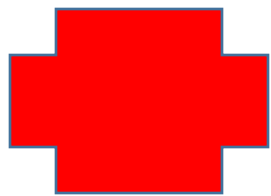


# TRAUMA ALERT



**Welcome to the Trauma Alert Education Newsletter brought to you by  
Beacon Trauma Services**

**Edition 15 (2021)**

## What is TQIP?



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**A QUALITY PROGRAM  
of the AMERICAN COLLEGE  
OF SURGEONS**

Source: <https://tinyurl.com/n9395ydf>

- The American College of Surgeons Trauma Quality Improvement Program (ACS TQIP) works to elevate the quality of care for trauma patients in trauma centers.
- TQIP accomplishes its work by collecting data from trauma centers, providing feedback about the trauma centers' performance and identifying institutional characteristics that the particular trauma center staff can implement to improve patient outcomes.
- The program uses risk adjusted benchmarking to provide hospitals with accurate national comparisons.
- Memorial Hospital of South Bend Trauma Center is focusing on the following TQIP indicators and data:
  - Ventilator Associated Pneumonia (VAP)
  - Acute Kidney Injury (AKI)
  - Unplanned admission to the ICU
  - Unplanned visit to the OR
- This newsletter will focus on AKI.

## Acute Kidney Injury (AKI)



Source: <https://tinyurl.com/rbh4f5b3>

- By definition, AKI is the abrupt decrease (within 48 hours) in kidney function that includes:
  - Increase in serum creatinine of absolute increase of greater than 0.3 mg/dl, or a percentage increase of 50%.
  - Increase in serum BUN.
  - Decrease in urine output of less than 0.5 ml/kg/hour for more than 6 hours.
  - Impairment of fluid, electrolyte, and acid-base balance.
- The term acute kidney injury is replacing the earlier term acute renal failure (ARF) to better reflect the spectrum of injury to the kidney.
- AKI is the leading cause of death after bleeding and traumatic brain injury in trauma patients.
- AKI is seen in 1% to 5% of all hospitalized patients and up to 25% of patients in the ICU.
  - Approximately 70% of patients who develop AKI are 70 or older.
  - 50% of trauma patients with AKI will have a longer length of stay.
- The effects of aging on the kidney;
  - Renal blood flow decreases by 1% per year after the age of 30.
  - Renal functional declines by 50% or more by the age of 70.
  - Older patients are more likely to have one or more co-morbidities.
  - The elderly also have a decrease in muscle mass and protein intake, which impacts the rate of creatinine production.
- The effects of medications on AKI;
  - NSAIDs (Ibuprofen, Toradol, and Naprosyn), ACE inhibitors, antimicrobials (acyclovir), diuretics, and antidepressants affect the blood flow to the kidneys.
  - Antibiotics like Vancomycin in higher doses can also affect the kidneys.
  - The risk increases when the medications are given over a long period of time or at higher doses and when used in combination with each other.
  - CT contrast, which is commonly given in trauma patients, can decrease the kidney function and lead to AKI. It is important to monitor the GFR (glomerular function rate) closely and administer IV fluids to flush the dye out of the kidneys.

- The following co-morbidities place the patient at a higher risk to develop AKI;
  - Chronic kidney problems.
  - Diabetes.
  - Hypertension.
  - Heart disease.
  - Obesity.
- When the trauma patient presents with the following conditions it also increases the risk for AKI;
  - Shock.
  - Hypotension.
  - Hemorrhage.
  - Dehydration.
  - Burns.
  - Traumatic injuries.

