Anaemia - assessment and classification

Background information

Updates to this care map

Key recommendations of the care map

Abbreviations used in this care map

Key recommendations of the care map

Aetiology

Clinical presentation

Initial assessment and investigations

Further investigation and diagnosis

Assessment of chronic disease

Acute anaemia

Anaemia of chronic disease

Other causes - treat accordingly

Go to Megaloblastic anaemias - management

Go to Common haemoglobinopathies

Go to chronic anaemias

Iron deficiency anaemia

Normal MCV

Low MCV

Determine underlying cause

High MCV

Low iron, normal/high TIBC and normal/low ferritin

Low iron, any TIBC, and normal/high ferritin

Iron overload and sideroblasts on peripheral film

Low vitamin B12 and elevated methylmalonate

Low folate and normal methylmalonate

Other causes of anaemia

Request iron profile and ferritin

Teardrop or target cells, splenomegaly and family history

Condsider referral to haematology

Low Hb on CBC

Go to autoimmune and aplastic anaemia

Go to chronic anaemias

Sideroblastic anaemia

Low iron, normal/low TIBC, and normal/high ferritin

Anaemia of chronic disease

Go to Megaloblastic anaemias - management

Autoimmune haemolytic anaemias

Go to other causes of anaemia

Bone marrow failure

Myelodysplastic disorders

Other causes of anaemia

Stale iron and s...
1 Background information

Quick info:
The purpose of this care map is to define the appropriate diagnosis and management of common anaemias presenting in adults. The objective is to improve the appropriateness of investigation, prescribing, and referral of patients presenting to provider organisations in Qatar. It is intended that the care map will be used primarily by physicians in primary care and outpatient settings.

Scope of the care map
Aspects of care covered in this care map include the following:
• Diagnosis and management of common anaemias in adults, including:
  • Iron deficiency anaemia.
  • Thalassaemia.
  • Sickle cell haemoglobinopathies.
  • Aplastic anaemia.
  • Anaemia of chronic disease.
  • Autoimmune haemolytic anaemias.
  • Megaloblastic anaemias.
Aspects of care not covered in this care map are:
• Anaemia in children.
• Sideroblastic anaemias.
• Non-autoimmune haemolytic anaemias.
• Detailed discussion of myelodysplastic disorders.

Definitions
Anaemia is not a diagnosis and requires a full diagnostic evaluation aimed at establishing the underlying cause [1].
Anaemia is defined as [2]:
• A condition in which the quality and/or quantity of circulating red blood cells are below normal.
• Hb levels [3]:
  • <13 g/dL (130 g/L) in male patients.
  • <12 g/dL (120 g/L) in female patients.
  • <11 g/dL (110 g/L) in pregnant women.
Anaemia is typically classified on a morphological basis according to the size of erythrocytes, into the following categories [1]:
• Microcytic (MCV: <80 fL).
• Normocytic (MCV: 80-100 fL).
• Macrocytic (MCV: >100 fL).

Epidemiology
Definitive data on the incidence and prevalence of anaemia in Qatar is not presently available. However, the 2011 WHO-estimated percentages of women with anaemia were as follows [16]:
• Non-pregnant women aged 15-49 years:
  • Hb <12 g/dL (<120 g/L): 28
  • Hb <8 g/dL (<80 g/L): 0.7%.
• Pregnant women aged 15-49 years:
  • Hb <11 g/dL (<110 g/L): 28%.
  • Hb <7 g/dL (<70 g/L): 0.2%.
Approximately 50% of anaemia in women world-wide is due to iron deficiency. In parts of the Eastern Mediterranean and Middle East, inherited anaemias (including sickle cell traits, G6PD deficiency and thalassaemias) are important causes of anaemia to consider [16].

References:
Please see the care map's Provenance.

