlying haematological malignancy or immunosuppression

Patients are also at a higher risk in the immediate post-operative period and for the first two years after splenectomy.

Antibacterial prophylaxis should be with penicillin V 250mg b.d. (or a macrolide if penicillin allergic).

### **References:**

- Davies JM, Lewis MPN et al. [Review of guidelines for the prevention and treatment of infection in patients with an absent or dysfunctional spleen: Prepared on behalf of the British Committee for Standards in Haematology by a Working Party of the Haemato-Oncology Task Force.](#) Br J Haematol 2011; 155: 308-317
- Public Health England. [Immunisation against infectious disease.](#) Update 02/09/2014.

## Clinical Problem: Sweats

We are often referred patients with 'sweats' for investigation of possible haematological malignancy. Although it is true that haematological malignancy can cause *drenching* night sweats, it is unusual for this to be the sole presenting feature. Other systemic features include unexplained weight loss (>10% body weight within 6 months), lymphadenopathy / splenomegaly or an abnormal full blood count.

### Differential Diagnosis:

- *Infection* – acute or chronic infections including tuberculosis, endocarditis and HIV infection.
- *Endocrine* – menopause, hyperthyroid, diabetes mellitus, pheochromocytoma, carcinoid syndrome or acromegaly.
- *Neurological* – Parkinsonism or autonomic neuropathy.
- *Malignancy* – Haematological malignancy including myeloproliferative disorders or lymphoma.
- *Medication* – in particular antidepressants (SSRIs, especially venlafaxine, and tricyclics), hormonal agents (e.g. tamoxifen, GnRH agonists) or NSAIDs.
- Withdrawal from alcohol or other illicit substances.

### Examination:

- Examine for lymphadenopathy, splenomegaly or hepatomegaly.

### Baseline investigations:

- Full blood count, blood film, basic biochemistry, LDH, immunoglobulins, TSH, glucose.
- Other tests depending on suspected cause, e.g. chest x-ray, hormone levels, withdrawal of suspected medications.

### Referral:

- NICE recommends considering a 2 week wait referral for patients having night sweats with unexplained splenomegaly or lymphadenopathy
- Other speciality referrals depending on suspected cause.

### References:

- Paisley AN, Buckler HM. [Investigating secondary hyperhidrosis](#). Br Med J 2010; 341: 4475.
- NICE. [Suspected cancer: recognition and referral](#). June 2015
- NICE Clinical Knowledge Summary. Haematological Cancers - Recognition and Referral (November 2015). <https://cks.nice.org.uk/haematological-cancers-recognition-and-referral>

## Clinical Problem - Easy bruising (also relevant for other bleeding symptoms)

Easy bruising is a relatively common symptom, especially in females or the elderly, although it is uncommon to find a significant underlying disorder. In a survey of 500 healthy individuals, 18% felt they bruised easily.

Easy bruising as a solitary symptom is unlikely to be significant, however suspicion is higher when accompanied by other haemorrhagic problems (e.g. epistaxis, gum bleeding, menorrhagia or bleeding at previous childbirth, surgery or dental extraction) or if there is a family history of a bleeding disorder.

A life-long history of a bleeding tendency may point towards an inherited disorder while a more recent history suggests an acquired cause.

### Differential diagnosis:

Acquired:

- *Trauma*, often arms & legs but can be atypical if non-accidental injury
- *Low platelets*, especially if  $<50 \times 10^9/l$ , multiple causes – [see above](#).
- *Abnormal platelet function* – e.g. uraemia, liver disease, NSAIDs, clopidogrel, anti-depressants (SSRI), anticonvulsants.
- *Abnormal coagulation* – e.g. liver disease, anticoagulants.
- *Vascular defect* – e.g. amyloid, corticosteroids, scurvy, senile purpura (usually dorsum of hands and extensor surfaces of forearms).
- *Autoimmune disease* – e.g. thyroid disease.

Inherited:

- *Vascular disorders*, all rare and generally associated with other features, e.g. Marfan syndrome, Ehlers-Danlos syndrome, hereditary haemorrhagic telangiectasia.
- *Inherited platelet disorders*, rare and generally mild.
- *Inherited coagulation factor deficiency*, e.g. all rare except Von Willebrand disease. Haemophilia A & B can present in later life if mild (a third have no family history).