### Causes of Acute Kidney Injury

#### Prerenal

Sudden and severe reduction in blood pressure (shock) or interruption of blood flow to the kidneys from severe injury or illness

- Blood loss
- Dehydration
- Heart failure
- Sepsis
- Vascular occlusion

#### Intrinsic Renal

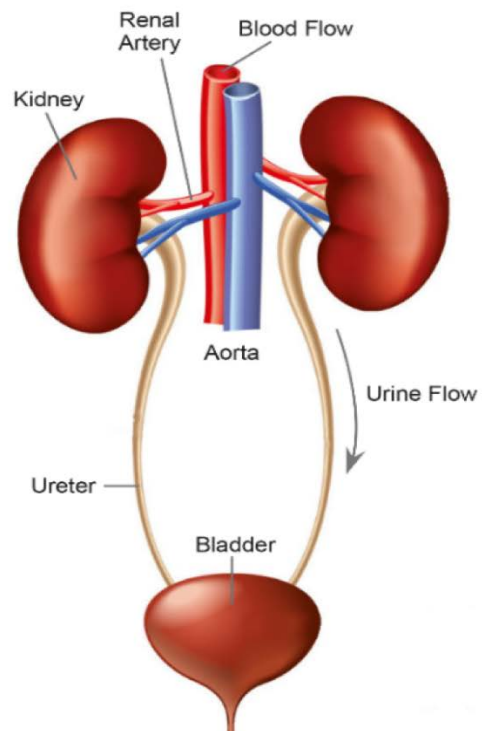
Direct injury to the kidneys by inflammation, drugs, toxins, infection, or reduced blood supply

- Acute tubular necrosis
  - Drugs
  - Toxins
  - Prolonged hypotension
- Glomerulonephritis
- Acute tubular necrosis
  - Drugs
  - Toxins
  - Autoimmune disease
  - Infection
- Small-vessel vasculitis

#### Postrenal

Sudden obstruction of urine flow due to enlarged prostate, kidney stones, bladder injury or tumor

- Benign prostatic hyperplasia
- Cervical cancer
- Meatal stenosis/phimosis
- Retroperitoneal fibrosis
- Prostate cancer
- Urinary calculi



## **AKI Clinical Course**

- Because kidney function usually returns to baseline if AKI is identified early and appropriately treated, all nurses need to be alert for risk factors for AKI, able to recognize the early signs and symptoms, and implement nursing interventions and treatments ordered by the healthcare provider.
- **Initial Phase**
  - This is the time between the kidney injury and the reduction in kidney function.
  - By recognizing that the patient has co-morbidities that put them at risk or that they take or have been given any of the high risk medications the healthcare provider can help reduce any injury.
  - By paying close attention to the mechanism and presenting clinical state of the trauma patient the healthcare provider can also help to reduce the potential for injury.
    - For example, the elderly trauma patient with preexisting conditions of diabetes and hypertension that is hypotensive and has received several contrast CT's to determine injury is at a much greater risk for AKI than the average 30 year old trauma patient.
  - During this phase the nurse can play a pivotal role in preventing or minimizing AKI. The nurse should be looking at co-morbidities, prescribed medications, and administered medications, presenting clinical state, lab results and the amount of CT contrast the patient received.
- **Oliguric Phase**
  - During this phase urine output decreases. This phase usually occurs 1 to 7 days after the kidney injury and lasts 10 to 14 days.
  - In this phase the urine output is decreased or has stopped.
  - The labs will reflect: hyponatremia, hyperkalemia, metabolic acidosis, and elevated BUN and creatinine.
  - This is why it is so vital that the nurse is looking at the lab work and measuring urine output in patients at risk for AKI. The nurse can also play a pivotal role in this phase of AKI.
  - During this phase the nurse still can play a pivotal role in minimizing the damage to the kidneys.
- **Diuretic Phase**
  - When healthcare providers recognize AKI and intervene early the patient starts this phase where urine production increases because the nephrons have regained the ability to secrete.
  - Because of the sudden increase in production of urine and fluid loss the patient may experience hypovolemia, hypotension, hyponatremia and hypokalemia. This should stabilize once the kidneys return to normal.

- **Recovery Phase**

- This phase occurs when the kidneys regain the ability to manage metabolic waste and the BUN and creatinine return to normal.
- This process can take several weeks and in some cases up to a year.