2 Aetiology
Quick info:

**Microcytic anaemia**

Causes of microcytic anaemia include:

- Iron deficiency anaemia, resulting from [4-8]:
  - Chronic blood loss including:
    - Menorrhagia.
    - Epistaxis.
    - Haematuria.
    - Upper GI bleeding.
    - Lower GI bleeding.
  - Dietary deficiency.
  - Malabsorption of iron, e.g.:
    - Gastric surgery, coeliac disease, or extensive bowel resection.
  - Increased demand for iron, e.g.:
    - Pregnancy.
- Anaemia of chronic disease, resulting from [1]:
  - Chronic infection, e.g.:
    - Tuberculosis.
  - Chronic inflammation, including:
    - Rheumatoid arthritis
    - Systemic lupus erythematosus.
    - Polymyalgia rheumatica.
    - Malignancy.
- Sideroblastic anaemia, resulting from [1]:
  - Inherited disease:
    - X-linked inheritance.
  - Acquired disease:
    - Myelodysplasia.
    - Myeloproliferative disorders.
    - Myeloid leukaemia.
    - Rheumatoid arthritis.
    - Malignancy.
    - Drugs e.g., isoniazid.
    - Alcohol misuse.
    - Lead toxicity.
  - Thalassaemias [1].

**Normocytic anaemia**

Normocytic anaemia may result from [9]:

- Increased red blood cell loss or destruction.
- Decreased red cell production.

Causes of normocytic anaemia due to increased RBC loss or destruction include [1,9-12]:

- Acute blood loss.
- Hypersplenism.
- Haemolytic disorders:
  - Congenital conditions:
    - Haemoglobinopathies, e.g. homozygous sickle cell disease (haemoglobin SS disease); heterozygous sickle haemoglobin C disease (haemoglobin SC disease).
    - Disorders of red cell membranes, e.g. hereditary spherocytosis, hereditary elliptocytosis.
• Red blood cell enzyme deficiencies, e.g. glucose-6-phosphate dehydrogenase deficiency, pyruvate kinase deficiency.
• Mechanical haemolysis:
  • Macrovascular disorders, e.g. history of heart valve replacement or valvular disorder.
  • Microangiopathic disorders, e.g. disseminated intravascular coagulopathy, haemolytic-uraemic syndrome, thrombotic thrombocytopenic purpura.
• Autoimmune haemolytic anaemias:
  • Warm-reactive anaemias.
  • Cold-reactive anaemias.
  • Drug-induced anaemias.
• Paroxysmal nocturnal haemoglobinuria.
• Drugs that can cause haemolysis, e.g.:
  • Penicillin.
  • Methyldopa.
  • Cephalosporins.
  • Erythromycin.
  • Procaainamide.
  • Paracetamol.
• Infections.
• Blood transfusion reactions.

Causes of normocytic anaemia due to decreased red cell production may include [1,2,9,10,13,14]:
• Primary causes:
  • Marrow aplasia or hypoplasia.
  • Pure red blood cell aplasia.
  • Myelopathies.
  • Myeloproliferative disorders.
• Secondary causes:
  • Chronic renal failure.
  • Liver disease.
  • Endocrine deficiencies.
  • Inflammatory disorders.
  • Infections.
  • Cancer.
  • HIV.
• Drugs:
  • Antiepileptic medications.
  • Azathioprine.
  • Sulphonamides.
  • Isoniazid.
  • Procaainamide.
  • Penicillamine.
  • Chloramphenicol.
• Expansion of plasma volume:
  • Pregnancy.
  • Over-hydration.

**Macrocytic anaemia**

Common causes of macrocytic anaemia include [1,9,14,15]:
• Vitamin B$_{12}$ or folate deficiency.
• Excess alcohol intake – may cause macrocytosis more commonly due to toxic effect of alcohol than folate deficiency secondary to alcoholism.
• Pregnancy and the neonatal period.
• Drugs, e.g.:
  • Azathioprine.
  • Hydroxycarbamide.
  • Methotrexate.
  • Anticonvulsants (phenytoin, valproic acid).
  • Trimethoprim/sulfamethoxazole.
  • Metformin.
  • Cholestyramine.
  • Zidovudine.
  • Stavudine.
  • Lamivudine.
• Hypothyroidism – modest increase in mean cell volume may be seen.
• Liver disease (non-alcoholic).
• Haemolysis.
Rarer causes include [1,13,15]:
  • Myeloma.
  • Myelofibrosis.
  • Myelodysplastic syndrome.
  • Bone marrow failure syndromes, e.g. aplastic anaemia, red cell aplasia.
  • Primary bone marrow dysplasias including myelodysplasia and myeloproliferative disorders.

