An Example of a Laboratory Testing Algorithm for Anemia
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NOTE: If Hemoglobin is greater than or equal to 13 gm/dL, no further evaluation is required. However, if the ferritin level is known to be less than 100 ng/dL or the transferrin saturation is known to be less than 20% with a ferritin less than 300 ng/dL, then consider iron therapy.

NOTE: If Hemoglobin is less than 13 gm/dL, the patient should be evaluated according to this testing algorithm. Additional laboratory studies may be ordered by the patient blood management provider. There may be a recommendation to postpone surgery with a referral back to the primary care provider or hematologist for further evaluation.

To enter the testing algorithm for anemia:

If Hgb is less than 13 gm/dL AND MCV is less than or equal to 105 fl: see Flow Diagram A.

If Hgb is less than 13 gm/dL AND MCV is greater than 105 fl: see Flow Diagram B.
Flow Diagram A
MCV Less than or equal to 105

Hgb is less than 13 gm/dl

IF TSat greater than 20% and ferritin greater than 100 ng/ml and MCV less than 80 consider thalassemia or hemoglobinopathy

MCV less than or equal to 105

Reticulocyte count, RetHe, iron, iron binding capacity, ferritin, creatinine

Add testing for vitamin B12 if MCV greater than or equal to 90

If vitamin B12 is less than or equal to 300 pg/ml, follow algorithm for B12 deficiency and MCV greater than 105 * (see next page)

Ferritin less than 100 ng/ml?

YES

Consistent with iron deficiency. Consider possible sources of chronic blood loss, malabsorption, dietary deficiency, medications.

TSat less than 20% or RetHe less than 29 pg?

NO

Consistent with iron deficient erythropoiesis, anemia of inflammation (functional iron deficiency) or combined anemia of inflammation and iron deficiency

If pre-operative anemia management, treat with intravenous iron

Consider obtaining CRP and soluble Transferrin Receptor (sTfR) for further evaluation

Are sTfR results available and index greater than 2 or less than 1

sTfR/log Ferritin greater than 2

Consistent with anemia of inflammation and iron deficiency. Consider evaluation for possible sources of chronic blood loss

sTfR/log Ferritin less than 1

Consistent with isolated anemia of inflammation

sTfR/log Ferritin is inconclusive between 1 and 2; use clinical judgment regarding need to evaluate patient for sources of chronic blood loss

Consider addition of ESA to intravenous iron

Consistent with chronic kidney disease.

Consider Hematology Consult to rule out plasma cell dyscrasia or other primary marrow process if clinically indicated

Possible anemia of chronic kidney disease.

Creatine greater than 1.3 mg/dl or eGFR less than 60 ml/min?

Yes

No

Consider renal consult. Consider EPO level

If pre-operative anemia management, treat with ESA and intravenous iron

Negative for primary marrow pathology?

* = refer to Diagram B

"This algorithm is intended to provide general information to healthcare professionals and other interested persons. Professionals seeking additional information, and individuals seeking personal medical advice should obtain it from a qualified physician."
Flow Diagram B
MCV greater than 105

Hgb is less than 13 gm/dl

MCV greater than 105

Is folate less than 3.3 ng/ml

Yes
Folate Deficiency

No

Reticulocyte Count, RetHe, Vitamin B12, Folate, Creatinine

* Vitamin B12 less than or equal to 300

Yes

If RetHe less than 29 pg, consider additional iron studies (see flow diagram A)

No

Reticulocyte count elevated


Is there associated Leucopenia, thrombocytopenia or ovalocytosis?

Yes

Consider hematology consult to rule out myelodysplasia MDS

No

Creatinine greater than 1.3 mg/dL or eGFR less than 60 ml/min

Yes

Consider hematology consult to rule out plasma cell dysplasia or other primary marrow process if clinically indicated.

No

Obtain Serum Methylmalonic acid

Yes

Vitamin B12 Deficiency. Treat with Vitamin B12.

No

MMA greater than 0.4 Mmol/L

Yes

Vitamin B12 Deficiency. Treat with Vitamin B12.

No

See evaluation for Vitamin B12 greater than 300 pg/ml

* begin here if patient with MCV less than 105 have vitamin B12 less than or equal to 300 pg/ml

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