### **Nursing Assessment and Interventions for AKI**

- Obtain a detailed medical and medication history from the patient as assess if they are at risk for AKI upon admission.
- For the trauma patient obtain the mechanism of the injury, the amount of IV fluids given, the amount of CT contrast given, admission labs, medications administered prior to admission.
- Based on the mechanism and presenting clinical state assess the patient for Rhabdomyolysis. The increase in the myoglobin in this condition can severely damage the kidneys, as that is where the myoglobin is eliminated.
- Assess and closely monitor the patient fluid status with accurate intake and output levels. Daily weights should also be done.
- Monitor vital signs. Assess heart and lung sounds.
- Monitor BUN, creatinine, sodium, potassium, magnesium, GFR, calcium, and phosphate.
- Monitor urine specific gravity and sodium levels.
- Monitor for metabolic acidosis. An ABG will show a low pH and a low bicarbonate level.
  - Due to the acidosis the patient may exhibit Kussmaul respirations (rapid, deep breaths).
  - Other signs of metabolic acidosis include flushed skin, headache, tachycardia, and alterations in level of consciousness.
- Assess the nutritional status of the patient. Undernourishment is present in 20% of hospitalized patients, especially in older adults.
- Perform an AKI Risk Index for operative procedures. From 1% to 5% of all surgery patients will experience AKI as a postoperative complication. The AKI Risk Index outlines nine risk factors;
  - Male  $\geq$  age 56, active congestive heart failure, ascites, hypertension, emergency surgery, intraperitoneal surgery, mild or moderate renal insufficiency (preop creatinine  $>1.2$  mg/dl), and diabetes treated with oral medications or insulin.
  - Risk is classified as follows:
    - Class I: 0 – 2 risk factors.
    - Class II: 3 risk factors.
    - Class III: 4 risk factors.
    - Class IV: 5 risk factors.
    - Class V: 6 or more factors.

## Recognition and Thank you

- Health Coordinator Day- August 23<sup>rd</sup>.



Source: <https://tinyurl.com/yaq4y9gk>

Mr. P, who is 70 years of age, was admitted after falling at home and fracturing his hip. He laid on his garage floor for several hours before his son came to check on him after he didn't answer his phone. He is due to undergo surgery tomorrow morning. He has a history of diabetes, congestive heart failure, and hypertension. His admission labs were within normal limits. His repeat labs 6 hours later showed an increase in his creatinine and BUN, his potassium is now 4.9, and he has a decrease in urine output, he also has an increase in his CK/Myoglobin level and dark urine that is frothy.

1. Based on the above scenario what is the AKI Risk Index for Mr. P?
  - a. Class III.
  - b. Class II.
  - c. Class IV.
  - d. Class 1.
2. What concerns you about the mechanism of injury, dark urine, and increase in CK/myoglobin?
  - a. Nothing its normal for his age.
  - b. Mr. P may have Rhabdomyolysis.
  - c. Mr. P may need an extra protein shake.
  - d. Mr. P may have a compartment syndrome.
3. Which of the following are important nursing interventions for Mr. P?
  - a. Obtain a detailed medical and medication history
  - b. Monitor labs and vital signs.
  - c. Monitor daily weight, intake, and output.
  - d. Notify the physician of the risk for AKI and the abnormal lab results.
  - e. All of the above.

**Answers at the End**

## Teamwork



Source: <https://tinyurl.com/y9qy28c6>

### Test your knowledge answers-

1. C
2. B
3. E

### References-

Ali Becky, Gray-Vickery Peg. Limiting the damage from Acute Kidney Injury. *Nursing* 2021. March: 22-31.

Hulse Coral, Davies Annette (2018). Acute Kidney Injury: prevention and recognition. *Nursing Times*: 111:30/31, 12 – 15.

**For questions or future submissions contact Stacie Bobeck MSN, RN, CEN, CPEN, TCRN, SANE-A Beacon Trauma Educator and Outreach/Injury Prevention Coordinator at [sbobeck@beaconhealthsystem.org](mailto:sbobeck@beaconhealthsystem.org)**