

Supplementary files

Supplementary 1. Knowledge assessment form for doctors

A. Demographics

Hospital	<input type="checkbox"/> Rwamagana <input type="checkbox"/> Kinyihira <input type="checkbox"/> Ruhango <input type="checkbox"/> Bushenge <input type="checkbox"/> Rwinkwavu <input type="checkbox"/> Shyira <input type="checkbox"/> Rutongo <input type="checkbox"/> Remera-Rukoma <input type="checkbox"/> Gihundwe <input type="checkbox"/> Gisenyi
Age of the respondent (in years)
Gender	<input type="checkbox"/> Female <input type="checkbox"/> Male
Education level	<input type="checkbox"/> Registered nurse <input type="checkbox"/> Medical doctor (general practitioner)
Years of practice
Department	<input type="checkbox"/> Internal medicine <input type="checkbox"/> Surgery <input type="checkbox"/> Obstetrics- Gynecology <input type="checkbox"/> Emergency <input type="checkbox"/> HDU/ICU <input type="checkbox"/> ALL
Have you had previous AKI lecture/training?	<input type="checkbox"/> during undergraduate <input type="checkbox"/> while working as part of CPD training <input type="checkbox"/> I do not remember
How often have you seen patients with acute kidney injury on the wards in the last 6 months?	<input type="checkbox"/> frequently <input type="checkbox"/> rarely <input type="checkbox"/> never <input type="checkbox"/> I do not know
How often do you think you missed acute kidney injury diagnosis on the wards in the last 6 months?	<input type="checkbox"/> frequently <input type="checkbox"/> rarely <input type="checkbox"/> never <input type="checkbox"/> I do not know
How comfortable do you feel managing AKI patients?	<input type="checkbox"/> very comfortable <input type="checkbox"/> comfortable <input type="checkbox"/> less comfortable <input type="checkbox"/> not comfortable at all

HDU: high dependent unit, ICU: intensive care unit, CPD: continuous professional development.

B. Clinical assessment

Clinical vignette to assess knowledge about AKI

Each of the following clinical case scenarios will mimic typical patients, encountered routinely, in your daily practice. Each question will give you relevant information on presenting symptoms, history of illness, physical exam findings, laboratory and radiologic results, diagnosis, and treatment plan. At the end of the case presentation there are multiple choice questions and you are requested to choose the **best** answer(s).

Case 1:

A 25 year-old man presents to emergency department with a 3 days history of watery diarrhea and diffuse abdominal pain. He is HIV positive and he is on HAART (tenofovir, lamivudine, and efavirenz) since 2015, his CD4 count is 690

cells/ml and his viral load is undetectable. His surgical history is unremarkable. Vital signs 100/60mmHg, pulse rate is 115/min, T= 37°C, SPO2 98% on room air, RR= 12 cycles/min. He has dry mucus membrane and dry axilla. Physical exam regular rhythm, tachycardia, there is no abdominal tenderness nor guarding, bowel sounds are slightly increased. The remainder of physical exam is unremarkable.

Initial lab tests are done and the patient is admitted in observation room while waiting for results, he is started on IV fluid. 6 hours later lab tests showed Hb 16, Hct 42, WBC 11.700 (N=62%, L=23%,M=11%, E=4%), PLT 150.000, Serum creatinine= 1.9 mg/dl, urea 50mg/dl, K 3.9mEq, Na: 144 meq/dl, Stool analysis showed Entamoeba histolytica. He is put on metronidazole po 500mg tid for 7days, buscopan and oral rehydration solution. His renal function tests are repeated the following day: serum creatinine= 1.2 mg/dl, urea 18 mmol/dl, K4.2, Na: 140. He is discharged home to continue his medications.

What is the most likely cause of his renal dysfunction?

- a) Prerenal azotemia
- b) Tenofovir toxicity
- c) HIV-associated nephropathy
- d) Acute tubular necrosis

What type of IV fluid will best correct his lab abnormalities:

- a) Dextrose 5%
- b) Dextrose 10%
- c) Ringers lactate
- d) Heamacel

What physical finding is in favor of hypovolemia in this patient?