References:
Please see the care map's Provenance.

3 Updates to this care map

Quick info:
Date of publication: 19-Mar-2017
Please see the care map's Provenance for additional information on references, contributors, and the editorial approach.

4 Key recommendations of the care map – 1

Quick info:
The key recommendations of this care map are:

**Diagnosis:**
• Anaemia is not a diagnosis and requires a full diagnostic evaluation aimed at establishing the underlying cause [1].
• Approximately 50% of anaemia in women world-wide is due to iron deficiency.
• In parts of the Eastern Mediterranean and Middle East, inherited anaemias (including sickle cell traits, G6PD deficiency and thalassaemias) are important causes of anaemia to consider [16].

**Initial investigation:**
• CBC with differential [1,3,26].
• Consider performing a peripheral blood film if [1,4,26][R-GDG]:
  • Anaemia is confirmed on CBC and;
  • Iron deficiency anaemia is not suspected.

**IDA:**
• Perform further investigations relevant to the underlying cause and according to the clinical scenario for confirmed IDA (see the Aetiology care point).

• Unless significant overt non-GI loss is present, all postmenopausal women and male patients with confirmed IDA should be referred for an upper and lower GI investigation [4][L2, RGA1].

• The underlying cause of the IDA should be investigated and documented appropriately [R-GDG].

• In patients with a treatable underlying cause continue iron supplementation until the Hb concentration and red cell indices are normal [4,7]:
  • Continue oral iron for 3 further months until iron stores are replenished and then stop.
  • Monitor Hb levels and red cell indices every 3 months for one year [4,7][L3, RGA2].
  • Recheck Hb levels once more after another year has passed and if symptoms recur.
  • If Hb or red cell indices drop below normal, give additional iron.

• Further investigations are only indicated if Hb and red cell levels have not normalised despite treatment.

**IDA in pregnancy:**

• Women with Hb <11 g/dL (<110 g/L) before 12 weeks' gestation or <10.5 g/dL (<105 g/L) beyond 12 weeks gestation, are anaemic and should be offered a trial of therapeutic iron replacement – unless they are known to have a haemoglobinopathy [8].

• Severely anaemic pregnant patients, i.e. Hb levels <7 g/dL (<70 g/L) patients should be referred urgently to an obstetric specialist [8].

**Thalassaemia:**

• In thalassaemia minor: The Hb electrophoresis may be normal, if a combined iron deficiency is present. Therefore, it is important to treat any suspected iron deficiency, prior to testing for thalassaemia [R-GDG].

• Refer all patients to a haematologist if thalassaemia intermedia or major are suspected or confirmed [R-GDG].

**Sickle cell haemoglobinopathies:**

• When sickling crises are suspected, prompt and efficient treatment remains vital and primarily consists of [31]:
  • Pain relief.
  • Oxygenation.
  • Hydration.
  • Treatment of bacterial infection or the underlying cause.

• Transfusion may be considered after discussion with a haematologist.

**Aplastic anaemia (AA):**

• AA is defined as a pancytopenia (Hb <10 g/dL, platelet count <50 x10^9/L, neutrophil count <1.5 x 10^9/L), with a hypocellular bone marrow in the absence of an abnormal infiltrate or marrow fibrosis [33].

• See 'Autoimmune and aplastic anaemia - management' for the initial investigations to be performed in cases of suspected AA.

• Refer all patients with suspected AA to a haematologist after exclusion of other common causes of anaemia [R-GDG].

**Myelodysplastic syndrome (MDS):**

• MDS may be indicated by the following [35,36]:
  • Usually an elderly patient with macrocytic anaemia.
  • Features of dysplasia on peripheral smear.
  • Unexplained cytopenia.

• If MDS is suspected refer all cases to a haematologist for further management [R-GDG].

