Medications

Ferrous sulfate
- Pharmacological Class: Hematinic
- Therapeutic Class: Antianemic, nutritional supplement

Reason for taking: The client has a decreased iron level. Ferrous sulfate is used to replace iron during deficiency status (Jones & Bartlett Learning, 2022).
Nursing assessment: The nurse should check the patient's blood tests, looking specifically at hematocrit and hemoglobin, before administering this medication and check on intake and output levels to check for constipation (Jones & Bartlett Learning, 2022).

succimer
- Pharmacological Class: Lead chelator
- Therapeutic Class: Chelating agent

Reason for taking: The client is taking this medication because it is a type of oral chelation therapy. Chelation therapy has been known to treat lead poisoning (Multum, 2023).
Nursing assessment: The nurse may need to have the patient drink extra fluids before administration of this medication, depending on the patient's intake levels (Multum, 2023).

acetaminophen
- Pharmacological Class: Nonsalicylate
- Therapeutic Class: Anti-pyretic

Reason for taking: The client is taking this medication to treat pain. This medication is known to relieve mild to moderate pain (Jones & Bartlett Learning, 2022).
Nursing assessment: The nurse should assess the patient's pain level before administering this medication (Jones & Bartlett Learning, 2022).

Demographic Data

Admitting diagnosis: Lead poisoning

Age of client: 12 months (DOB: 4/12/2023)

Sex: Male

Weight in kgs: 10.1 kg

Allergies: None

Date of admission: April 17, 2024

Admission History

Pathophysiology

Disease process: "Broadly speaking, lead interacts with human physiology in two significant ways: it has a strong affinity for sulfhydryl groups and electron donor groups in general, such that lead ends up bound to and affecting a wide range of proteins" (Halmo & Nappe, 2023). Lead has similar properties of other cations like zinc and calcium, and it is capable of disrupting many different cellular mechanisms which is why the pathophysiology of lead toxicity is so complex. Lead toxicity can ultimately affect every organ system in a human. Young children who are diagnosed with lead toxicity may experience a hinderance in the synaptic pruning process that takes place in young brains, which is most likely the cause of the neurobehavioral issues with lead toxicity (Halmo & Nappe, 2023). "From a hematologic perspective, lead causes anemia by interfering with the function of several enzymes involved in heme synthesis as well as enzymes involved in maintaining erythrocyte cell membrane integrity, which leads to decreased production and increased destruction of erythrocytes" (Halmo & Nappe, 2023).

S/S of disease: Lead poisoning can xZDdxZ cause a multitude of varying signs and symptoms depending on the severity of exposure. Those include irritability, lethargy, fatigue, myalgia, abdominal pain, loss of appetite, constipation, vomiting, headaches, tremors, weight loss, encephalopathy, paralysis, and colic (Agency for Toxic Substance Disease Registry, 2023). Lead poisoning can also cause neurological and neurobehavioral issues that can lead to the following: a decline in verbal capability, speech and hearing impairment, a decline in learning and memory, a lowered IQ, and signs of hyperactivity (Agency for Toxic Substance Disease Registry, 2023). The mother of the patient said, "he wasn't showing any symptoms of being sick". The abdominal X-ray did show a lot of stool throughout the entire colon, so the patient may have been constipated, but there was no record of his last bowel movement prior to admission. The mother said, "he's been eating and drinking like normal, and he has been acting like his normal self".

Method of Diagnosis: In order to diagnose an individual with lead poisoning, they need to have a blood lead screening test. They take a sample of the individual's blood and look specifically at the lead level in your blood. "BLL testing is currently required at 12 and 24 months for all Medicaid-enrolled children unless the state has a Centers for Disease Control and Prevention and the Centers for Medicare and Medicaid Services waiver indicating that children enrolled in Medicaid are not at a higher risk for high BLLs than other children" (Agency for Toxic Substance Disease Registry, 2023). Depending on the lead level, there are different severities of lead toxicity. This patient had a lead level of 66 ug/dL which puts him in the severe category.

