Acute Coronary Syndrome (ACS) Myocardial Infarction (MI)

JoAnn Smith, 68 years old

Primary Concept
Perfusion
Interrelated Concepts (In order of emphasis)
1. Fluid and Electrolyte Balance 2. Clinical Judgment 3. Communication 4. Collaboration

UNFOLDING Reasoning Case Study-STUDENT Carolyn Lynch

Acute Coronary Syndrome/Acute MI

History of Present Problem:

JoAnn Smith is a 68-year-old woman who presents to the emergency department (ED) after having three days of progressive weakness. She denies chest pain, but admits to shortness of breath (SOB) that increases with activity. She also has epigastric pain with nausea that has been intermittent for 20-30 minutes over the last three days. She reports that her epigastric pain has gotten worse and is now radiating into her neck. Her husband called 9-1-1 and she was transported to the hospital by emergency medical services (EMS).

Personal/Social History:

JoAnn is a recently retired math teacher who continues to substitute teach part-time. She is physically active and lives independently with her spouse in her own home. She has smoked 1 pack per day the past 40 years. JoAnn appears anxious and immediately asks repeatedly for her husband upon arrival.

What data from the histories are RELEVANT and have clinical significance to the nurse?

RELEVANT Data from Present Problem:	**Clinical Significance:**
Progressive Weakness Dyspnea w/exertion Epigastric pain w/nausea Radiating pain into neck	Any type of physical exertion increases the HR, this reduces the time the heart spends in diastole, resulting in an increase in myocardial 02 demand. Isometric exercises of the arms can cause exertional pain When the digestive system is processing food, the blood is diverted to the GI system which reduces the blood flow to the coronary arteries The radiating pain from angina is a common manifestation. Refractory pain from the muscles and nerves
RELEVANT Data from Social History:	**Clinical Significance:**
Still teaching at her age Lives with her spouse Smoker for 40 years Anxiety	Teaching children in this day and age would give anyone stress let alone a retired school teacher. Maybe her spouse is driving her nuts while they are both retired so she goes to work part time to get out. Her overall anxiety-all of these contribute to stress which activates the SNS and increase the workload of the heart. Smoking diminishes 02 by increasing the level of C02. Nicotine stimulates catecholamine release release, causing vasoconstriction and an increased HR

What is the RELATIONSHIP of your patient's past medical history (PMH) and current meds?

PMH:	**Home Meds:**	**Pharm. Classification:**	**Expected Outcome:**
• 1.Diabetes mellitus type II • • 2.Hypertension • • 3.Hyperlipidemia • • 4.Cerebral vascular accident (CVA) with no residual deficits • • 5.Gastro-esophageal reflux disease (GERD) • • 6.Anemia-Iron deficiency	1.Metformin 500 mg PO bid 2. Lisinopril 5 mg PO daily 3.Simvastatin 20 mg PO daily 4.Clopidogrel 75 mg PO daily 4 4.Aspirin 81mg. PO daily 5.Omeprazole 20 mg PO daily 5. Iron Sulfate 325 mg PO daily	1.Biguanides 2.Inhibitors (ACE) 3.Hmg coa reductase inhibitors 4.Platelet aggregation inhibitor 4.salicylates 5.proton pump inhibitor 6.iron supplements	1. Extended release - management of DM2 2.control of HTN 3.Lowers total LDL cholesterol and triglycerides 4.Inhibits platelet aggregation 4.Prophylaxis of ischemic attacks and MI's 5.reduces accumulation of acid in the gastric lumen 6.treatment and prevention of iron deficiency anemia

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One disease process often influences the development of other illnesses. Based on your knowledge of pathophysiology (if applicable), which disease likely developed FIRST that created a "domino effect" in her life?

