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Iron Studies/Ferrlecit Protocol

Clinical Education

4/2021

NORTHWEST Kidney Centers

Learning Objectives

At the end of this presentation, the nurse will be able to:

1. Understand the roles of iron in treatment/management of anemia in CKD patients.
2. Have a better comprehension of the NKC Standing Orders for administration of Ferrlicit
3. Can identify when iron study labs are drawn
4. Properly interpret iron study lab results
5. Identify resources for NKC's iron protocol

Understanding the Roles of Iron

- Iron is a key element for red blood cell production.
- About 70% of iron is in the hemoglobin & myoglobin.
- It is also essential for respiration, energy metabolism, & immune function.
- About 25% of iron is stored as ferritin – in the cells & in the blood.

Sources of Iron

- Meat & Poultry
  - Lean beef, veal, pork, lamb, chicken, turkey, & liver (yum)
- Seafood
  - Fish, mussels, & shellfish
- Vegetables
  - Green leafy vegetables, tofu, broccoli, sweet peas, Brussel sprouts, kale, tomatoes, lima beans, potatoes, corn, beets, cabbage

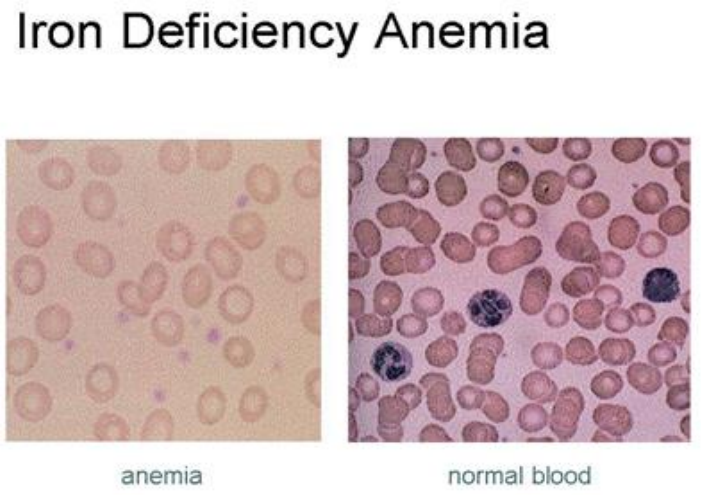
**Remember, diet restrictions for CKD patients – especially on vegetables.

Iron-Deficiency Anemia

- A common cause of anemia
- Due to lack of mineral iron in the body that is needed to make RBC's
- In healthy people, diet provides enough iron
- Iron deficiency anemia can be associated with pica (dialysis patients = ice cravings)
- *Remember*: Anemia in CKD has been associated with increased risk of morbidity & mortality.

Types of Iron Deficiency

1. Absolute iron deficiency
2. Functional iron deficiency
3. Inflammatory block



Absolute Iron Deficiency

Inadequate amount of iron in the body.

Causes

- Reduced iron intake
  - Poor appetite, diet, malnutrition
- Blood loss
  - GI bleeding
  - Frequent phlebotomy
  - Blood loss in dialysis circuit
- Reduced iron absorption due to medications
  - Examples: proton pump inhibitors, phosphate binders
- Reduced iron absorption
  - Due to increased Hepcidin levels

Absolute Iron Deficiency

- Among CKD patients, absolute iron deficiency is defined when:

- The transferrin saturation (TSAT) is ≤20%

AND

- The serum ferritin concentration is ≤200 ng/mL among hemodialysis patients.

Functional Iron Deficiency

- Presence of adequate iron stores but inability to sufficiently mobilize iron from storage sites (liver, reticuloendothelial cells).

- **Hallmark**:

  Anemia response to iron supplementation with an increase in hemoglobin and/or decrease EPO requirement.