Treatment of disease: Treatment of lead toxicity includes medication, education on sources of lead and how to prevent it from occurring again, education on nutrition, ongoing monitoring, and collaboration with other organizations to make sure the home is safe to return to. The specific medication is called, "chelation therapy and is considered a mainstay in the medical management of children with BLLs > 45 ug/dL but should be used with caution" (Agency for Toxic Substance Disease Registry, 2023). The patient is receiving oral chelation therapy 200 mg twice a day and another 100 mg dose at bedtime. The mother of the patient received education on nutrition for the child and sources of lead that can be found in the home. The mother is collaborating with outside agencies to take care of the sources of lead in her home, so they have a safe home for discharge.

The mother of the patient took him to have his routine 12-month lead screening performed at a WIC office on April 3, 2024. The patient tested positive for the presence of lead in his blood, and the lead value was 37 ug/dL. On April 17, 2024, the mother took him to Iroquois Memorial Hospital in Watseka to have the patient rescreened. The lead level at that time was 66 ug/dL. IMH suggested the mother take her child to Carle in Urbana for treatment and observation. The patient was taken to Carle Hospital in Urbana and was admitted on April 17, 2024. The patient was not exhibiting any signs and symptoms of lead poisoning. He was acting his normal self and eating and drinking as usual. He had a slight fever the weekend before coming to Carle, but it had subsided. The mother and her children live in a house that is 100+ years old. The mother said she had not witnessed the patient eating any paint chips.

Relevant Lab Values/Diagnostics

- The patient had an abdominal X-ray completed on 4/17/24. Findings of the X-ray showed an unobstructed bowel gas pattern with an excess amount of feces located throughout the colon. Lead poisoning has been known to cause constipation. The mother did not note the child's last bowel movement prior to admission to the hospital. The abdominal x-ray is typically used to check for an obstructed bowel (Pagana et al., 2020). An obstructed bowel can be caused by constipation.
- Lead with Demographic, Venous: Results pending
  - This test will give the provider a more current lead level of the patient. This patient has been diagnosed with lead poisoning, which is why they are having it done.
- Creatinine: 0.38 mg/dL (0.70 – 1.30 mg/dL)
  - A decrease in creatinine is more than likely due to the fact that this patient is only 12 months of age and has a decreased muscle mass. A decreased muscle mass is associated with a decreased creatinine level (Pagana et al., 2020).
- Albumin: 3.6 g/dL (3.8 – 5.4 g/dL)
  - Lead is toxic to enzymes; since albumin is an enzyme, this can cause a decrease in albumin levels. "Lead's high affinity for sulfhydryl groups makes it particularly toxic to multiple enzyme systems, including heme biosynthesis" (Agency for Toxic Substance Disease Registry, 2023).
- Iron: 31 ug/dL (65 – 175 ug/dL)
  - Increased absorption of lead can lead to a decrease in iron levels leading to iron deficiency anemia (Halmo & Nappe, 2023). Toddlers are also at an increased risk for iron deficiency anemia which could have been an underlying cause that hadn't been diagnosed yet.
- RBC: 5.07 (3.89 – 4.97 10^6/uL)
  - An elevated red blood cell count can be caused by dehydration (Pagana et al., 2020). The mother had said he had been drinking as usual. However, there are no other logical reasons for the increased red blood cell count.

Medical History

Previous Medical History: N/A

Prior Hospitalizations: N/A

Past Surgical History: N/A

Social needs: The patient lives at home with his mother and siblings. The patient will need a safe home for discharge.