Easy bruising or other haemorrhagic symptoms are very subjective. An anxious patient may worry about minor symptoms while a patient with a true bleeding disorder may disregard significant symptoms as being normal for their experience. Patients with bleeding disorders often have multiple haemorrhagic symptoms or symptoms which have required medical intervention.

**Examination** should look for current bruises (size, distribution), petechiae (very suggestive of vascular or platelet disorder) or mucosal bleeding. Also check for lymphadenopathy, hepatomegaly or splenomegaly.

**Baseline investigations** therefore include: FBC (NICE suggest urgent <48hr), blood film, coagulation screen (inc. PT, APTT and fibrinogen), U+E, liver function and thyroid function. NICE also suggest urine dipstick for haematuria.

**Referral:** Patients with significant or multiple symptoms or abnormal baseline investigations should also be referred to Haematology as further investigation is best performed in this setting.

### References:

NICE Clinical Knowledge Summary. Bruising (March 2016).

<https://cks.nice.org.uk/bruising>

## Clinical Problem: Abnormal Coagulation

Blood clotting tests should be performed when there is a suspicion of an underlying bleeding disorder. Screening in the absence of symptoms rarely detects significant abnormalities but may detect insignificant problems prompting unnecessary referral and further testing. It should be remembered that abnormal clotting tests do not always indicate a bleeding disorder and that not all bleeding disorders produce abnormal clotting results.

Isolated prolonged prothrombin time (PT) or PT > APTT	Isolated prolonged activated thromboplastin time (APTT) or APTT > PT	Prolonged PT and APTT
Warfarin, rivaroxaban, apixaban, edoxaban  Vitamin K deficiency  Liver disease (early)  Inherited – FVII deficiency	Lupus anticoagulant  Heparin  Dabigatran  Inherited – FXII, FXI, FIX or FVIII deficiency  <b>Often seen as a mild unexplained abnormality</b>	Liver disease (late)  Disseminated intravascular coagulation (DIC)  Hypo- / dys-fibrinogenaemia (inherited or acquired)  Inherited – FX, FV or prothrombin deficiency.

### Examination:

- Evidence of bleeding disorder (e.g. unexplained bruising or bleeding).
- Features of liver disease

### Baseline investigations:

- FBC, PT, APTT, mixing studies, thrombin time, fibrinogen, U+E, LFT

Any further relevant coagulation tests may be performed automatically by the laboratory if enough sample is available and if the clinical details suggest bleeding symptoms.

If unexplained consistently prolonged PT then repeat sample after trial dose of 10mg vitamin K.

If unexplained consistently prolonged APTT then initially screen for lupus anticoagulant, especially if mixing studies do not show complete correction.

If unexplained consistently prolonged APTT with complete correction on mixing then consider coagulation factor assays, especially if personal or family history of abnormal bleeding.

### Referral:

- Haematology referral if suspicion of inherited or acquired bleeding disorder regardless of clotting test results (see protocol on [easy bruising](#) for more specific details).
- Not for haematology referral if a non-haematological cause is apparent, e.g. liver disease.

## Clinical Problem: Thrombophilia

Individuals who have an increased risk of developing a pathological thrombosis are described as having a thrombophilia. There are both inherited and acquired causes of thrombophilia. Low-risk thrombophilias such as the factor V Leiden mutation or the prothrombin G20210A mutation are common in the population (each ~3-5% population) and are weak risk factors for thrombosis. Rarer thrombophilias such as deficiencies of antithrombin, protein C or protein S (each ~0.1-0.2% population) are stronger risk factors for thrombosis.

Requests for thrombophilia testing are most commonly encountered following an episode of venous thrombosis or if there is a family history of thrombosis or thrombophilia. Thrombophilia testing should only be performed if it will influence clinical management and should not be performed indiscriminately in these situations. Inherited thrombophilia testing is also not recommended following arterial thrombosis (except in the rare case of arterial embolism via a patent foramen ovale or arterial thrombosis in children).

It should be noted that results are unlikely to influence the intensity or duration of anticoagulation following VTE and are typically unrelated to the risk of recurrence.