- a) respiratory rate of 12
- b) Absence abdominal tenderness
- c) Dry mucus membrane and axillar
- d) Lack of peripheral edema

Case 2:

A 68 year-old woman with no previous medical history is brought to the hospital by her son for fever, chills and vomiting. Symptoms started 2 days ago and included mild headache, fever and polyarthralgia. At arrival to the ED, her BP is 90/50mmHg, pulse rate is 120/min, T= 39°C, SPO2 98% on room air, RR= 14 cycles/min. She is diaphoretic, ill looking but fully awake, cardiovascular system exam reveals tachycardia, with a regular rhythm and without a murmur. Pulmonary and abdominal exams are unremarkable. She is diagnosed with Plasmodium falciparum malaria, prescribed artesunate IV and paracetamol IV, and admitted to the hospital. 2 hours later, other results are available, WBC = 10, Hb= 14g/dl, platelets 130.000. Serum creatinine is 1.9 mg/dl, urea is 43mmol/L. Her blood pressure is the same. What is the next best step in the management of this patient:

- a) Add broad spectrum antibiotics
- b) Start IV Normal saline
- c) Start IV furosemide
- d) Keep the current management and reevaluate in 2 days

Case 3:

A 27 year-old woman is transferred to the District Hospital for management of post-partum hemorrhage. She is gravida1 and para 0, no known medical illness and her pregnancy was uneventful. She had all the 4 antenatal care visits. Earlier today, the patient presented to health center in active labor, delivered a healthy 3.2 Kg baby girl and was sent to post-labor ward for observation. 1 hour later, a nurse found her unresponsive, her BP is 80/40, HR 130bpm, RR 18 cycles/min and SPO2: 95%; all her clothes and bed sheets are stained with red blood and gynecological exam revealed active vaginal bleeding. Resuscitation with IV fluid is started, while she is being urgently transferred to DH for further assessment and management. A diagnosis of uterine atony was made after assessment by a doctor at the district hospital, hysterectomy was performed after other interventions failed and the patient was hemodynamically stabilized. She required 5l of Normal Saline and massive red blood cell transfusion during operation. Urine output is recorded at 180ml. On the second day post-delivery, the patient is awake but weak, BP 100/60mmHg, HR 90bpm, RR 12 cycles/min, cardiovascular and pulmonary exam are unremarkable. Abdomen is tender and the incision site is clean. There is 250ml of concentrated urine. These are other lab results: Hb 10.7, Hct

31, WBC 8.700 (N=65%, L=23%,M=11%, E=1%), PLT 150.000, Serum creatinine= 5.5 mg/dl, urea 60 mmol/dl, K 6.5 mEq, Na: 140 meq/dl. What is the most likely diagnosis?

- a) Acute Interstitial Nephritis
- b) Acute Tubular necrosis
- c) Post-partum Glomerulonephritis
- d) Thrombotic Thrombocytopenic purpura.

What would be an indication for emergent dialysis in the patient?

- a) Serum creatinine
- b) Serum urea
- c) Hyperkalemia
- d) oliguria

Case 4:

A 40 year-old man with fever, severe abdominal pain and vomiting starting 5 days prior presentation. He took ibuprofen for pain which did not help. His past medical history is remarkable for asthma, controlled with Seretide 250/50 (fluticasone /salmeterol), and peptic ulcer disease. The patient is ill looking, lying in bed, shivering but alert. Vital signs: BP was 87/45mmHg, HR:130bpm, RR 12 cycles/min, T 39C. Physical exam is notable for mild abdominal distention, generalized guarding and marked rebound tenderness in the epigastrium region. No masses were palpated and there were reduced bowel sounds. The remainder of the exam is unremarkable. Initial lab tests showed WBC 18, Hb 12g/dl, plt 210. Upright abdominal x ray showed air below the right hemidiaphragm, and the bed side abdominal ultrasound is positive for free fluid in the peritoneum. Resuscitation with IV fluids was started and patient rushed to operating room for urgent laparotomy for suspected ruptured peptic ulcer which has complicated by sepsis. After surgery, he was started on broad spectrum antibiotics and admitted in high dependent unit for close follow up. 3 hours post-surgery other results are available: serum creatinine 3.6mg/dl, K: 5.9, Na: 140, urea: 42mg/dl

What is the risk factor for AKI this patient?

- a) Age
- b) delay in initiation of antibiotics
- c) Sepsis
- d) use of ibuprofen

What physical exam finding is the major risk factor for AKI in this patient?

- a) Hyperthermia
- b) Hypotension
- c) Abdominal distension
- d) Rebound tenderness

Case 5 :

A 75 year-old male with Chronic Kidney Disease and hypertension presents to ED with slurred speech and right sided body weakness. BP was 180/110mmHg, HR:110bpm, RR 12 cycles/min. Physical exam revealed an irregularly irregular pulse, right hemiparesis and expressive aphasia. A brain CT performed with and without contrast showed an infarct in the left frontal and parietal lobes. The patient was put on aspirin, simvastatin, amlodipine and atenolol. 2 days later his creatinine is 3mg/dl (baseline was 1.2 mg/dl) and urine output is 250ml/24hours. A diagnosis of contrast-induced acute kidney injury is considered. What treatment could have potentially reduced the risk of kidney injury in this patient?

