CASE STUDY 2

Ms. Jimenez (Part 1)

GENDER

Female

AGE

56

SETTING

- Hospital

ETHNICITY

- Hispanic

CULTURAL CONSIDERATIONS

PREEXISTING CONDITIONS

- Motor vehicle crash (MVC) eight weeks ago with no injury; depression

COEXISTING CONDITIONS

- Suicide attempt; metabolic acidosis

COMMUNICATION

DISABILITY

SOCIOECONOMIC

- Financial difficulties secondary to divorce five years ago; nonsmoker

SPIRITUAL/RELIGIOUS

PHARMACOLOGIC

- 4-methylpyrazole (Fomepizole; Antizol); pyridoxine hydrochloride (Vitamin B_6); thiamine (Vitamin B_1); succinylcholine chloride (Anectine); levalbuterol (Xopenex); lorazepam (Ativan); propofol (Diprivan, Disoprofol); etomidate

LEGAL

ETHICAL

ALTERNATIVE THERAPY

PRIORITIZATION

- Medical stabilization

DELEGATION

THE URINARY SYSTEM

Level of difficulty: Difficult

Overview: This case addresses the medical consequences of a failed suicide attempt. The nurse's understanding of the effects of ingesting ethylene glycol (antifreeze) is essential for prioritizing care, interpreting lab and arterial blood gas results, and identifying the purpose of prescribed medications.

DIFFICULT

Client Profile

Ms. Jimenez is a 56-year-old woman who has been having financial difficulties since her divorce five years ago. She was recently involved in a motor vehicle crash (MVC) in which she drove over a curb and hit a telephone pole. She did not sustain any significant injuries in the MVC. Today, Ms. Jimenez's daughter Maria returned home at 8:00 P.M. to find Ms. Jimenez sitting on the floor with a decreased level of consciousness. Maria was able to shake her mother awake. With slurred speech, Ms. Jimenez told her daughter that she drank three large glasses of antifreeze (ethylene glycol) at around 7:00 P.M. Maria called 911 and emergency medical services transported Ms. Jimenez to the local emergency department.

Case Study

Upon arrival to the emergency department, Ms. Jimenez is afebrile with a rectal temperature of 97°F (36.1°C). Her other vital signs are blood pressure 135/85, pulse 68, and respiratory rate 24. Her initial arterial blood gases (ABGs) on a 15 liters per minute non-rebreather revealed a pH of 7.19, partial pressure of carbon dioxide ($PaCO_2$) of 13 mmHg, partial pressure of oxygen (PaO_2) of 359 mmHg, bicarbonate (HCO_3^-) of 5 mEq/L, and oxygen (O_2) saturation of 100%. Ms. Jimenez is sedated in the emergency department using etomidate. She is intubated and put on a mechanical ventilator. A Foley catheter is inserted. She receives succinylcholine chloride, lorazepam, and propofol. Her oxygen saturation is 92% on an FIO_2 (fraction of inspired oxygen) of 70%. The health care provider's physical examination reveals no abnormal findings. The neurological exam is deferred because Ms. Jimenez is intubated and sedated. An electrocardiogram (ECG, EKG) shows that Ms. Jimenez is in a normal sinus rhythm. A chest X-ray (CXR) shows no infiltrate and proper endotracheal tube placement.

A urinalysis shows a specific gravity of 1.010, a small amount of occult blood, 3 to 5 white blood cells per high-power field (HPF), a few bacteria per HPF, and a moderate amount of uric acid crystals and urine calcium oxalate crystals. A urine culture & colony count was negative (no growth). Her blood alcohol level is less than 10 mg/dL. Her ethylene glycol level is 36 mg/dL. Her complete blood count (CBC) is within normal limits except for a mean cell volume (MCV) of 79.2 μm^3. Troponin level is 0 ng/mL, creatine kinase (CK) is 182 U/L, and creatine kinase cardiac isoenzyme (CK-MB) is within normal limits (WNL). Serum osmolality is 392 mOsm/Kg. Her electrolytes are WNL except for a serum bicarbonate of 7 mEq/L. She has an anion gap of 29 mEq/L, blood urea nitrogen (BUN) of 25 mg/dL, and creatinine of 1.4 mg/dL. Her liver function tests are WNL.