**ACD:**

• ACD is a common cause of anaemia and is frequently associated with chronic infection or inflammatory disease states [1,9,37].

• Patients with ACD should be referred to an appropriate specialist for management of the underlying cause [R-GDG].

References:

Please see the care map's Provenance.

5 Key recommendations of the care map – 2
Autoimmune haemolytic anaemias:
- Autoimmune haemolytic anaemias are typically indicated by [1,12]:
  - High MCV.
  - Reticulocytosis.
  - NB: MCV and reticulocytes may be normal in the early stages of the disease.
  - Positive Coomb’s test (DAT).
- If autoimmune haemolytic anaemia is suspected on initial investigations refer to a haematologist for further management [R-GDG].
- All patients with a suspected acute haemolytic crisis should however be referred to the emergency department [R-GDG].

Vitamin $B_{12}$ deficiency:
- Vitamin $B_{12}$ deficiency is indicated by [1,38]:
  - Very high MCV.
  - Low serum vitamin $B_{12}$ level.
  - Elevated methylmalonate level.
  - May be associated with pancytopenia.
- Investigations of vitamin $B_{12}$ deficiency include [38,41]:
  - Testing for serum anti-intrinsic factor antibodies [38,41][L2, RGA1].
    - A positive test is associated with a high likelihood of pernicious anaemia.
  - See 'Autoimmune and aplastic anaemia' for treatment and maintenance therapy in vitamin $B_{12}$ deficiency.
- Consider seeking specialist advice from an appropriate specialist if:
  - A myelodysplastic syndrome is suspected [R-GDG].
  - A second opinion is required [R-GDG].
  - Malabsorption of vitamin $B_{12}$, other than pernicious anaemia, is suspected [38].
  - Patient has pernicious anaemia and gastrointestinal symptoms [38].
  - Vitamin $B_{12}$ deficiency is thought to be due to poor diet [38].

Folate deficiency:
- Folate deficiency is commonly seen in [6,8,10,20,38,39]:
  - Patients with poor dietary intake of natural sources of folate (e.g. legumes, chickpeas, and brown rice).
  - Certain gastrointestinal conditions (coeliac disease, inflammatory bowel disease).
  - Blood disorders (e.g. haemolytic anaemia).
  - Pregnancy.
    - Folate requirement is increased during pregnancy.
    - Chronic alcoholism.
    - Use of anticonvulsant drugs or trimethoprim.
  - See 'Megaloblastic anaemia - management' for the management of folate deficiency.

References:
Please see the care map's Provenance.

6 Abbreviations used in this care map

Quick info:
The abbreviations used in this care map are as follows:

AA
Aplastic anaemia

ACD
Anaemia of chronic disease

ANA
Anti-nuclear antibodies
Anaemia - assessment and classification

CBC
Complete blood count
CMV
Cytomegalovirus
DAT
Direct antiglobulin test
DsDNA
Double-stranded DNA
EBV
Epstein-Barr virus
ESA
Erythropoiesis-stimulating agents
G6PD
Glucose-6-phosphate dehydrogenase
GI
Gastrointestinal
GORD
Gastro-oesophageal reflux disease
Hb
Haemoglobin
HbA
Normal adult haemoglobin
HbAS
Heterozygous combination of the normal haemoglobin gene with the sickle cell gene
HbS
Sickle haemoglobin
HbSB
Heterozygous combination of abnormal haemoglobin genes with the sickle cell gene
HbSS
Homozygous sickle cell gene
HIV
Human immunodeficiency virus
HRT
Hormone replacement therapy
IDA
Iron deficiency anaemia
IM
Intramuscular route
LDH
Lactate dehydrogenase
MCH
Mean corpuscular haemoglobin
MCHC
Mean corpuscular haemoglobin concentration
MCV
Mean corpuscular volume
MDS
Myelodysplastic syndrome
NSAIDS
Non-steroidal anti-inflammatory drugs
PPI
Proton pump inhibitor
PR


This care map was published by Qatar. A printed version of this document is not controlled so may not be up-to-date with the latest clinical information.
Anaemia - assessment and classification

Per rectum

**RBC**
Red blood cell

**TIBC**
Total iron-binding capacity

References:
Please see the care map's Provenance.

