MCV < 80 f/l
Ferrous Sulphate 200mg PO TDS already started on discharge from the Cardiac Day Case

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Ferritin < 30 μg/l

Ferritin 30 μg/l – 100 μg/l

Ferritin > 100 μg/l

Iron deficiency (IDA)

- **Coeliac screen**
- Assess for source of bleeding (incl urine dipstick)

CRP > 30

TSAT < 20%

(functional iron deficiency)

CRP Normal/ elevated

TSAT > 20%

GP to contact the patient to stop the oral iron

Non iron deficient microcytic anaemia or functional iron deficiency
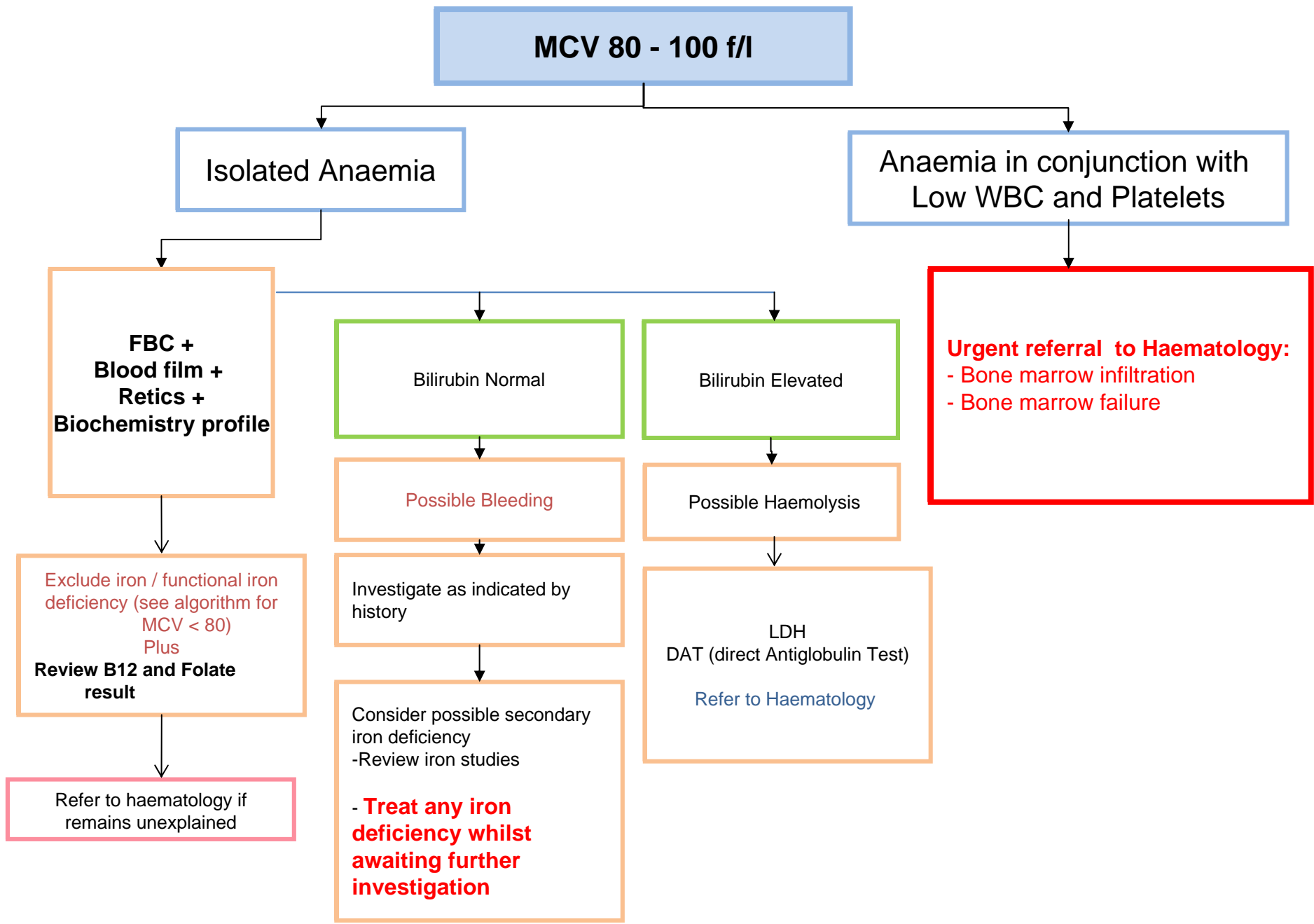
Consideration of:
1. **Non-haematological cause**
- **Acute/ chronic inflammation**
- **Chronic infection**
- **Malignancy**
- **Liver disease**
- **Renal failure**

2. Haematological cause
- **Haemoglobinopathy eg: Thalassaemia trait**
- **Sideroblastic anaemia**

Refer as appropriate

Refer to gastroenterology (unless overt non-GI blood loss)
- Adult male
- Postmenopausal female
- Premenopausal female with GI symptoms
Please highlight in the referral that the patient is on the BVH pre surgery anaemia optimisation pathway