Ms. Jimenez is admitted to the intensive care unit (ICU) and prescribed intravenous (IV) fluids of normal saline with 2 ampules of bicarbonate at 125 mL per hour. The medications prescribed for her include 4-methylpyrazole IV every 12 hours, thiamine 100 mg IM, and levalbuterol treatments. Lab work prescribed includes CBC, electrolytes, ethylene glycol levels, basic metabolic panel (BMP), creatinine level, acetone level, and urinalysis.

In the ICU at the bedside, a Quinton dialysis catheter is surgically inserted in the right internal jugular vein for emergency dialysis and placement of the Quinton catheter is confirmed by CXR.

Questions

1. What is ethylene glycol? What products contain ethylene glycol?

2. Discuss the potential effects of ingesting ethylene glycol (antifreeze).

3. What is a "half-life"? Explain the half-life of ethylene glycol and how ethylene glycol is cleared from the body.

4. Ms. Jimenez's ethylene glycol level is 36 mg/dL. What is the lethal dose of ethylene glycol?

5. Discuss the rationale for why Ms. Jimenez is receiving 4-methylpyrazole. What is a drawback of this medication?

6. If 4-methylpyrazole is not available, what is the next most effective treatment for ethylene glycol poisoning? Discuss how this treatment is administered and what should be monitored during administration.

7. If Maria had come home earlier and Ms. Jimenez was found within half an hour of drinking the antifreeze, what three interventions could have been considered to decrease the progression of the toxic effects of the ethylene glycol?

8. Briefly describe the indication for each of the following medications Ms. Jimenez received during her initial medical treatment: thiamine, succinylcholine chloride, levalbuterol, lorazepam, propofol, and etomidate.

9. Why were intravenous (IV) fluids of normal saline with 2 ampules of bicarbonate at 125 mL per hour prescribed as part of the medical management of Ms. Jimenez?

10. Complete an analysis of Ms. Jimenez's initial arterial blood gas (ABG) results while on 15 liters of oxygen via non-rebreather. Are her ABG's consistent with those expected for a person with an ethylene glycol overdose?

11. Why was Ms. Jimenez intubated and placed on a mechanical ventilator?

12. Ms. Jimenez is on a mechanical ventilator set on assist-control of 14, respiratory rate of 28, volume 650, oxygen 40%, and a PEEP of 5. What does each ventilator setting indicate?

13. The respiratory rate on a mechanical ventilator is usually set between 10 and 14 breaths per minute. Why is the rate for Ms. Jimenez set at 28 breaths per minute?

14. Which of Ms. Jimenez's laboratory results below are most significant in the determination of a diagnosis of ethylene glycol poisoning?

- Urinalysis: specific gravity of 1.010, small amount of occult blood, 3 to 5 white blood cells per HPF, a few bacteria per HPF, and a moderate amount of uric acid crystals and urine calcium oxalate crystals.
- Urine culture & colony count was negative (no growth)
- Serum osmolality is 392 mOsm/Kg
- Bicarbonate of 7 mEq/L
- Anion gap of 29 mEq/L
- BUN of 25 mg/dL
- Creatinine of 1.4 mg/dL

15. Explain how a Wood lamp could be used to help confirm the ingestion of ethylene glycol.

16. Briefly explain what Ms. Jimenez's troponin, CPK, and CK-MB indicate.

17. Why did Ms. Jimenez's prescribed laboratory tests include an assessment of her liver function?

18. What is a Quinton catheter and why was one inserted?

19. Prioritize three nursing diagnoses that are appropriate to include in Ms. Jimenez's plan of care.

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CASE STUDY 3

Ms. Jimenez (Part 2)

