



STANDARD GUIDELINE: Vitamin B12 Injection

Program Area: Home Care

Section: Nursing

Reference Number: CLI.5412.SG.003

Approved by: Regional Lead – Community & Continuing Care

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Revised yyyy/mmm/dd

PURPOSE:

To provide guidelines for the administration of Vitamin B12 in the Community for Home Care Clients.

Application:

- Requires Signed Health Care Provider orders.
- Requires Signed Initiation of Vitamin B12 Intramuscular Injection Form (CLI.5412.SG.003.FORM.01) completed in full by the Health Care Provider.
- Activity by Skill Level: RN/LPN/RPN.
- Does not require specialized training.

Possible Nursing Diagnosis:

- Imbalanced nutrition: Less than Body requirements related to insufficient intake, lack of knowledge of food sources of Vitamin B12.
- Deficient Knowledge regarding Vitamin B12 injection and food sources related to lack of exposure, lack of experience.

Preamble

Vitamin B12 (Cobalamin) is a water-soluble vitamin, however it differs from other water-soluble vitamins in that it is not excreted quickly in the urine, but rather it accumulates and is stored in the liver, kidney and other body tissues. Because of this, Vitamin B12 deficiency may not manifest itself in a person until several years later. The classic vitamin B12 deficiency is pernicious anemia, which is characterized by large immature red blood cells.

Vitamin B12 functions as a methyl donor and works with folic acid in the synthesis of DNA and red blood cells. It is important in maintaining the health of the insulation sheath (i.e. myelin sheath) that surrounds nerve cells.

Two enzymatic reactions are known to be dependent on Vitamin B12. In the first reaction, methylmalonic acid is converted to succinyl –CoA using Vitamin B12 as a co-factor. Vitamin B12 deficiency can lead to increased levels of methylmalonic acid. In the second reaction, homocysteine is converted to methionine by using Vitamin B12 and folic acid as co-factors. Vitamin B12 or Folic Acid deficiency can lead to increased homocysteine levels.

The stomach's acidic environment helps to facilitate the breakdown of Vitamin B12 that is found in food. Intrinsic factor (which is released from the parietal cells) in the stomach, binds to vitamin B12 in the duodenum. The Intrinsic factor complex aids in the absorption in the terminal ileum.

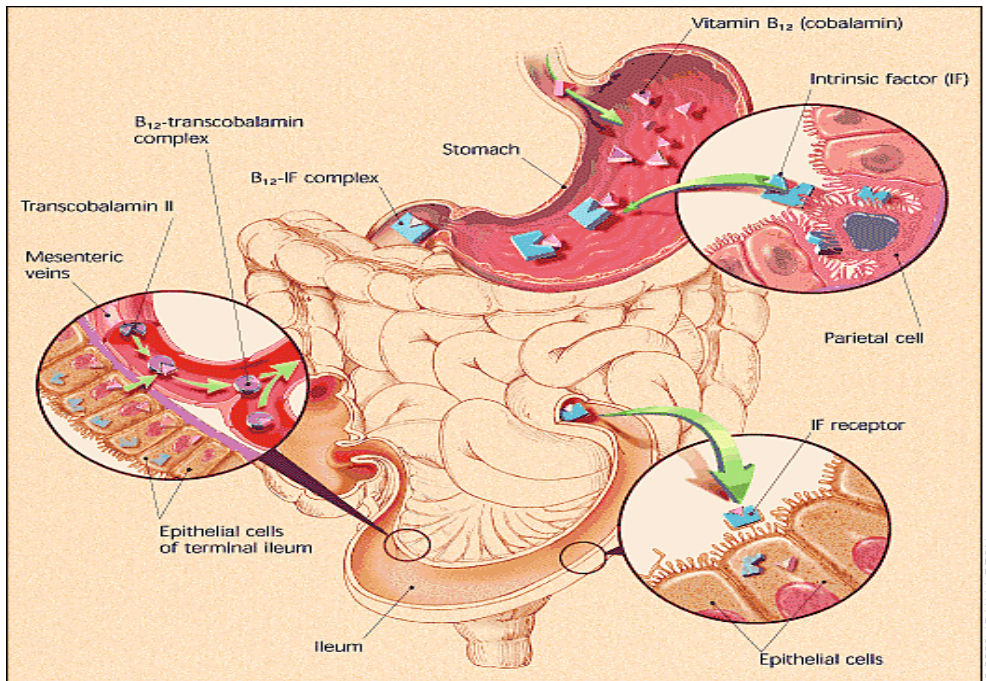


Figure 1: Absorption and Transport of Vitamin B12

There is also evidence of a second alternative system of absorption that is independent of intrinsic factor or even an intact terminal ileum. The second pathway involves Vitamin B12 binding to transcobalamin II and is transported throughout the body. Approximately 1% of large oral dose Vitamin B12 is absorbed by this second pathway and is important in relation to oral replacement therapy.