### Indications for screening:

#### *Venous thrombosis*

- Patients with an unprovoked VTE where a first degree relative has also had VTE. This is the *only* patient group suggested by NICE CG144, however opinions and guidelines vary. Also consider testing in:
  - Patients who develop unprovoked venous thromboembolism at <40 years old.
  - Patients who have recurrent unprovoked VTE, although likely to need long term anticoagulation regardless of result.
  - Patients with unprovoked VTE at an unusual site, e.g. upper limb (unless related to central line), intra-abdominal thrombosis or cerebral vein.

#### *Family screening* (NOT recommended by NICE CG144)

- First degree family members of patients with a known thrombophilia, where knowledge of a thrombophilic defect may be useful (e.g. daughters of child-bearing age).
- First degree family members of a patient with early or recurrent VTE, where knowledge of a thrombophilic defect may be useful (e.g. daughters of child-bearing age)<sup>\*\*\*</sup>

#### *Obstetrics*

- Testing before commencing COC/HRT is generally **not** recommended, as even if a first degree family member is known to have a thrombosis, a negative result does not exclude an increased risk of venous thrombosis. This is especially true where it is not known if a thrombophilia is present in the index case.

<sup>\*\*\*</sup>It is important to recognise that thrombophilia testing is not comprehensive and only includes the most common and serious abnormalities. A negative screen does not exclude a familial predisposition to thrombosis.

Testing cannot be performed at the time of an acute thrombotic event or while a patient is on anticoagulation. The majority of patients will require samples to be taken 4–6 weeks after the completion of anticoagulation.

**Referral:**

- Consider haematology referral if patient meets criteria for testing as mentioned above. We would prefer to perform the counselling and testing ourselves (samples need to arrive at the laboratory as soon as possible) rather than see patients following testing performed in the community.

**References:**

- Baglin T, et al. [Clinical guidelines for testing of hereditary thrombophilia](#). Br J Haematol 2010; 149: 209-220
- NICE. [Venous thromboembolic diseases: diagnosis, management and thrombophilia testing. CG144](#). Update Nov 2015.

## Clinical Problem: VTE Prevention in travellers

Although the risk of venous thrombosis is approximately doubled by long-haul travel (>6 hours), the absolute risk remains low for most people. The risk is increased regardless of the mode of travel, and it is uncertain if air travel confers any additional risk. Long-haul flights are not advised for 3 months following hip or knee replacement.

### *Low risk:*

No previous DVT / PE (unless still on anticoagulant therapy)

No recent surgery (<4 weeks)

No moderate or high risk factors

### *Moderate risk:*

Previous DVT / PE and not on anticoagulation

Surgery (anaesthesia >30 minutes) in past 4-8 weeks

Pregnant or post-partum

Clinically evident cardiovascular disease (e.g. recent MI or symptomatic CCF)

Recent major acute illness (e.g. pneumonia)

Taking OCP or HRT

Obese (BMI >30 kg/m<sup>2</sup>)

Varicose veins with phlebitis

Family history of VTE (1<sup>st</sup> degree relative)

Polycythaemia

Lower limb fracture in plaster (can it be changed to a split cast to reduce risk?)

### *High risk:*

Surgery (anaesthesia >30 minutes) within past 4 weeks

Known thrombophilia

Cancer – awaiting treatment or on active treatment

## **Management:**

*Low risk* – no specific measures. General advice includes avoiding prolonged immobility (recline seat when possible, loose clothing, calf / leg exercises when sitting, short walks or breaks when possible), maintaining a normal fluid intake and avoiding alcohol or sedatives.

*Moderate risk* – General advice plus class 1 compression stockings or propriety flight socks (unless ABPI <0.5).

*High risk* – As per moderate risk but also consider LMWH (would need prophylactic dose for outbound and return flights, instruction on use & storage, sharps bin, and letter for customs / security).

Class 1 stockings should provide 14-17mmHg compression at the ankle. Not available on prescription for sole use of VTE prevention (class 1 can be prescribed for varicose veins). Propriety flight socks widely available.

Aspirin (either commencing aspirin or increasing the dose if already using) is not recommended for VTE prevention during travel.

## **References:**

NICE Clinical Knowledge Summary. DVT Prevention for Travellers (March 2013).

<https://cks.nice.org.uk/dvt-prevention-for-travellers>