GENDER

Female

AGE

56

SETTING

- Hospital

ETHNICITY

- Hispanic

CULTURAL CONSIDERATIONS

PREEXISTING CONDITIONS

- Motor vehicle crash (MVC) eight weeks ago with no injury; depression

COEXISTING CONDITION

- Suicide attempt with ethylene glycol (antifreeze) poisoning

COMMUNICATION

DISABILITY

SOCIOECONOMIC

- Financial difficulties secondary to divorce five years ago; nonsmoker

SPIRITUAL/RELIGIOUS

PHARMACOLOGIC

LEGAL

- Safety sitter

ETHICAL

ALTERNATIVE THERAPY

PRIORITIZATION

- Client safety

DELEGATION

- Psychiatric consult; social services

MODERATE

THE URINARY SYSTEM

Level of difficulty: Moderate

Overview: The client ingested ethylene glycol two days ago and has been medically stabilized. The long-term effects of ethylene glycol poisoning are discussed. The nurse is asked to explain the stages of acute renal failure and the function of hemodialysis. Collaborative resources to assist the client following discharge are identified.

Client Profile

Ms. Jimenez is a 56-year-old woman who has been having financial difficulties since her divorce five years ago. She was recently involved in a motor vehicle crash (MVC) in which she drove over a curb and hit a telephone pole. She did not sustain any significant injuries in the MVC. Two days ago, Ms. Jimenez's daughter Maria returned home at 8:00 P.M. to find Ms. Jimenez sitting on the floor with a decreased level of consciousness. Maria was able to shake her mother awake. With slurred speech, Ms. Jimenez told her daughter that she drank three large glasses of antifreeze (ethylene glycol) at around 7:00 P.M. Maria called 911 and emergency medical services transported Ms. Jimenez to the local emergency department.

Case Study

It is forty-eight hours after her arrival in the emergency department. Ms. Jimenez has undergone twelve hours of emergency dialysis, has been extubated, and is medically stable for transfer to a medical-surgical nursing unit. A safety sitter remains in Ms. Jimenez's room at all times. Ms. Jimenez is alert and oriented but has a flat affect. She is not remorseful for her actions and states, "I had hoped I would be successful this time." A psychiatrist sees Ms. Jimenez for a consultation. The psychiatric assessment reveals that she has been planning the poisoning for a few weeks. She states, "I was hoping I would die quickly and it would look like an accident." Ms. Jimenez states that she has made attempts in the past to overdose on medications. She did not seek care at the hospital when these suicide attempts were not successful. She has been depressed since divorcing her husband five years ago. Since her divorce, she has not paid taxes and there have been mounting financial bills with the Internal Revenue Service. As a result, her wages are being garnished (money is withheld from her paycheck and sent to a creditor). She reports, "On the outside I appear bright and upbeat but on the inside I am so lonely and sad and just don't want to go on anymore." She wonders how she will pay for her medical care now. "I had not planned on the poison not working and needing dialysis. I bet dialysis is expensive."

Questions

1. Explain acute renal failure (ARF).
2. Considering the conditions that cause ARF, which type of ARF is Ms. Jimenez experiencing?
3. What characteristics and laboratory data define the four phases of acute renal failure, and what is the approximate duration of each phase?
4. It has been four days since admission. According to the definitions provided in the response to question number 3, which phase of acute renal failure is Ms. Jimenez experiencing?
5. While the nurse is assessing the Quinton catheter insertion site, Ms. Jimenez asks what dialysis is and how long she will need to do it. Her initial dialysis treatment was twelve hours long and she is wondering if she will always have to be "hooked up" to the machine that long each time. How should the nurse respond?
6. On admission, Ms. Jimenez's creatinine was 1.4 mg/dL and her BUN was 25 mg/dL. Ms. Jimenez has repeat creatinine and BUN labs drawn two days after admission. The results are a creatinine of 4.7 mg/dL and a BUN of 24 mg/dL. A day later her creatinine is 8.5 mg/dL with a BUN of 57 mg/dL. Are these results getting better or worse since admission? Discuss why.
7. The following potassium values are reported: on admission, 3.6 mEq/L; forty-eight hours after admission, 4.0 mEq/L; and seventy-two hours after admission, 4.2 mEq/L. What potential cardiovascular change is of greatest concern to the nurse?
8. Identify five priority nursing diagnoses that are appropriate to include in Ms. Jimenez's plan of care.
9. Why has a safety sitter been included as part of Ms. Jimenez's plan of care?
10. What are two collaborative services to consider when planning Ms. Jimenez's discharge?
11. Discuss how Ms. Jimenez's recent MVC may relate to her current admission.