Oral Versus Parenteral Therapy

Since as early as 1968, Oral Vitamin B12 has been shown to have an efficacy equal to that of injections in the treatment of Vitamin B12 deficiency states. Although the majority of dietary Vitamin B12 is absorbed in the terminal ileum via the intrinsic factor, evidence for the second pathway is mounting. Vitamin B12 is thought to be absorbed “en masse” in high doses.

Intramuscular injections have several drawbacks including:

- The injections are painful;
- Health care professionals are at risk for needle stick injuries and exposure to blood/body fluids;
- Administration of intramuscular injections is costly to the health care system as often clients/families are unable to be self-care; and
- Treatment schedules for the Intramuscular therapy vary from monthly to every three-month injection.

Although the daily requirement of Vitamin B12 is 2 micrograms (mcg) once daily, the initial oral replacement dose consists of 1,000 to 2,000 micrograms and maintenance dose of 1,000 micrograms per day. The high dose of oral Vitamin B12 is required because of the variable absorption of oral Vitamin B12 is doses of less than 500 micrograms.

Figure 2: Schedule for Vitamin B12 Therapy

Route of Administration	Initial Dosage	Maintenance Dosage
Oral	1,000 to 2,000 micrograms per day for one to two weeks	1,000 micrograms per day for life
Intramuscular (IM)	100 to 1,000 micrograms every day or every other day for one to two weeks	100 to 1,000 micrograms every one to three months

After the diagnosis of Vitamin B12 Deficiency is made and the Physician has initiated the treatment plan, follow up by the Physician is important in determining the client's response to the therapy regimen. In mild Vitamin B12 deficiency, it is recommended that serum Vitamin B12, homocysteine and methylmalonic acid levels be measured every two to three months after initiation of therapy. It is the responsibility of the prescribing Physician to ensure the follow up is scheduled. If the Home Care nurse is involved in the administration of the Vitamin B12, the Nurse must ensure communication be sent to the Physician and obtain the results for documentation on the client file.

IMPORTANT POINTS TO CONSIDER:

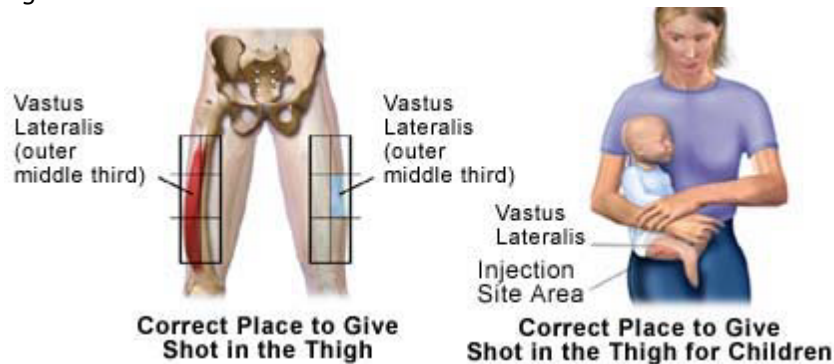
- Evidence based research supports the use of oral Vitamin B12 in the treatment/management of Vitamin B12 deficiency. Home Care Nurses no longer routinely administer Intramuscular Vitamin B12.
- For clients to receive intramuscular injections of Vitamin B12 in the community the Physician must complete the Initiation of Vitamin B12 Intramuscular Injection Form (CLI.5412.SG.003.FORM.01) in full and all of the outlined criteria must be met. The criteria include:
 - Client must have trialed the high dose Vitamin B12 and the trial did not produce the desired therapeutic outcome/effect.
 - The use of oral Vitamin B12 is contraindicated in the client based on the client's inability to take any medications via oral route.
 - The client is homebound, bedridden and is unable to get out to medical appointments at all.
- For new clients it is the responsibility of the Case Coordinator to fax the Physician the required document. The Case Coordinator must ensure the criteria are met.
- For existing clients, it is the responsibility of the Case Coordinator to fax the Physician the form to determine if the client can convert to a high dose oral Vitamin B12 therapy regimen.