- TSAT ≤20% and elevated ferritin levels

Inflammatory Block Anemia

- Features:
  - Anemia that does not response to EPO and iron.
  - Lab features: Low TSAT (< 20%), high ferritin (800+)
- Inflammation results in:
  - Sequestration of iron within reticuloendothelial system (RES).
  - Lowered absolute amount iron available for erythropoiesis.
- Probable mediator: excess of a hormone called "hepcidin."

Iron-Deficiency Anemia in CKD

- CKD patients suffer from either one or all three types of iron deficiency:
  - Absolute deficiency due to malnutrition, blood loss, & hepcidin
  - Functional deficiency because of inability to adequate mobilize from storage sites such as the liver
  - Inflammatory block due to increased hepcidin that decreases iron absorption &/ or release

**Remember these reasons when evaluating iron lab results.

Lab Indicators - Hemoglobin

Hemoglobin:

- The oxygen-carrying and iron-bearing component of the RBC

- Target goal for dialysis patients = 10.0-11.0 gm/dl

Why look at hemoglobin?

Remember that iron is the key element in RBC production & found mostly in hemoglobin. Therefore, it helps in managing anemia.

Lab Indicators – Iron Studies

Components of the Iron Studies include:

- ✓ Ferritin
- ✓ Serum iron
- ✓ Total iron-binding capacity (TIBC)
- ✓ Transferrin saturation (TSAT) **

Lab Indicators – Ferritin

Ferritin:

- A protein that binds to iron; helps store iron in body
- Indirect marker of total iron stored in the body
- Normal levels = 18-270 ng (nanograms)/ml
- Low levels = sign of iron deficiency anemia
- High levels = possibly hemolytic anemia, megaloblastic anemia, anemia of chronic disease, or inflammation

Lab Indicators – Transferrin & TIBC

Transferrin/Total Iron Binding Capacity (TIBC):

- Transferrin = protein that carries iron in the blood; normal levels are 170-370 mg/dl

- TIBC measures levels of transferrin in blood; how much or how little transferrin exists to carry iron; normal levels are 250-450 mcg/dl

- High transferrin/TIBC levels indicate iron-deficiency anemia (iron is low, transferrin levels increase)

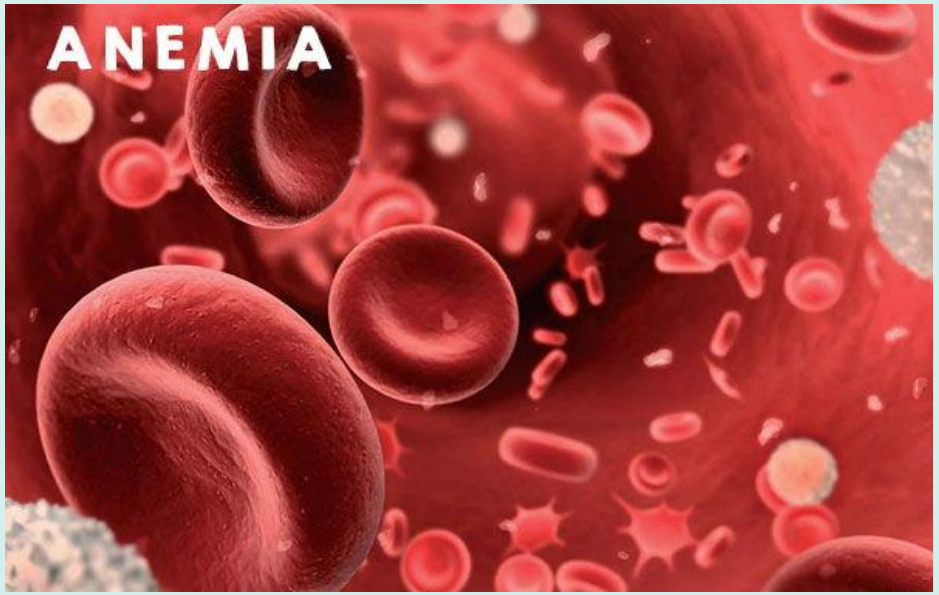
- Low transferrin/TIBC levels may indicate anemia of chronic disease, hemolytic anemia, pernicious anemia, sickle cell anemia