- Circle what PMH problem likely started **FIRST**
- Underline what PMH problem(s) **FOLLOWED** as domino(s)

Patient Care Begins:

Current VS:	**P-Q-R-S-T Pain Assessment (5th VS):**	
T: 99.2 F/37.3 C (oral)	**P**rovoking/Palliative:	Nothing/Nothing
P: 128 **(**regular)	**Q**uality:	Ache
R: 24 (regular)	**R**egion/Radiation:	Left arm that radiates into neck
BP: 108/58	**S**everity:	5/10
O2 sat: 99% room air	**T**iming:	Intermittent-20-30" at a time

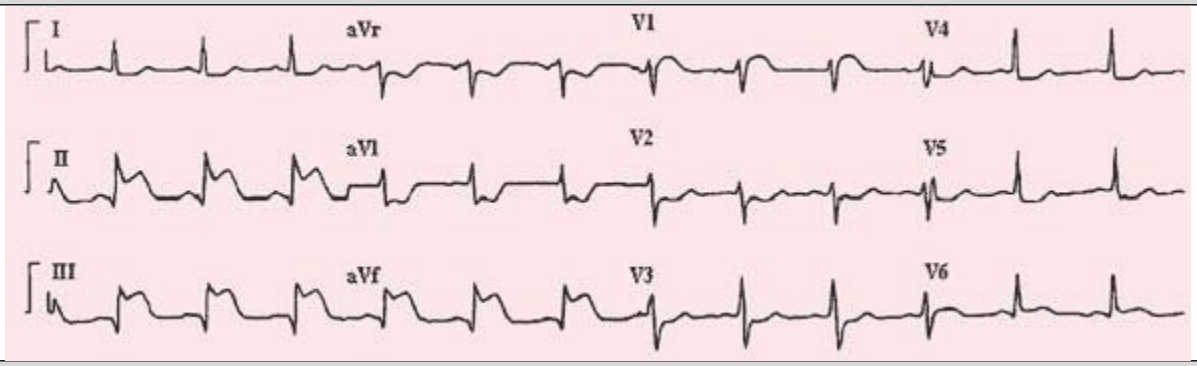
What VS data are RELEVANT and must be recognized as clinically significant by the nurse?

RELEVANT VS Data:	**Clinical Significance:**
Pulse	Hard is working harder to get blood circulating
Ache in left arm that radiates into neck	Blood is not getting to this area in the body and there may be a blockage of some sort. With her hyperlipidemia, plaque may have ruptured causing a thrombus formation
Pain rating of 5/10	This is a significant degree of pain and probably due to the possible blockage or semi-blockage. Possible MI
The amount of time the pain lasts	A part of the body is not receiving adequate tissue perfusion causing the pain. This could be semi blocked or blocked

Current Assessment:	
GENERAL APPEARANCE:	Anxious, appears uncomfortable, body tense
RESP:	Respirations labored, coarse crackles present in bases bilaterally anterior/posterior
CARDIAC:	Pale, diaphoretic, no edema, heart sounds regular S1S2 with no abnormal beats, pulses strong, equal with palpation at radial/pedal/post-tibial landmarks
NEURO:	Alert & oriented to person, place, time, and situation (x4)
GI:	Abdomen soft/non-tender, bowel sounds audible per auscultation in all 4 quadrants
GU:	Voiding without difficulty, urine clear/yellow
SKIN:	Skin integrity intact, skin turgor elastic, no tenting present

What assessment data is RELEVANT and must be recognized as clinically significant by the nurse?

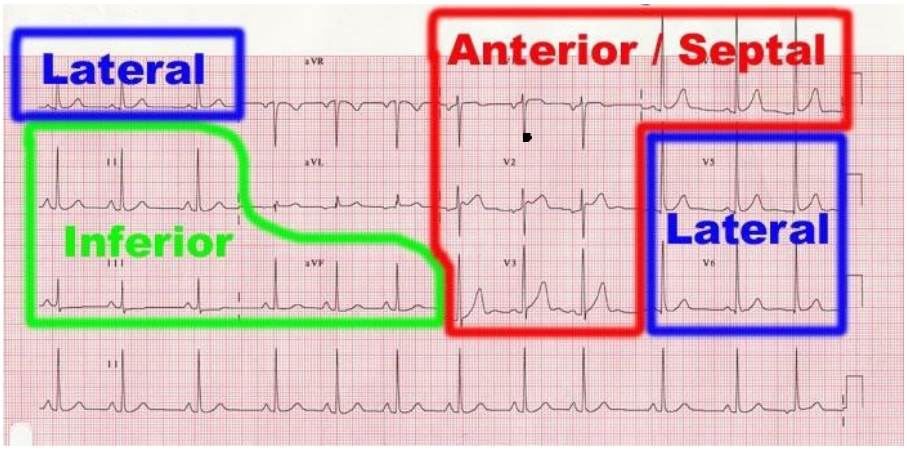
RELEVANT Assessment Data:	**Clinical Significance:**
Labored respirations	Pt is working harder for gas exchange
Coarse crackles	Coarse crackles could indicate that there is a blockage on the left side of the heart-(LV dysfunction)
Pale, diaphoretic	Pts with Diabetes often exhibit an absent MI because of cardiac neuropathy