Active Orders

- Vital signs Q4Hr
  - Monitoring vital signs every 4 hours provides information about the patient's status. Monitoring the vital signs can indicate whether the patient's health is declining or improving.
- Neuro checks Q4Hr
  - Lead poisoning often leads to neurobehavioral problems and can also cause developmental issues with hearing and speech (Agency for Toxic Substance Disease Registry, 2023).
- I/Os
  - Lead poisoning can lead to a lack of appetite, nausea, vomiting, and constipation, which is why the patient's intake and output needs to be monitored (Agency for Toxic Substance Disease Registry, 2023).
- Notify the provider if vitals go outside the normal parameters
  - When the vitals are abnormal this could potentially require intervention/attention by the provider to correct the health status of the patient.
- CLA
  - The child life assistant will determine the needs/desires of the patient and try to help meet those needs for the patient.

Assessment	
General	The patient is awake and alert. The patient appears appropriately groomed for place and is in no acute distress.
Integument	Skin color is medium brown, no presence of cyanosis. Skin is warm, dry, and intact upon palpation. No presence of rashes, lesions, bruising, or petechiae. Normal quantity, distribution, and texture of the patient's hair. No signs of clubbing or cyanosis present in the nails. Skin turgor returns back to normal immediately, no presence of tenting. Capillary refill in fingers/toes less than 2 seconds bilaterally.
HEENT	Head and neck: Head is normocephalic and symmetrical. The neck is also symmetrical. Trachea is midline with no presence of deviation, thyroid is non-palpable with no nodules noted. Bilateral carotid pulses are palpable and are 2+. No lymphadenopathy is felt in the head or neck. Eyes: Sclera is white bilaterally, corneas are clear bilaterally, conjunctiva is pink bilaterally, and no visible drainage of the eyes bilaterally. Lids are pink and moist bilaterally, without any presence of lesions or discharge. PERRLA intact bilaterally. No nystagmus observed. Ears: No visible or palpable deformities on auricles bilaterally. Unable to assess internal ear due to no otoscope in the patient's room to view tympanic membranes. Nose: Septum is midline, turbinates are bilaterally pink and moist. No visible bleeding or polyps observed. Frontal sinuses were palpated bilaterally, they seem to be nontender. The patient's nose was slightly runny, experiencing a little nasal congestion. Throat: Oral mucosa overall is moist and pink without lesions. Hard palate is intact. Unable to assess soft palate due to the patient not understanding commands. No lead lines were observed in the mouth. Two incisors are present on the lower jaw. Good dentition noted.
Cardiovascular	Regular rate and rhythm noted. S1 and S2 sounds are clear without presence of murmurs, gallops, or rubs. PMI is palpable between the 3rd and 4th intercostal space at the MCL.
Respiratory	Regular rate and pattern of breathing noted. Respirations are non-labored and symmetrical. Lung sounds are clear throughout bilaterally anteriorly/posteriorly upon auscultation. No signs of crackles, wheezes, or rales. No use of accessory muscles, retractions, grunting, or nasal flaring was observed. A slight cough was noted.
Genitourinary	Normal pattern of urination noted. The last wet diaper was changed around 4:30 pm on 4/19/24 (color and amount of urine looked normal, yellow in color and no sediment noted).
Gastrointestinal	Abdomen is nontender and soft, with no presence of organomegaly or masses upon palpation of all four quadrants. Bowel sounds are normoactive (5 – 34 clicks/gurgles) noted in all four quadrants. No CVA tenderness was noted bilaterally. The last bowel movement was around 2:30 PM on 4/19/24, the bowel movement had a wet yellow paste appearance.
Musculoskeletal	All four extremities have full range of motion. No presence of joint swelling, tenderness, or muscle weakness.
Neurological	Patient is awake and alert. PERRLA is intact bilaterally. Cranial nerves are unable to be assessed. DTRs are 2+ bilaterally in all locations. No

	seizure activity noted.
Most recent VS (highlight if abnormal)	**Time:** 3:45 PM **Temperature:** 97.6°F **Route:** Axillary **RR:** 34 bpm **HR:** 122 bpm **BP and MAP:** BP – 107/62 mm Hg MAP: 79 mm Hg **Oxygen saturation:** 100% **Oxygen needs:** No supplemental oxygen is necessary. Room air only.
Pain and Pain Scale Used	Pain Score – 0 Pain Scale: FLACC Scaled