Transferrin Saturation (TSAT)

Iron Saturation: (%)

- An estimate of how much iron is being stored in the body
- Normal levels 10-50%; goal for dialysis patients 30-50%
- Low levels can indicate iron deficiency & can cause cardiac complications since low iron levels decrease the body's ability to carry oxygen
- High levels indicate overdosing of iron supplements or an underlying disease causing the body to absorb too much iron

Now the Protocol



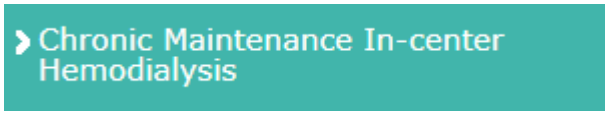
Protocol For Giving Ferrlecit

Found in the **"Chronic Maintenance In-Center Hemodialysis Orders"**

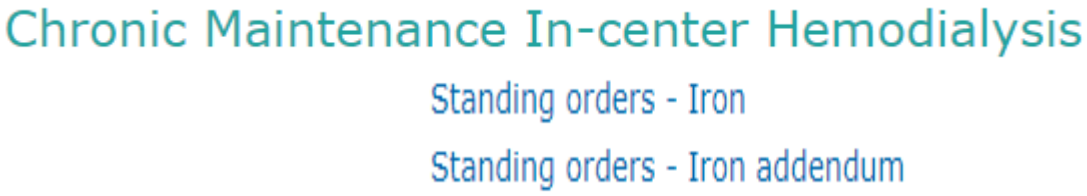
Go to K-Net > Choose **"Clinical"**

Choose **"Standing Orders"**

Choose **"Chronic Maintenance In-center Hemodialysis Orders"**



Choose **"Standing Orders – Iron"** and **"Standing Orders – Iron Addendum"**



Protocol For Giving Ferrlecit

Chronic Maintenance In-Center Hemodialysis Standing Orders - Iron

Sodium ferric gluconate (ICD10- D63.1)

1. **Goal**: Iron saturation 30 - 50%

2. **Labs:** (ICD10 = E83.10)
   - a. Draw iron labs quarterly (ferritin and iron saturation) Jan.–Apr.-Jul.–Oct.
   - b. Wait a minimum of 7 days after the last dose of Sodium ferric gluconate before drawing iron labs.

3. **Hemoglobin**:
   - a. If hemoglobin is greater than or equal to 12 or ferritin is greater than or equal to 1000, hold Sodium ferric gluconate.

4. **Infection/Antibiotics:** HOLD IV iron if patient has an infection requiring IV antibiotics in-center. If patient is still receiving IV antibiotics more than 2 weeks in-center, then can resume IV iron dosing at that time.

Protocol For Giving Ferrlecit

Chronic Maintenance In-Center Hemodialysis Standing Orders – Iron (Addendum)

Chronic Maintenance In-Center Hemodialysis Standing Orders – Iron, item 5c clarification:

5. Sodium ferric gluconate dosing:

a. Based on most recent iron labs, give IV Sodium ferric gluconate per table below.
b. Doses with frequency "every run" may be given up to 3x/week depending on patient's dialysis schedule.
c. Maintenance dosing: Dose should start the second full week of the month (mid-week run preferable).

If	Actions
Iron Saturation	**IV Sodium ferric gluconate Dose**
< 20%	125 mg every run ×6, then start monthly maintenance dose the following month, every 4 weeks x 2 doses
20 - < 30%	125 mg every run ×3, then start monthly maintenance dose the following month, every 4 weeks x 2 doses
30 - 50%	125 mg every **4 weeks** (maintenance x 3 doses)
> 50%	Hold Sodium ferric gluconate, recheck iron saturation every month. Follow rules above.