Aae1   **? remove if unexplained?**
Any authorised employee, 22/04/2014

MCV 80 - 100 f/l

Isolated Anaemia

**FBC +
Blood film +
Retics +
Biochemistry profile**

Exclude iron / functional iron deficiency (see algorithm for MCV < 80)
Plus
Review B12 and Folate result

Refer to haematology if remains unexplained

Bilirubin Normal

Possible Bleeding

Investigate as indicated by history

Consider possible secondary iron deficiency
-Review iron studies

- Treat any iron deficiency whilst awaiting further investigation
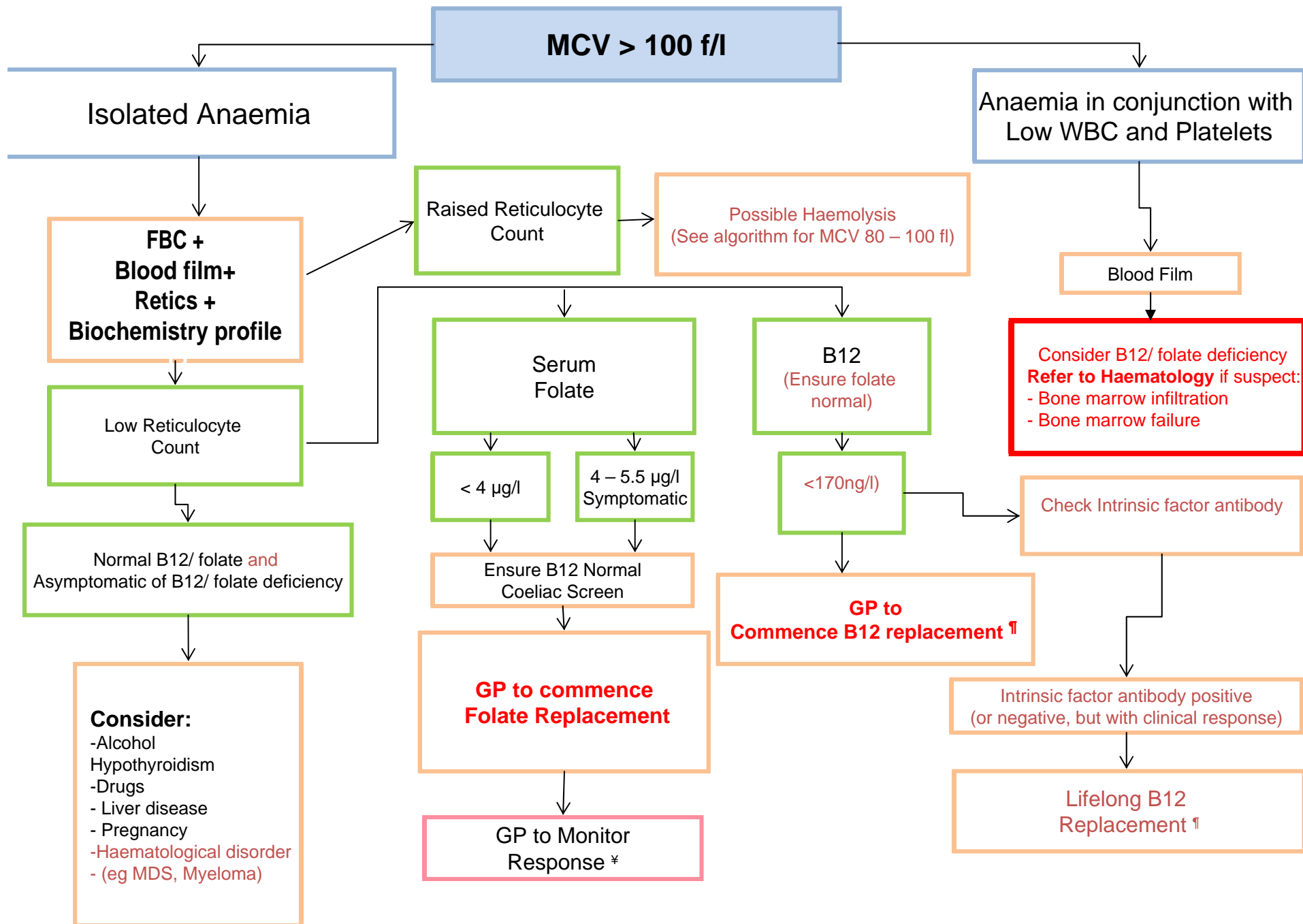
Bilirubin Elevated

Possible Haemolysis

LDH
DAT (direct Antiglobulin Test)

Refer to Haematology

Anaemia in conjunction with Low WBC and Platelets

**Urgent referral to Haematology:
- Bone marrow infiltration
- Bone marrow failure**

MCV > 100 f/l

Isolated Anaemia

Anaemia in conjunction with Low WBC and Platelets

**FBC +
Blood film+
Retics +
Biochemistry profile**

Raised Reticulocyte Count

Possible Haemolysis
(See algorithm for MCV 80 – 100 fl)

Blood Film

Consider B12/ folate deficiency
Refer to Haematology if suspect:
- Bone marrow infiltration
- Bone marrow failure

Low Reticulocyte Count

Serum Folate

B12
(Ensure folate normal)