PROCEDURE:

1. Review client file for documentation and Physician Orders.
2. Explain procedure to client and expected outcome.
3. Wash hands/perform routine practices.

4. Perform five rights of medication administration.
5. Prepare the medication in the selected syringe/needle.
6. Don Non-sterile gloves.
7. Select site for injection. Select a muscle that is soft when relaxed and firm when tensed, in a relaxed state there are no hardened masses palpable and firm palpation is not uncomfortable to the client. Avoid areas with complications such as abscesses, necrotic tissue, damaged nerves or bones. The site of choice for children under the age of 36 months is the Vastus lateralis muscle. The Ventrogluteal is the site for choice for children over the age of 36 months and Adults. The deltoid muscle is seldom used, as it is a smaller muscle that cannot hold large volume of medication. *Note: Multiple injections given in the same extremity should be separated as far apart as possible, preferably 1" to 1 ½".*
 - a. Vastus Lateralis (Lateral Mid-Thigh) - in the anterolateral aspect of the middle or upper thigh. To landmark, divide the area into 6 quadrants from the greater trochanter of the femur to just above the knee and the outer middle third is the site to use.

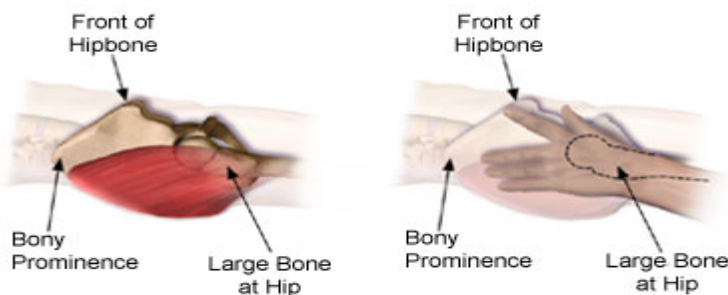
Figure 3: Vastus Lateralis Landmark



- b. Ventrogluteal Muscle - the hip is a preferred site as it has good bony landmarks and there is little risk of hitting major blood vessels or nerves. To landmark, the nurse should place their heel of the hand on the greater trochanter with fingers directed upward. The index finger is placed on the anterior superior iliac spine, the middle finger is stretched out dorsally, palpating the crest of the ileum and then pressing below it. The triangle formed by the index finger, middle finger and the crest of the ileum is the injection site. For land marking on the

client's left hip, the nurse should use their right hand, and for the client's right hip, the nurse should use their left hand.

