Assess for the presence of risk factors, both major and minor or contributing:

- Congenital pernicious anemia
- Pancreatic insufficiency can produce Cbl deficiency
- Zollinger-Ellison syndrome
- Disorders of the ileum cause Cbl deficiency due to loss of the ileal receptors for the Cbl-IF complex
- Many drugs impair Cbl uptake in the ileum
- Increased incidence of autoimmune disorders and thyroid disease
- Gastric disorders that cause Cbl deficiency are gastrectomy, gastric stapling, and bypass procedures for obesity and extensive infiltrative disease of the gastric mucosa
- Strict vegetarians and, most particularly, people who do not consume eggs, milk, or meat can develop Cbl deficiency

Source: http://www.emedicine.com/Med/topic1799.htm#section~Followup

Are Risk Factors Present?

YES

Monitor for presence of signs/symptoms:
- Insidious anemia
- Weight loss
- Painful and beefy red tongue
- Nonspecific gastrointestinal symptoms are not unusual
- Paresthesias, weakness, clumsiness, and an unsteady gait.
- Urinary retention and impaired micturition may occur because of spinal cord damage

NO

Initiate client education for Health Seeking Behaviors to identify:
- Consume adequate amounts of B12 in eggs, milk and red meat
- Teach risk factors for B12 deficiency & encourage physician consultation if manifested
- Teach s/s of pernicious anemia and B12 deficiency

Are positive findings present?

YES

Initiate the plan of care for a Risk for Ineffective Therapeutic Regimen management:
- Instruct client about course and progression of illness and the requirements for lifelong replacement therapy
- Explain s/s of ineffective replacement therapy; anemia, leukopenia, thrombocytopenia, CNS demyelination
- Teach client about diagnostic testing; generally identified through serum B12 studies, CBC, and possibly bone marrow aspiration
- Explain that folic acid can mask symptoms of B12 deficiency and may require monitoring
- Review B12 replacement strategies; PO doses, injection schedule or nasal spray therapy.
- Because an increased familial incidence of pernicious anemia exists, family members should be aware that they are at greater risk of developing this disease and should seek medical attention promptly if they develop anemia or mental and neurological symptoms.
- Review periodic monitoring and evaluation

NO

Are Risk Factors Present?

POSSIBLY UNSTABLE

Follow collaborative plan of care for PC: diverticulitis
See plan of care for anemia
Potential Complication: CNS demyelination secondary to pernicious anemia

**ASSESS s/s of CNS demyelination secondary to pernicious anemia**

**Hematologic**
- Megaloblastic anemia
- Pancytopenia (leukopenia, thrombocytopenia)

**Neurologic**
- Paresthesias, Peripheral neuropathy, Combined systems disease (demyelination of dorsal columns and corticospinal tract)
- Bladder and Bowel symptoms

**Psychiatric**
- Irritability, personality change, Mild memory impairment, dementia, Depression, Psychosis

**Cardiovascular**
- Possible increased risk of myocardial infarction and stroke

Source: [http://www.aafp.org/afp/20030301/979.html](http://www.aafp.org/afp/20030301/979.html)

**Assess for contributing factors:**
- Impaired absorption vs. inadequate intake of Vitamin B12 and folic acid
- s/p gastric surgery, chronic gastritis, gastric cancer, PUD, medications that reduce gastric acid pH impeding B12 breakdown, disorders affecting the terminal ileum, Crohn’s disease

**Monitor for presence of CNS demyelination**
- Monitor CBC for macrocytic anemia with a mild leukopenia and thrombocytopenia
- Monitor for low serum Cbl in patients with pernicious anemia
- Monitor for low serum folic acid which can mask Vit B12 deficiency leading to increased neurological damage
- Monitor for intrinsic factor antibodies
- Monitor Schilling test result that measures Cbl absorption
- Monitor the rise of methylmalonic acid and homocysteine levels
- Monitor results of bone marrow aspiration

If neurologic deterioration is noted, prepare client for MRI and monitor results

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**DO**

**Perform nursing actions to correct B12 deficiency**

- Administer B12 replacement as prescribed and instruct client in the importance of continuing lifelong replacement
- Transfuse client with packed RBCs to keep Hemoglobin between 8-10
- If neurologic deficits are noted, provide supportive care; be aware that neurological deficits will most likely be permanent
- If thrombocytopenia is present, initiate bleeding precautions
- If leukopenia is present, initiate infection protection

**CALL**

- Call for new onset neurological deficits, worsening macrocytic anemia, leukopenia, thrombocytopenia, decreased serum B12
- If present, provide supportive care, if hemodynamically unstable, initiate IV access, shock management & call ready response team and MD

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**OUTCOMES/BENCHMARKS:**

- No neurological deficits
- MCV and Hgb within normal limits; no leukopenia, thrombocytopenia
- Serum B12 > 400 pg/ml
- Serum folic acid within normal limits