Nursing Diagnosis 1	**Nursing Diagnosis 2**	**Nursing Diagnosis 3**
Knowledge deficit related to risk factors of lead poisoning as evidenced by lead paint being present in the home.	Risk for imbalanced nutrition related to elevated blood lead levels.	Risk for fatigue related to decreased iron levels.
Rationale	**Rationale**	**Rationale**
The patient is diagnosed with lead poisoning due to the patient's home being over 100 years old and containing lead paint, which is most likely the cause of the child's elevated blood lead level. The mother of the patient was unaware that sweeping dust and particles of lead can increase the risk of lead poisoning.	The patient is diagnosed with lead poisoning. Lead poisoning can cause the following symptoms, loss of appetite, nausea, vomiting, constipation, and poor growth which could cause the patient to have an imbalanced nutrition.	The patient's iron level value was 31 ug/dL. Due to the patient's decreased iron level, this could cause the patient to experience fatigue.

Interventions **Intervention 1:** "Select teaching strategies (such as discussion, demonstration, role-playing, and visual materials) appropriate for patient's individual learning style" (Phelps, 2022). **Intervention 2:** "Have patient give return demonstration of any skills taught" (Phelps, 2022).	**Interventions** **Intervention 1:** "Obtain and record patient's weight at the same time every day to get accurate readings" (Phelps, 2022). **Intervention 2:** "Determine food preferences and provide them within the limitations of patient's prescribed diet" (Phelps, 2022).	**Interventions** **Intervention 1:** "Encourage patient to eat foods rich in iron and minerals, unless contraindicated" (Phelps, 2022). **Intervention 2:** "Structure patient's environment; for example set up daily schedule based on the patient's needs and desires" (Phelps, 2022).
Evaluation of Interventions The client and his mother were receptive and responded well to the interventions chosen. The mother demonstrated her knowledge by repeating the information that she was taught back to the nurse.	**Evaluation of Interventions** The client and his mother were receptive and responded well to the interventions chosen. The mother demonstrated her knowledge by explaining the importance of maintaining a balanced nutrition by weighing the patient and feeding foods that will maintain proper nutrition for the child.	**Evaluation of Interventions** The client and his mother were receptive and responded well to the interventions chosen. The mother demonstrated her knowledge by explaining how a low iron level could cause fatigue in her child and how she should feed the patient iron rich foods and make a beneficial schedule for the child.

		What do you expect?	What did you observe?
Erickson's Psychosocial Developmental Stage	Autonomy vs. Shame and Doubt	In a child who is in the autonomy vs. shame and doubt stage, you can expect the following: successfully gain self-control and autonomy, willingly separates from the parent, exhibit negativism, shows affection spontaneously, imitates playmates or adults, shows increased enthusiasm with playmates, withstands delayed gratification, has a problem taking turns (Ricci et al., 2021).	The patient willingly separated from the parent when going to the playroom. The patient looked very enthusiastic when he saw there were volunteers in the playroom to play with him. The patient displayed spontaneous affection for his mother while in the patient's room. The patient demonstrated autonomy when he was walking down the hall and began to walk in the opposite direction of his mother.
Piaget's Cognitive Developmental Stage	Sensorimotor	In a child who is in the sensorimotor stage, you can expect the following: utilizes all their senses in their environment, mimics domestic chores, able to differentiate self from objects, increased object permanence, able to place and pull objects in and out of containers (Ricci et al., 2021).	The patient demonstrated an increase in object permanence when I had a toy in my hand and then made it disappear and reappear. The patient didn't seem to surprised when the toy reappeared. While in the playroom the patient was playing with blocks and he was placing them in and pulling them out of the container.
Age-Appropriate Growth & Development Milestones	**1.** Imitates adults/play mates **2.** Spontaneously shows affection **3.** Increasingly enthusiastic about play mates		
Age-Appropriate Diversional Activities	**1.** Television **2.** Interactive toys **3.** Sleeping		

References (3):

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