The Steps Of The Protocol

1. **GOAL:** Transferrin Saturation (TSAT) 30-50%

2. **LABS:** (ICD10 = E83.10) Ferritin and TSAT
   - Drawn quarterly (Jan-April-July-Oct)
   - MUST wait at least **7** days from the last dose of Ferrlecit to draw iron labs

The Steps Of The Protocol

3. HEMOGLOBIN/FERRITIN RESULTS:

- If Hgb is > or = to 12, **HOLD** Ferrlecit
- If Ferritin is > or = to 1,000, **HOLD** Ferrlecit

4. INFECTION/ANTIBIOTICS:

- If patient is receiving IV antibiotics in-center for an infection, **HOLD** Ferrlecit
- May resume Ferrlecit if patient has received antibiotics for over 2 weeks (and is continuing antibiotic therapy)
- (iron may further increase risk of infection)

The Steps of the Protocol

5. Sodium ferric gluconate dosing:

a. Based on most recent iron labs, give IV Sodium ferric gluconate per table below.

b. Doses with frequency “every run” may be given up to 3x/week depending on patient’s dialysis schedule.

c. Maintenance dosing: Dose should start the second full week of the month (mid-week run preferable).

Sodium Ferric Gluconate Dosing

If	Actions
Iron Saturation	**IV Sodium ferric gluconate Dose**
< 20%	125 mg every run ×6, then start monthly maintenance dose the following month, every 4 weeks x 2 doses
20 - < 30%	125 mg every run ×3, then start monthly maintenance dose the following month, every 4 weeks x 2 doses
30 - 50%	125 mg every **4 weeks** (maintenance x 3 doses)
> 50%	Hold Sodium ferric gluconate, recheck iron saturation every month. Follow rules above.

The protocol also aim to have ALL PATIENTS be on the same schedule for quarterly draw.

A "hard stop" is necessary 7 days prior to the scheduled lab draw regardless of where the patient is in the dosing cycle.

What Tools Do We Have?

How can you quickly review & act on chemistry results?

Go to "Ascend LabCheck" > Click on "Reports" > "Custom"

You can create your own custom report(s) or select from the list. Here's a sample:

1. Anemia Report

01/01/2021 to 01/31/2021

Collected	Patient Name	Nephrologist	>=0 <=9.9 HGB	>=10 <=11.9 HGB	>=12 <=20 HGB	>=1000 <=5000 FERR	>=0 <=999 FERR	>=0 <=19 SAT	>=20 <=29 SAT	>=30 <=50 SAT	>=51 <=200 SAT
01/05/2021				11.3			649			30	
01/06/2021			9.1				638		21		
01/20/2021			8.5								
01/25/2021			9.5								
01/29/2021				10.0							
01/06/2021			9.7				112	9			
01/18/2021				10.2							
01/05/2021					12.2		260		29		
01/19/2021				11.2							

Let's Apply Our Protocol

Case Study 1: Mr. A. is a new patient. He started February 21st. Anemia labs are as follows:

Initial "Anemia Management" Lab Results	
Hemoglobin	9.7
Iron	60
Transferrin	108
Ferritin	72
TIBC	375
TSAT	19%

Based on the above results:

1. *What kind of iron deficiency anemia does Mr. A have?*
2. *What dose of Ferrlecit will he receive?*
3. *When will he receive the last dose of Ferrlecit & when will you schedule the next draw for iron studies?*

Case Study 1

Initial "Anemia Management" Lab Results	
Hemoglobin	9.7
Iron	60
Transferrin	108
Ferritin	72
TIBC	375
TSAT	19%

Based on the above results:

1. *What kind of iron deficiency anemia does Mr. A have?*

Answer:

Absolute iron deficiency anemia because the Ferritin is <200 AND TSAT < 20%

Case Study 1

Initial "Anemia Management" Lab Results	
Hemoglobin	9.7
Iron	60
Transferrin	108
Ferritin	72
TIBC	375
TSAT	19%

2. *What dose of Ferrlecit will Mr. A receive?*

If	Actions
Iron Saturation	IV Sodium ferric gluconate Dose
< 20%	125 mg every run ×6, then start monthly maintenance dose the following month, every 4 weeks x 2 doses

Mr. A will receive repletion dose 125mg qrun x6 starting 2/23. Then maintenance dose the following month every 4 weeks x 2 doses.