12 Lead EKG:

Interpretation:
STEMI
Clinical Significance:
The ST segment is elevated signifying there is as blockage. It appears to be anterior

Location of ST Segment Changes (lateral/anterior/inferior)**:**

Use the diagram below to identify the location of the infarction:

Though this content on basic 12-lead EKG interpretation may be above the scope of knowledge required for most programs, take advantage of the APPLICATION of the principle that ***ischemia causes distinct EKG changes****. This is relevant when a patient on routine cardiac telemetry monitoring begins to have NEW ST-T wave changes. If the nurse understands the significance of these changes, a RESCUE of a patient with a change of status can begin!*



Radiology Report: Chest x-ray

What diagnostic results are RELEVANT and must be recognized as clinically significant to the nurse?

RELEVANT Results:	Clinical Significance:
Scattered bilateral opacities consistent with atelectasis or pulmonary edema	This CXR signifies that there is a dysfunction on the left side which is increasing pulmonary pressure and pulmonary edema. The blood is not able to get back to the heart and it is backing up into the lungs.

Radiology Report: Echocardiogram

What diagnostic results are RELEVANT and must be recognized as clinically significant to the nurse?

RELEVANT Results:	Clinical Significance:

Global left ventricle hypokinesis with ejection fraction of 25%	25% of blood is being ejected from the heart per contraction. Left ventricle hypokinesis-means that the left side of the hearts ability to pump is impaired.

Lab Results:

Complete Blood Count (CBC):	Current:	High/Low/WNL?
WBC (4.5-11.0 mm 3)	10.5	WNL
Hgb (12-16 g/dL)	12.9	WNL
Platelets(150-450x 103/µl)	225	WNL
Neutrophil % (42-72)	70	WNL

What lab results are RELEVANT and must be recognized as clinically significant by the nurse?

RELEVANT Lab(s):	Clinical Significance:
All	The CBC's indicate that the symptoms patient experiencing are not caused by an infection or internal hemorrhage.

Basic Metabolic Panel (BMP):	Current:	High/Low/WNL?
Sodium (135-145 mEq/L)	135	WNL
Potassium (3.5-5.0 mEq/L)	4.1	WNL
Glucose (70-110 mg/dL)	184	HIGH
Creatinine (0.6-1.2 mg/dL)	1.5	HIGH
Misc. Labs:		
Magnesium (1.6-2.0 mEq/L)	1.8	WNL

RELEVANT Lab(s):	Clinical Significance:
Glucose	The glucose is high because the SNS has kicked in blocking insulin and producing glucose .
Creatinine	Indicate reduced kidney function . The creatinine is a waste product that is often seen elevated because the kidneys are not being perfused so the renin-angiotensin system has also kicked in.

What lab results are RELEVANT and must be recognized as clinically significant by the nurse?

Cardiac Labs:	Current:	High/Low/WNL?
Troponin (<0.4 ng/mL)	1.8	HIGH
BNP (B-natriuretic Peptide) (<100 ng/L)	1150	HIGH

What lab results are RELEVANT and must be recognized as clinically significant by the nurse?

RELEVANT Lab(s):	Clinical Significance:
Troponin	Troponin is released after an MI and are specific to cardiac tissue ischemia
BNP	An elevation shows that this is cardiac and not respiratory

Lab Planning: Creating a Plan of Care with a PRIORITY Lab:

Lab:	Normal Value:	Clinical Significance:	Nursing Assessments/Interventions Required:
Troponin **Value:** **1.8** ng/mL	**Critical Value:**	Troponin is a protein released after contractions. A positive value shows the patient has injury to myocardium	Explain the purpose of sampling q6hrs x3 in conjunction with CK-MB and serial ECG's

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Clinical Reasoning Begins…

1. ***What is the primary problem that your patient is most likely presenting with?***
   Myocardial infarction