7 Clinical presentation

Quick info:
Presenting features are common to most anaemias [2,8,11,13,17,18]:

- **Common symptoms:**
  - Fatigue, lethargy, weakness.
  - Shortness of breath.
  - Palpitations.
  - Headache.
  - Lightheadedness or dizziness.
- **Less common symptoms:**
  - Tinnitus.
  - Taste disturbance.
  - Pruritus.
  - Pica: Abnormal cravings for non-food items, e.g. ice, sand, paint, or starch.
  - Sore tongue.
  - Brittle nails.
  - Hair loss.
  - Restless legs syndrome.

References:
Please see the care map's Provenance.

8 Initial assessment and investigations

Quick info:
Consider asking about the following:

- **Dietary history [4,7,19,20][L1]:**
  - Vegans and vegetarians or patients on other restricted diets.
  - Alcohol intake.
- **GI ulceration/bleeding [1,4,7,21,22][L1]:**
  - NSAIDs, aspirin, corticosteroid or anticoagulant use.
  - Dyspepsia, GORD, history of peptic ulcer.
  - Haemorrhoids.
  - Passing blood PR.
  - Passing black motions, confirm they are not taking iron tablets.
- **Personal or family history of:**
  - Telangiectasia or angiodyplasia.
  - Coagulopathies.
  - Inflammatory bowel disease.
- **Malabsorption [4,6][L2]:**
• History of GI diseases, gastrectomy, or bariatric surgery.
• Symptoms including: indigestion, diarrhoea, steatorrhoea, abdominal distention.

Menstrual history [1,13]:
• Frequency, duration, estimated blood loss.
• Obstetric history.
• Post-menopausal bleeding.

Haematuria [5,7].
• Epistaxis [4,7].
• Parasitic infestations [23].

Consider performing a general physical examination, as directed by the clinical presentation. Features to examine for include [1,4,7,18,24,25,26]:

• Assess pallor of conjunctivae, mucus membranes and palms.
• Assess for:
  • Stomatitis and cheilitis.
  • Atrophic glossitis.
  • Nail changes – brittle, ridged koilonychia.
• Look for cutaneous signs such as jaundice, petechiae, bruising, telangiectasia, or rare causes of GI blood loss, e.g. Peutz-Jeghers syndrome and hereditary haemorrhagic telangiectasia [1,4,11,27].

• Cardiovascular examination:
  • Signs of heart failure, infective endocarditis, prosthetic heart valves, tachycardia, postural hypotension.
• Neurological examination:
  • Signs of peripheral neuropathy or cognitive impairment.
• Rectal examination:
  • PR bleeding, melaena, rectal masses, haemorrhoids.

Initial investigations for anaemia [1,3,26]:
• CBC with differential.

Consider performing a peripheral blood film if [1,4,26][R-GDG]:
• Anaemia is confirmed on CBC; and
• Iron deficiency anaemia is not suspected.

References:
Please see the care map's Provenance.

9 Low Hb on CBC

Quick info:
Assess MCV and consider a peripheral blood film [1,4,26].

References:
Please see the care map's Provenance.

14 Further investigation and diagnosis

Quick info:
Further investigation required, possible causes include [1,4,26]:
• Acute blood loss.
• Haemolytic anaemia.
• Bone marrow suppression.
• Combined nutritional deficiency.
• Anaemia of chronic disease.
References:
Please see the care map's Provenance.

17 Myelodysplastic disorders

Quick info:
MDS may be indicated by the following [35,36]:
• Usually an elderly patient with macrocytic anaemia.
• Features of dysplasia on peripheral smear.
• Unexplained cytopenia.

NB: If MDS is suspected refer all cases to a haematologist for further management [R-GDG].

References:
Please see the care map's Provenance.

18 Other causes of anaemia

Quick info:
Other causes of anaemia include [1,4,26]:
• Drug induced.
• Hypothyroidism.
• Haemolysis.
• Liver disease.
• Increased reticulocytes.

References:
Please see the care map's Provenance.