Case Study 1

3. When will he receive the last dose of Ferrlecit & when will you schedule the next draw for iron studies?

Answer:

Mr. A will receive Ferrlecit 125mg on 2/23, 2/25, 2/27, 3/1, 3/3, & 3/6.

Then the protocol states to start monthly maintenance dose the following month, every 4 weeks x 2 doses. Since the next iron draw will be in April, Mr. A's Ferrlecit dose will finish on 3/6. No Ferrlecit dose should be given the week prior to lab draw.

FEBRUARY						
Su	Mo	Tu	We	Th	Fr	Sa
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	1	2	3	4	5	6
7	8	9	10	11	12	13

MARCH						
Su	Mo	Tu	We	Th	Fr	Sa
28	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

APRIL						
Su	Mo	Tu	We	Th	Fr	Sa
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	1
2	3	4	5	6	7	8

Practicing The Ferrlecit Protocol

Lab:

Iron Saturation is 54%

Q: What is the next step?

Practicing The Ferrlecit Protocol

Labs:

Iron Saturation is 54%

Q: What is the next step?

A: Hold Ferrlecit & recheck iron saturations q month, following protocol with subsequent lab results

Practicing The Ferrlecit Protocol

Labs:

Iron Saturation is 17%

Q: What is the next step?

Practicing The Ferrlecit Protocol

Labs:

Iron Saturation is 17%

Q: What is the next step?

A: Give Ferrlecit 125mg q run x 6, then start monthly maintenance dose the following month.

Practicing The Ferrlecit Protocol

Labs:

Hgb is 13.2

Q: What is the next step?

Practicing The Ferrlecit Protocol

Labs:

Hgb is 13.2

Q: What is the next step?

A: Hold Ferrlecit until Hgb drops below 12

Practicing The Ferrlecit Protocol

Labs:

Iron saturation is 42%

Q: What is the next step?

Practicing The Ferrlecit Protocol

Labs:

Iron saturation is 42%

Q: What is the next step?

A: Give 125mg Ferrlecit every month

Practicing The Ferrlecit Protocol

<u>Situation</u>:

Pt. B had fever & chills. Blood cultures were positive. MD ordered IV Vancomycin 500mg x 6 treatments and patient is scheduled to receive 125mg Ferrlecit every run x 3.

Q: What should be done & why?

Practicing The Ferrlecit Protocol

Situation:

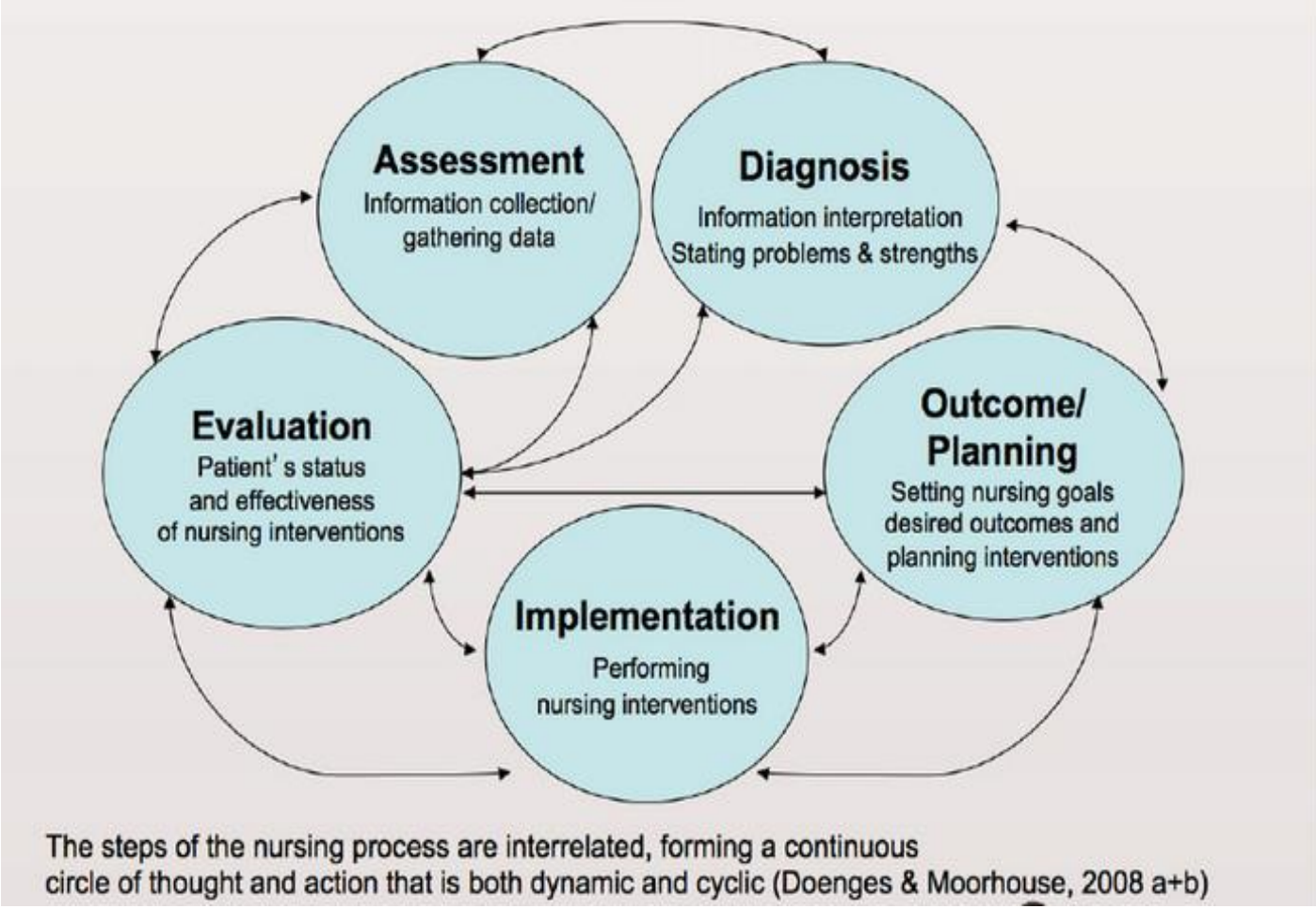
Pt. B had fever & chills. Blood cultures were positive. MD ordered IV Vancomycin 500mg x 6 treatments and patient is scheduled to receive 125mg Ferrlecit every run x 3.

Q: What should be done & why?

A: Hold Ferrlecit until antibiotic therapy is done because iron increases the risk of infection.

Remember The Nursing Process!

It is more than just numbers!



The steps of the nursing process are interrelated, forming a continuous circle of thought and action that is both dynamic and cyclic (Doenges & Moorhouse, 2008 a+b)

Summary Of Ferrlecit

- Ferrlecit dosing is based on iron labs, drawn quarterly
- Ferrlecit must be held for at least 7 days prior to drawing iron labs
- Hold Ferrlecit for infections requiring antibiotics; resume Ferrlecit if antibiotic therapy continues over 2 weeks: Hold for ferritin > or = 1,000 or Hgb > or = 12
- For Ferrlecit dosing and administration schedule, follow the iron saturation labs/table in the S.O.

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Questions?