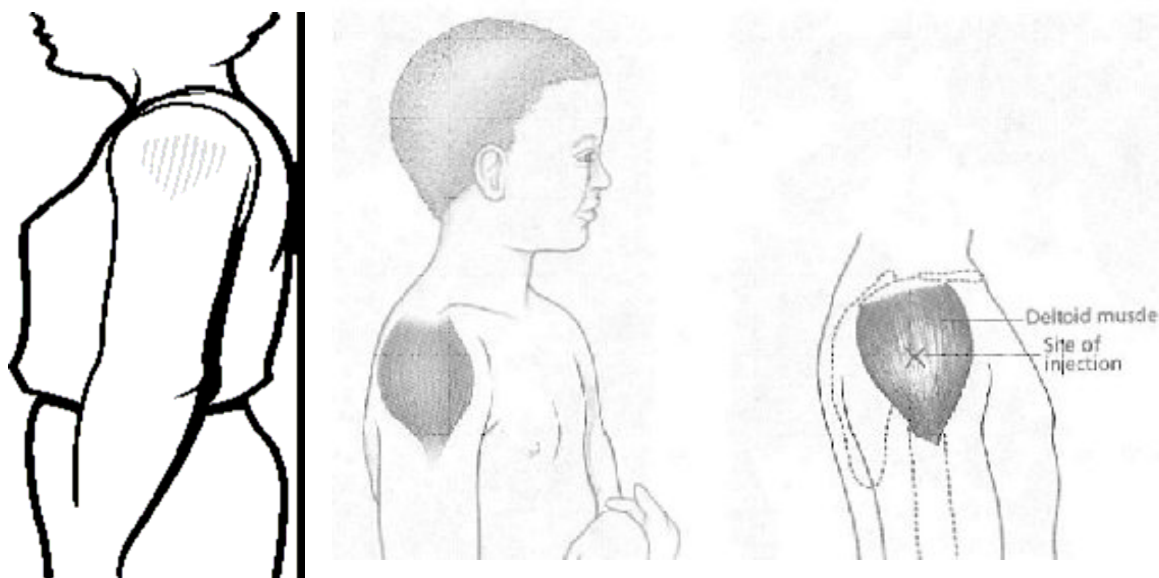
Figure 4: Ventrogluteal Landmark



Correct Place to Give Shot in the Right Hip

- c. Deltoid - have the client's elbow flexed and the forearm supported. Locate the lower edge of the acromion process. Estimate a point opposite the axilla. Visualize an inverted triangle with the base at the acromion process and the apex just below the axilla. This defines the deltoid muscle. Locate a rectangular area in the middle of the muscle as follows:
- Upper edge: two to three finger widths below the acromion process.
 - Lower edge: a point just above the axilla.
 - Side edges: parallel to arm, slightly posterior to midline of outer arm. The injection site is in the middle of this area, as shown.

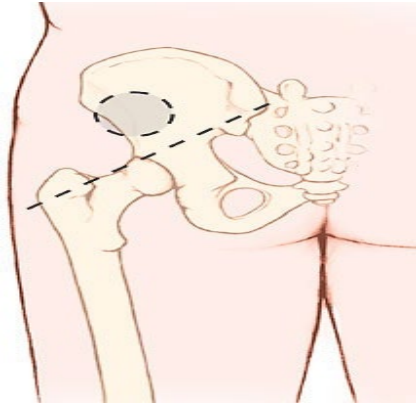
Figure 5: Deltoid Landmarking



- d. Dorsogluteal (the gluteus maximus muscle) - The site is the upper outer aspect of the upper outer quadrant of the buttock, approximately two to three inches below the crest of the

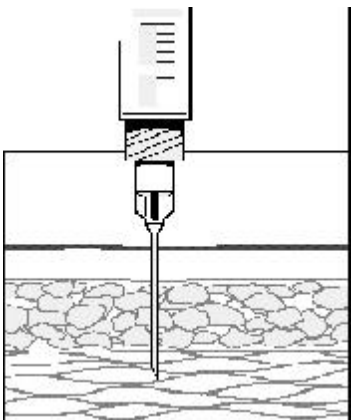
ileum. To establish this site, draw an imaginary line from the posterior superior iliac spine to the greater trochanter of the femur. This line is lateral to and parallel to the sciatic nerve, therefore a site selected laterally and superiorly to this line will be away from the sciatic nerve and major blood vessels.

Figure 6: Dorsogluteal Landmarking



8. Assist the client into a position that facilitates the relaxation of the muscle selected and that is comfortable for the client.
9. Cleanse selected site with alcohol swab.
10. Hold the syringe at a 90-degree angle and in a firm quick motion insert the needle through the skin into the muscle. (See Figure 7.)

Figure 7



11. There is no data to document the necessity for aspiration but if performed and blood appears after negative pressure, the needle should be withdrawn and a new site selected.
12. Inject the medication by holding the syringe steadily and slowly pushing on the plunger.
13. Remove from the muscle pulling in the line of the insertion.
14. Massage the site with a new alcohol swab. If bleeding occurs, apply pressure to the site until it stops and apply an adhesive bandage if necessary.

15. Assist the client to a comfortable position.
16. Remove gloves.
17. Wash hands/perform routine practices.
18. Document client response to the injection, medication administration including dose, time, site used, skin assessment, muscles assessment and client teaching done.

EQUIPMENT/SUPPLIES:

- Non-Sterile gloves of appropriate size.
- Alcohol wipes.
- Approved Sharps Container.
- Safety Engineered Needles and syringe of appropriate gauge and size:
 - Infants from birth to 12 months of age: recommend 7/8" –1" needle, 23-25 gauge;
 - Toddlers 12 months of age to 36 months: recommend 7/8" –1" needle, 23-25 gauge;
 - Toddlers over age 36 months, children and Adults: recommend 1" –2" needle, 23-25 gauge.
- Prescribed medication.

SUPPORTING DOCUMENTS:

CLI.5412.SG.003. FORM.01 Initiation of Vitamin B12 Intramuscular Injection Form

REFERENCES:

Oh, Robert C & Brown, David L. Vitamin B12 Deficiency. American Family Physician (March 1, 2003)
<https://www.aafp.org>

Larsen, Hans R. Summaries of latest research concerning Vitamin B12. International Health News Issue 164 (February 2006) http://www.yourhealthbase.com/vitamin_B12.html

Schrier, Stanley L. Diagnosis and Treatment of Vitamin B12 and Folic Acid Deficiency. Uptodate.com (last updated October 2008) <http://www.uptodate.com/home/index.html>