2. ***What is the underlying cause/pathophysiology of this primary problem?***

The heart becomes hypoxic within the first 10 seconds of a occlusion. Heart cells are deprived of O2 and glucose is needed for aerobic metabolism and contractility. Anaerobic metabolism begins-lactic acid accumulates. The pain atherosclerotic plaque ruptures and releases substances into the vessels. The platelet aggregation and thrombus formation. It can either semi block or fully block the vessel. (Lewis, 2017)

Collaborative Care: Medical Management

Care Provider Orders:	Rationale:	Expected Outcome:
Establish 2 large bore peripheral IVs	Large bore needles will be needed to give aggressive fluids if needed or even blood transfusions.	Increased fluid rehydration or blood volume at a faster rate
Metoprolol 5 mg IV push x1 now	Decreased HR and decreases frequency of attacks of angina.	Decrease in HR and less anginal pain
Nitroglycerin IV drip-start at 10 mcg and titrate to keep SBP >100	Increased coronary blood flow by dilating coronary arteries improving collateral circulation. Decreased left ventricular preload Reduces myocardial O2 consumption	Better tissue perfusion due to dilated coronary arteries. Angina relieved due to less O2 demand
Clopidogrel 600 mg po x1 now	Stops clotting (platelet aggregation) Helps stop further increase in thrombus or additional thrombus from forming	Absence of ST elevation and no further signs of blood clotting formation
Aspirin 324 mg (81 mg tabs x4) chew x1 now	Used in combination with other anti-coagulants to help stop platelet clotting and reperfusing the heart muscle. Will decrease the thrombus size To inhibit further thrombus formation size and/or future formation	No evidence of ST elevation, pain or clotting symptoms
Heparin 60 units/kg IV x1 Now	To determine if there is a blockage	No evidence of ST elevation that would indicate another clot Or that the clot is increasing Better tissue perfusion by evidence of ECG and HR decrease
To cath lab as soon as team ready		If there is a blockage indicated, a PCI will be performed

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PRIORITY Setting: Which Orders Do You Implement First and Why?

Care Provider Orders:	Order of Priority:	Rationale:
1.Establish 2 peripheral IVs 1. Metoprolol 5 mg IV push x1 now 2. Nitroglycerin IV drip-start at 10 mcg and titrate to keep SBP >100 3. Clopidogrel 600 mg po x1 now 4. Aspirin 324 mg (81 mg tabs x4) chew/po x1 now 5. Heparin 60 units/kg IV x1 now 6. To cath lab as soon as team ready	1.Establish 2 peripheral IVs 2. Nitroglycerin IV drip-start at 10 mcg and titrate to keep SBP >100 3.. Heparin 60 units/kg IV x1 now 4. Clopidogrel 600 mg po x1 now 5. Aspirin 324 mg (81 mg tabs x4) chew/po x1 now 6. To cath lab as soon as team ready	1. To prepare for nitro and rapid fluids or medications STAT 2. Decreases pain in ischemia and is a vasodilator to help with blood perfusion 3. Prevents further thrombus formation or from enlarging 4. to stop the binding of platelets 5. decreases platelet aggregation 6. To determine if blockage is present and PCI or CABG need performed

Medication Dosage Calculation:

Medication/Dose:	Mechanism of Action:	Volume/time frame to Safely Administer:	Nursing Assessment/Considerations:
Metoprolol 5 mg IV push (5 mg/5 mL vial)	Promotes reverse remodeling (removed the thickness of the myocardial wall)	**IV Push: 5ml Volume every 15 sec?** 1.25 or 1.3ml q 15 sec.	Monitor BP, ECG, and pulse rate Frequently during adjustments and during therapy. Monitor VS's and ECG q5/15 min. Monitor HR. If <40 bpm, administer atropine -0.25-1.5mg. IV Monitor dyspnea, rales, crackles, wt gain, peripheral edema and JVD Assess for angina

Medication/Dose:	Mechanism of Action:	Volume/time frame to Safely Administer:	Nursing Assessment/Considerations:
Heparin 60 units/ kg Weight: 62 kg (1000 units/mL)	Prevents conversion of fibrinogen to fibrin and prothrombin to thrombin	**IV Push: 3.7ml Volume every 15 sec?** 0.9ml q 15sec. .	Monitor for bleeding. Apply pressure to prevent bleeding or hematoma formation at venipuncture sites .