24 Consider referral to haematology

Quick info:
Determine underlying cause and consider referral to haematology [1,4,26].

References:
Please see the care map's Provenance.

25 Megaloblastic anaemia

Quick info:
If suspected, the following investigations should be performed in addition to a CBC and a peripheral smear [15]:
• Reticulocyte count.
• LDH.
• Methylmalonate level.
• Homocysteine.
• Vitamin $B_{12}$.
• Red cell folate level.

References:
Please see the care map's Provenance.

26 Anaemia of chronic disease
Anaemia - assessment and classification

Quick info:
Anaemia of chronic disease is indicated by [1,9,37]:
- Low or normal MCV.
- Low serum iron.
- Normal or low TIBC.
- Normal or elevated serum ferritin.

References:
Please see the care map's Provenance.

27 Autoimmune haemolytic anaemias

Quick info:
Autoimmune haemolytic anaemias are typically indicated by [1,12]:
- High MCV.
- Reticulocytosis.
- NB: MCV and reticulocytes may be normal in the early stages of the disease.
- Positive Coomb's test DAT.

Other findings that may be present include [1,12]:
- Splenomegaly.
- Abnormal red cells on peripheral smear:
  - Spherocytosis.
  - Polychromasia.
  - Anisopikilocytosis.
- Raised LDH.
- Raised indirect bilirubin with normal ALT.
- Low haptoglobin.

References:
Please see the care map's Provenance.

28 Other causes - treat accordingly

Quick info:
Other possible causes include [1,4,26]:
- Acute blood loss.
- Bone marrow suppression.
- Combined nutritional deficiency.

References:
Please see the care map's Provenance.

29 Iron deficiency anaemia

Quick info:
Iron deficiency anaemia is indicated by [1,4,7,13,26]:
- Low MCV (<80 fl).
- Low MCH and low MCHC.
- Microcytic hypochromic red cells on peripheral blood film.
- Low serum iron.
- High TIBC.
• Low ferritin.
References:
Please see the care map's Provenance.

33 Vitamin B12 deficiency

Quick info:
Vitamin B\textsubscript{12} deficiency is indicated by [1,38]:
• Very high MCV.
• Low serum vitamin B\textsubscript{12} level.
• Elevated methylmalonate level
• May be associated with pancytopenia.
References:
Please see the care map's Provenance.

34 Folate deficiency anaemia

Quick info:
Folate deficiency is indicated by [1,20,38]:
• Very high MCV.
• Low folate levels.
• Normal methylmalonate levels.
Folate deficiency is commonly seen in [6,8,10,20,38,39]:
• Patients with poor dietary intake of natural sources of folate (e.g. legumes, chickpeas, and brown rice).
• Certain gastrointestinal conditions (coeliac disease, inflammatory bowel disease).
• Blood disorders (e.g. haemolytic anaemia).
• Pregnancy:
  • Folate requirement is increased during pregnancy.
• Chronic alcoholism.
• Use of anticonvulsant drugs or trimethoprim.
References:
Please see the care map's Provenance.

35 Sideroblastic anaemia

Quick info:
NB: The care of sideroblastic anaemia is not within the scope of this care map.
References:
Please see the care map's Provenance.

36 Thalassemia

Quick info:
Thalassaemias are indicated by [1,4,7,26]:
• Low MCV (<80 fl).
• Teardrop red cells on peripheral blood film.
• Target cells.
• Splenomegaly may be present.
Positive family history may be present.

References:
Please see the care map's Provenance.
Overview

This guideline document has been developed and issued by the Ministry of Public Health of Qatar (MOPH), through a process which aligns with international best practice in guideline development and localisation. The guideline will be reviewed on a regular basis and updated to incorporate comments and feedback from stakeholders across Qatar.

Whilst the MOPH has sponsored the development of the care map, the MOPH has not influenced the specific recommendations made within it.

This care map was approved on 19 Mar 2017.

For information on changes in the last update, see the information point entitled 'Updates to this care map' on each page of the care map.