Normal B12/ folate and
Asymptomatic of B12/ folate deficiency

< 4 µg/l

4 – 5.5 µg/l Symptomatic

<170ng/l)

Check Intrinsic factor antibody

Ensure B12 Normal
Coeliac Screen

**GP to
Commence B12 replacement ¶**

Consider:
-Alcohol
Hypothyroidism
-Drugs
- Liver disease
- Pregnancy
-Haematological disorder
- (eg MDS, Myeloma)

**GP to commence
Folate Replacement**

Intrinsic factor antibody positive
(or negative, but with clinical response)

GP to Monitor
Response ¥

Lifelong B12
Replacement ¶

¥ See attached sheet "folate deficiency"   ¶ See attached sheet "Vitamin B12 deficiency"

Macrocytic anaemia with megaloblastic changes (macrocytic red cells and hypersegmented neutrophils seen on blood film)

Folate Deficiency

Causes of folate deficiency

1. Dietary
- Deficient diet
- Alcoholism
2. Malabsorption (e.g. Coeliac disease, tropical sprue, IBD, jejunal resection)
3. Excess requirements
- Physiological – Pregnancy, prematurity/ infancy
- Malignancy
- Haemolytic anaemia (inc Sickle Cell)
- Inflammation (e.g. TB, Crohn's disease)
4. Medication
- Methotrexate
- Sulfalazine
- Cholestyramine
- Anticonvulsants
5. Metabolic
6. Excess urinary excretion (e.g. Congestive heart failure, chronic dialysis, acute liver damage)

Treatment

1. Ensure vitamin B12 levels normal/ replaced
- To avoid development of subacute combined degeneration of the cord
2. Dietary advice
3. Folic acid 5mg daily for 4 months
- May require prolonged treatment if cause persists

Further investigation and referral
- Generally, dictated by the likely aetiology
- If history consistent with malabsorption – screen for coeliac disease (anti-endomyseal or anti-transglutaminase antibodies)
- Haematology referral/advice – aetiology uncertain, suspected haematological malignancy
- Gastroenterology referral – Suspected malabsorption, positive coeliac screen
- Consider referral to dietician

Monitoring response to folate replacement

1. FBC and reticulocytes 10 days following initiation of treatment
- Improvement in Hb
- Reticulocyte count above normal level
2. Repeat FBC at 8 weeks and completion of treatment to ensure normalisation of Hb

Macrocytic anaemia with megaloblastic changes (macrocytic red cells and hypersegmented neutrophils seen on blood film)

Vitamin B12 Deficiency

Causes of vitamin B12 deficiency

1. Gastric – (e.g. gastrectomy, atrophic gastritis, *H. pylori*)
2. Intestinal – (e.g. resection, ,malabsorption, ileal Crohn's, chronic tropical sprue)
3. Dietary
4. Drugs – (e.g. colchicine, neomycinm anticonvulsants, PPIs/ H2 receptor antagonists)
5. Pernicious Anaemia

Apparent vitamin B12 deficiency
1. Metformin – Check intrinsic factor antibodies if B12 levels reduced. Treat if positive or strong clinical suspicion of deficiency (with yearly B12 monitoring)
2. Pregnancy – Levels drop 30% by T3. Only treat if strong clinical suspicion of deficiency. Check Holotranscobalomin, if available.
3. Oral contraceptives/ HRT – Only investigate further / treat if B12 < 150 µg/l (110 pmol/l) or strong clinical suspicion of deficiency

Treatment
1. Patients with neurological symptoms
- Do not delay treatment
- Initially: 1000mcg hydroxycobalamin (IM) every 2nd day until no further improvement
- Maintenance: 1000mcg hydroxycobalamin (IM) every 2 months for life
2. Patients with no neurological symptoms
- Initially: 1000mcg hydroxycobalamin (IM) 3x/ week for 2 weeks
- Maintenance:
    - Non-dietary cause: 1000mcg hydroxycobalamin (IM) every 3 months for life
    - Dietary: 1000mcg hydroxycobalamin (IM) twice per year or 50 – 150mcg cyanocobalamin (PO) daily (vegans/ proven dietary deficiency)
        - If dietary deficiency corrected, can be stopped once B12 levels normalised
3. Dietary advice

Secondary investigations for B12 deficiency
 - Plasma total homocysteine (tHcy), Methyl Malonic acid (MMA), Halotranscobalamin
- Availability variable and limited (discuss with local lab)

Further investigation and referral
- Generally, dictated by the likely aetiology
- Haematology referral/ advice – Pregnancy, Neurological symptoms, aetiology uncertain, suspected haematological malignancy
- Gastroenterology referral – Suspected malabsorption (other than pernicious anaemia), Pernicious anaemia *with* GI symptoms
- Consider referral to dietician

Monitoring response to vitamin B12 replacement

1. FBC and reticulocytes 10 days following initiation of treatment
- Expect, improvement in Hb and Reticulocyte count above normal level
- Check folate if no improvement
2. Repeat FBC at 8 weeks and completion of treatment to ensure normalisation of Hb
3. Haematology advice - if persistent symptoms despite replacement