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Collaborative Care: Nursing

3. What nursing priority(ies) will guide your plan of care? *(if more than one-list in order of PRIORITY)*

Risk for decreased cardiac tissue output
Risk for ineffective tissue perfusion
[CITATION Saw15 \l 1033]

4. What interventions will you initiate based on this priority?

Nursing Interventions:	Rationale:	Expected Outcome:

Decreased cardiac output: Review lab data-CK-MB, troponin, CBC Review diagnostic studies Assess degree of debilitation	To identify if additional bleeding is occurring due to anti-coag's, to assess for increase in muscle damage To review ECG or echocardiogram to evaluate progress of medications given to increase tissues perfusion Continue to monitor LOC, VS, edema and peripheral pulses to ensure no further complications are arising or side effects from medications	No additional bleeding or troponin elevations No further ST elevation No neuro issues, good perfusion aeb peripheral pulses, hr, 02 sats, BP

5. What body system(s) will you most thoroughly assess based on the primary/priority concern?
Heart and lungs, neuro

6. What is the worst possible/most likely complication to anticipate? Stroke

7. What nursing assessments will identify this complication EARLY if it develops? Neuro, tachypnea, labored breathing, HTN, combativeness,

8. What nursing interventions will you initiate if this complication develops? O2 supplication, contact the physician for lab orders, cxr, diuretics, morphine, blood pressure medication

9. What psychosocial needs will this patient and/or family likely have that will need to be addressed? Explanations to the patient and family as to what has happened. Honor advance directives, use touch if possible and eye contact. If family is to anxious or upset, offer comfort and refrain from discussion unless prompted.

10. How can the nurse address these psychosocial needs?by listening and addressing the concerns in a way that they can understand. The pt also needs to be heard and spoken to.

Evaluation: Two Days Later…

JoAnn had an angiogram that revealed an occluded proximal right coronary artery (RCA). She received two bare metal stents with 0 percent residual stenosis. She has been in the intensive care unit (ICU) the past two days and is now transferring to the cardiac telemetry floor. She has been receiving scheduled furosemide 40 IV mg every 12 hours. Her creatinine increased from 1.7 to 2.1 today. The last dose of furosemide was given four hours ago. She has had 100 mL urine output the past four hours. She fatigues easily, but tolerates being up in the chair for short periods of time. Faint basilar crackles persist bilaterally and her O2 is at 2 liters per n/c.

What data from this history are RELEVANT and must be recognized as clinically significant to the nurse?

RELEVANT Data from History:	**Clinical Significance:**
Angiogram performed	Assess femoral perforation site for bleeding or hematoma
Occluded RCA	To assess VS's, perfusion, BP to maintain perfusion
Metal stents	Anti-coagulant therapy to be provided-education to patient
On telemetry	To assess ECG
Furosemide being administered	To eliminate fluids and prevent pulmonary edema
Increase in creatinine	Muscle breakdown contributing to increase in creatinine-continue to monitor to ensure kidney function resumes
I&O's	Continue to monitor to ensure adequate intake and at least 30ml/hr is urinated - monitor AKI
Crackles bilaterally	Auscultate to ensure crackles are improving and heart failure is not a risk.
O2 – 2liters n/c	To ensure adequate perfusion

Current VS:	**Most Recent:**	**P-Q-R-S-T Pain Scale:**	
T: 97.2 F/36.2 C (oral)	**T:** 97.5 F/36.4 C (oral)	**P**rovoking/Palliative:	
P: 76 **(**regular/irregular)	**P:** 82 **(**regular)	**Q**uality:	Denies pain
R: 20 (regular)	**R:** 20 (regular)	**R**egion/Radiation:	

BP: 122/58	**BP:** 116/68	**S**everity:	
O2 sat: 95% room air	**O2 sat:** 94% room air	**T**iming:	

Current Assessment:	
GENERAL APPEARANCE:	Resting comfortably, appears in no acute distress
RESP:	Denies SOB, non-labored respiratory effort, breath sounds equal aeration bilaterally with faint crackles in both bases
CARDIAC:	Pink, warm & dry, 1+ pitting edema in lower extremities, heart sounds regular–S1S2, pulses strong, equal with palpation at radial/pedal/post-tibial landmarks
NEURO:	Alert & oriented to person, place, time, and situation (x4)
GI:	Abdomen soft/non-tender, bowel sounds audible per auscultation in all 4 quadrants
GU:	50 mL urine output since furosemide IV administered two hours ago, urine clear/yellow
SKIN:	Skin integrity intact, femoral puncture site soft, non-tender with no drainage, redness, or bruising