Editorial approach

This care map has been developed and issued by the Ministry of Public Health of Qatar (MOPH), through a process which aligns with international best practice in guideline development and localisation. The care map will be reviewed on a regular basis and updated to incorporate comments and feedback from stakeholders across Qatar.

The editorial methodology, used to develop this care map, has involved the following critical steps:

- Extensive literature search for well reputed published evidence relating to the topic.
- Critical appraisal of the literature.
- Development of a draft summary guideline.
- Review of the summary guideline with a Guideline Development Group, comprised of practising physicians and subject matter experts from across provider organisations in Qatar.
- Independent review of the guideline by the Clinical Governance body appointed by the MOPH, from amongst stakeholder organisations across Qatar.

Explicit review of the care map by patient groups was not undertaken.

Whilst the MOPH has sponsored the development of the care map, the MOPH has not influenced the specific recommendations made within it.

Sources of evidence

The professional literature published in the English language has been systematically queried using specially developed, customised, and tested search strings. Search strategies are developed to allow efficient yet comprehensive analysis of relevant publications for a given topic and to maximise retrieval of articles with certain desired characteristics pertinent to a guideline.

For each guideline, all retrieved publications have been individually reviewed by a clinical editor and assessed in terms of quality, utility, and relevance. Preference is given to publications that:

1. Are designed with rigorous scientific methodology.
2. Are published in higher-quality journals (i.e. journals that are read and cited most often within their field).
3. Address an aspect of specific importance to the guideline in question.

Where included, the ‘goal length of stay’ stated within this guideline is supported by and validated through utilisation analysis of various international health insurance databases. The purpose of database analysis is to confirm the reasonability and clinical appropriateness of the goal, as an achievable benchmark for optimal duration of inpatient admission.

Evidence grading and recommendations

Recommendations made within this guideline are supported by evidence from the medical literature and where possible the most authoritative sources have been used in the development of this guideline. In order to provide insight into the evidence basis for each recommendation, the following evidence hierarchy has been used to grade the level of authoritativeness of the evidence used, where recommendations have been made within this guideline.

Where the recommendations of international guidelines have been adopted, the evidence grading is assigned to the underlying evidence used by the international guideline. Where more than one source has been cited, the evidence grading relates to the highest level of evidence cited:

- **Level 1 (L1):**
  - Meta-analyses.
  - Randomised controlled trials with meta-analysis.
  - Randomised controlled trials.
  - Systematic reviews.

- **Level 2 (L2):**
  - Observational studies, examples include:
    - Cohort studies with statistical adjustment for potential confounders.
    - Cohort studies without adjustment.
    - Case series with historical or literature controls.
    - Uncontrolled case series.
  - Statements in published articles or textbooks.

- **Level 3 (L3):**
  - Expert opinion.
  - Unpublished data, examples include:
    - Large database analyses.
    - Written protocols or outcomes reports from large practices.

In order to give additional insight into the reasoning underlying certain recommendations and the strength of recommendation, the following recommendation grading has been used, where recommendations are made:

- **Recommendation Grade A1 (RGA1):** Evidence demonstrates at least moderate certainty of at least moderate net benefit.
- **Recommendation Grade A2 (RGA2):** Evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care.
- **Recommendation Grade B (RGB):** Evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended.
- **Recommendation Grade C1 (RGC1):** Evidence demonstrates a lack of net benefit; additional research is recommended.
- **Recommendation Grade C2 (RGC2):** Evidence demonstrates potential harm that outweighs benefit; additional research is recommended.
- **Recommendation of the GDG (R-GDG):** Recommended best practice on the basis of the clinical experience of the Guideline Development Group members.
Anaemia