1. What clinical data are RELEVANT and must be recognized as clinically significant?

RELEVANT VS Data:	**Clinical Significance:**
The vital signs look stable and the patient is not in any respiratory distress Or pain	The treatment performed on the patient has been successful. The medications are keeping the blood pressure stable, no further respiratory exacerbations and good perfusion.
RELEVANT Assessment Data:	**Clinical Significance:**
Crackles Edema	To ensure they don't get worse-this might indicate occlusion or heart failure Monitor to ensure edema doesn't worsen and that kidneys are working and that medication is also working

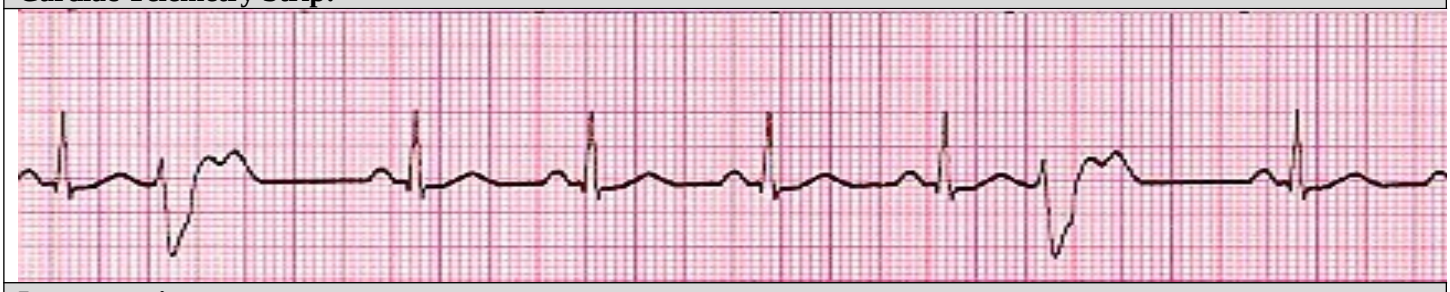
2. Has the status improved or not as expected to this point? It has improved.

3. Does your nursing priority or plan of care need to be modified in any way after this evaluation assessment? yes

Risk-prone health behavior

Knowledge, readiness for enhanced

[CITATION Saw15 \l 1033]

Cardiac Telemetry Strip:

Interpretation:
NSR w/PVC's
Clinical Significance:

This is normal after an MI. Continue to monitor electrolytes and O2. Determine the patients anxiety level. Stress reduction techniques may be necessary.

Two hours later…

JoAnn is resting quietly in bed. Foley catheter assessment reveals no new urine in bag from previous assessment two hours ago. Bladder scan reveals no residual urine. Review of labs reveal increased creatinine. The primary nurse gives the following SBAR to the on-call cardiologist:

Situation:

Name/age: Joann Smith, age 68

BRIEF summary of primary problem: Decrease in residual urine for 2 hours following 2 stent placements for an occluded proximal RCA. Furosemide 40mg. IV being administered. Creatinine is continuing to climb.

Day of admission/post-op #: pt is post op 2 days

Background:

Primary problem/diagnosis: AKI

RELEVANT past medical history: HTN, DM2

Assessment:

Vital signs:

Most Recent:
T: 97.5 F/36.4 C (oral)
P: 82 (regular)
R: 20 (regular)
BP: 116/68
O2 sat: 94% room air

RELEVANT body system nursing assessment data: Lungs (crackles), kidneys (increasing creatinine), edema 1+ pitting

TREND of any abnormal clinical data (stable-increasing/decreasing): creatinine is increasing-no urine output

INTERPRETATION of current clinical status (stable/unstable/worsening): Unstable as possible AKI

Recommendation:

Suggestions to advance plan of care: Consult with Nephro

The physician addresses your concern and orders a repeat basic metabolic panel (BMP and repeat x1 furosemide (Lasix) 40 mg IV push. You obtain the following results one hour later:

Basic Metabolic Panel (BMP):	Current:	High/Low/WNL?	Most Recent:
Sodium (135-145 mEq/L)	135	NORMAL	**132**
Potassium (3.5-5.0 mEq/L)	5.9	HIGH	**4.1**
Glucose (70-110 mg/dL)	152	HIGH	**184**
Creatinine (0.6-1.2 mg/dL)	2.9	HIGH	**2.1**

RELEVANT Lab(s):	Clinical Significance:	TREND: Improve/Worsening/Stable:
K+	Elevated K+ can cause dysrhythmias	Worse—the kidneys can not remove the extra K+
Glucose	Body is continuing to initiate the SNS increasing the glucose and inhibiting the insulin-it increases the glucose to make up for O2 demand	Worse-O2 demand is increasing aeb by Sp02 decrease
Creatinine	The abnormally high creatinine level indicates that the kidneys are not filtering the toxins out of the bloodstream.	Worse-furosemide was not adequate to remove the fluids
Na+:	The AKI may cause the Na to increase -in this case it brought it to normal..	-We will need to continue to watch this level and avoid excessive intake of sodium to avoid volume expansion, hypertension and HF. -

Current Assessment:	
GU:	One hour post furosemide administration IV, continues to have no urine output.

1. ***Has the status improved or not as expected to this point? This patient has improved cardiovascular but now the kidney function is compromised.***

2. ***Does your nursing priority or plan of care need to be modified in any way after this evaluation assessment? yes***

3. ***Based on your current evaluation, what are your nursing priorities and plan of care?***

Continue to monitor I&O's -wt q am before breakfast with same amount of clothing on. Monitor for hypervolemia. Auscultate lung sounds for worsening crackles or diminished lung sounds.
Continue to monitor K+ and Na+ to avoid hyperkalemia which can cause dysrthmias.
Use aseptic technique to avoid infection
Monitor medications that are potentially nephrotic. The kidneys are not filtering at this point and doses may need to be decreased.
BP modification to avoid hyperkalemia
Diet modification to avoid hyperkalemia and hypernatremia

Caring and the "Art" of Nursing

1. ***What is the patient likely experiencing/feeling right now in this situation?***
   Confusion, frustration, blame, helplessness, depression, anxiety The patient came in for an MI and is now having compromised kidney function. She may lash out, family may lash out.

2. ***What can you do to engage yourself with this patient's experience and show that she matters to you as a person?***
Definitely take the time to sit down and discuss the events. Ask what they understand about the condition of the MI and the events that took place after. Discuss modification needs for this time. Acute kidney damage can be reversed, so it is pertinent that compliance of the treatment plan are understood and followed through. Avoid placing blame but agree that their feelings are valid.

Use Reflection to THINK Like a Nurse

Reflection-IN-action (Tanner, 2006) is the nurse's ability to accurately interpret the patient's response to an intervention in the moment as the events are unfolding to make a correct clinical judgment.

1. ***What did I learn from this scenario?***
   This scenario showed me that just because a person came in for one diagnosis and are being treated for it doesn't mean other organ systems can't be affected. It is pertinent to understand that reviewing labs and diagnostic tests early can detect a problem or escalating issue. In this case, the pt came in with an MI and now her kidneys are in

shock. This could be acute or chronic depending on the body, the early treatment, prevention of further damage and continuous monitoring. Education to the patient is also important. If the patient does not understand the importance of compliance-it could be detrimental to their overall health and well-being.

2. ***How can I use what has been learned from this scenario to improve patient care in the future? Vigilance with monitoring labs, diagnostics and the person is crucial. Don't assume you are only taking care of one system. Other systems can be involved that may need monitoring and pampering until the body develops homeostasis.***

Deglin, J.H., Vallerand, A.H. & Sanoski, C.A. (2017). Davis's drug guide for nurses (15th ed). F.A. Davis Company: Skyscape Mobile Platform.

Lewis, B. H. (2017). Medical-surgical nursing: assessment and management of clinical problems (10th ed.). In *Medical Surgical Nursing 10th edition.* Elsevier.

Sawyer-Sommers, M., Brunner, L.S., & Fannin, E.F. (2015). Diseases and disorders: A nursing therapeutics manual (5th ed). F.A. Davis Company: Skyscape Mobile Platform.