References

Anaemia


Guideline Development Group members

The following table lists members of the Guideline Development Group (GDG) nominated by their respective organisations and the Clinical Governance Group. The GDG members have reviewed and provided feedback on the draft guideline relating to the topic. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Reham Afifi</td>
<td>Consultant Internal Medicine</td>
<td>Al Ahli Hospital</td>
</tr>
<tr>
<td>Dr Majd Riadh Akbik</td>
<td>Senior Specialist Family Medicine</td>
<td>Primary Health Care Corp</td>
</tr>
<tr>
<td>Dr Ibrahim Ahmad A.H. Al Hijji</td>
<td>Senior Consultant Haematologist, Head of Clinical Haematology, NCCCR</td>
<td>Hamad Medical Corporation</td>
</tr>
<tr>
<td>Dr Abdulhak A. Sadalla Alnuemi</td>
<td>Consultant Internal Medicine</td>
<td>Al Emadi Hospital</td>
</tr>
<tr>
<td>Dr Ahmad Al Sabbagh</td>
<td>Senior Consultant Haematopathologist, Director of the NCCCR laboratory</td>
<td>Hamad Medical Corporation</td>
</tr>
<tr>
<td>Dr Ahmed M. Hussein Babiker</td>
<td>Head of Registration Section &amp; Clinical Pharmacist</td>
<td>Dept of Pharmacy and Drug Control, MOPH¹</td>
</tr>
<tr>
<td>Dr Azza Abu Elrish</td>
<td>Consultant Family Medicine</td>
<td>Qatar Petroleum</td>
</tr>
<tr>
<td>Dr Ameena Ibrahim Fakhroo</td>
<td>Consultant Family Medicine</td>
<td>Primary Health Care Corp</td>
</tr>
<tr>
<td>Dr Abdul Hakeem Hamza</td>
<td>Consultant Family Medicine</td>
<td>Primary Health Care Corp</td>
</tr>
<tr>
<td>Dr Naseer Ahmad Masoodi</td>
<td>Assistant Chair/Senior Consultant Ambulatory General Internal Medicine</td>
<td>Hamad Medical Corporation</td>
</tr>
<tr>
<td>Dr Tariq Sheikh</td>
<td>Consultant Internal Medicine</td>
<td>Al Ahli Hospital</td>
</tr>
<tr>
<td>Dr Ruba Taha</td>
<td>Consultant Haematologist</td>
<td>Hamad Medical Corporation</td>
</tr>
</tbody>
</table>

Responsibilities of healthcare professionals

This care map has been issued by the MOPH to define how care should be provided in Qatar. It is based upon a comprehensive assessment of the evidence as well as its applicability to the national context of Qatar. Healthcare professionals are expected to take this guidance into account when exercising their clinical judgement in the care of patients presenting to them.

The guidance does not override individual professional responsibility to take decisions which are appropriate to the circumstances of the patient concerned. Such decisions should be made in consultation with the patient, their guardians, or carers and should consider the individual risks and benefits of any intervention that is contemplated in the patient’s care.

¹ Dr Ahmed Babiker attended the MOPH in his capacity as a Clinical Pharmacist and advisor on the availability of medications in Qatar.
Anaemia

Acknowledgements

The following individuals are recognised for their contribution to the successful implementation of the National Guidelines project.

Healthcare Quality Management and Patient Safety Department of the MOPH:

- Ms Huda Amer Al-Katheeri, Acting Director & Project Executive.
- Dr Alanoud Saleh Alfehaidi, Guideline & Standardisation Specialist.
- Dr Ilham Omer Siddig, Guideline & Standardisation Specialist.
- Ms Maricel Balagtas Garcia, Guideline Standardisation Coordinator.
- Dr Rasmeh Ali Salameh Al Huneiti, Research Training & Education Specialist.
- Mr Mohammad Jaran, Risk Management Coordinator.

Hearst Health International:

- Dr Mehmood Syed, Middle East Clinical Director & Project Clinical Lead.
- Mr Michael Redmond, Clinical Programmes Manager.
- Ms Deepti Mehta, Editorial and Research Manager.
- Ms Rebecca Cox, Editorial and Research Team Leader.
- Ms Shuchita Deo, Lead Editorial Assistant.
- Ms Siobhan Miller, Editorial Assistant.
- Ms Fatima Rahman, Editorial Assistant.
- Ms Tahmida Zaman, Editorial Assistant.
- Ms Emma Ramstead, Information Specialist.
- Dr Amy Glossop, Clinical Editor.
- Dr Zara Quail, Clinical Editor.
- Dr Sabine Fonderson, Clinical Editor.