- a) Dialysis after contrast Brain CT
- b) 2L of Normal saline prior to performing the CT
- c) 2L of D5W prior to CT
- d) 2L of normal saline post CT

Case 6:

61 year-old woman is evaluated for fatigue. She has chronic hypertension and is well controlled with amlodipine 10 mg OD and low salt diet. 3 months ago, she was seen in the clinic for complaints of chronic epigastric pain and heartburn. She was diagnosed with gastroesophageal reflux disease (GERD) and treated with omeprazole for 2 months and her symptoms improved. She continued to obtain omeprazole over the counter from a nearby pharmacy. Five days prior to presentation, she began to feel more fatigued and today she decides to consult a doctor at a district hospital. Vital signs are normal and physical exam is unremarkable. Basic laboratory are obtained and reveal: Hb 12.7, Hct 34, WBC 8.700 (N=65%, L=23%,M=11%, E=1%), PLT 198.000, Serum creatinine= 2.5 mg/dl (baseline 1.0 mg/dl), LDH 80U/L, Urine dip stick is positive for leukocytes, trace proteins, and pH 6. There are white blood cell casts on urine microscopy. Urine culture is negative. Imaging of her kidneys showed that they are normal size with good cortico-medullary differentiation.

Which of the following is the most likely diagnosis?

- e) Acute Interstitial Nephritis
- f) Acute Tubular necrosis
- g) Drug-induced Glomerulonephritis
- h) Hypertensive nephrosclerosis

What is the most likely cause of her renal dysfunction?

- a) Hypertension
- b) Amlodipine
- c) Omeprazole
- d) None of the above

Supplementary file 2. Knowledge assessment form for nurses/midwives

A. Demographics

1.Hospital	<input type="checkbox"/> Rwamagana <input type="checkbox"/> Kinyihira <input type="checkbox"/> Ruhango <input type="checkbox"/> Bushenge <input type="checkbox"/> Rwinkwavu <input type="checkbox"/> Shyira <input type="checkbox"/> Rutongo <input type="checkbox"/> Remera-Rukoma <input type="checkbox"/> Gihundwe <input type="checkbox"/> Gisenyi
2.Age (in years)
3.Gender	<input type="checkbox"/> Female <input type="checkbox"/> Male
4.Education level	<input type="checkbox"/> Registered nurse A1 <input type="checkbox"/> diploma nurse A2 <input type="checkbox"/> Registered nurse A0 <input type="checkbox"/> Master's level
sh5.Years of experience
6.Department	<input type="checkbox"/> Internal medicine <input type="checkbox"/> Surgery <input type="checkbox"/> Obstetrics- Gynecology <input type="checkbox"/> Emergency <input type="checkbox"/> HDU/ICU
7.Have you ever managed a patient with AKI on wards	<input type="checkbox"/> No <input type="checkbox"/> Yes
8.Previous AKI lecture/training	<input type="checkbox"/> during undergraduate <input type="checkbox"/> while working <input type="checkbox"/> never

B. Clinical assessment

The following clinical case scenarios will mimic typical patients, encountered routinely, in your daily practice. Each question will give you relevant information on presenting symptoms, history of illness, physical exam findings, laboratory and radiologic results, diagnosis, and treatment plan. At the end of the case presentation there are multiple choice questions and you are requested to choose the correct answer(s).

Read the questions and circle the correct answer or answers

You are assigned to work in male ward today. One of your patients is a 70-year old male patient. He presented to the emergency department with generalized weakness, headache, fever, vomiting and polyarthralgia for 5 days. The review of symptoms found decreased urine output. He had no other known illnesses. After physical exam and investigations, he was diagnosed and admitted to the hospital for severe malaria complicated to acute kidney injury. He is on day 3 of hospitalization and is on coartem (vomiting has stopped) and paracetamol. He also received IV fluid during the first 2 days of admission

1. What are the most important risk factors for AKI in this patient?
 - a) Age
 - b) Dehydration
 - c) Immobilisation
 - d) Drug toxicity
2. What findings on admission most favored the diagnosis of AKI?

- a) History of vomiting
 - b) Polyarthralgia
 - c) Decreased urine output
 - d) Fever
3. Based on the definition of AKI, which finding best support the diagnosis of AKI?
- a) Changes in serum creatinine
 - b) Changes in serum urea
 - c) Changes in serum sodium
 - d) Changes in urine output
4. Which of the following medications would increase the risk of acute kidney injury in this patient?
- a) Ibuprofen
 - b) Paracetamol
 - c) Tramadol
 - d) Aspirin
5. Which of the following is most important in the care of patient admitted for AKI?
- a) Measuring and documenting urine output daily
 - b) Checking serum creatinine every 8 hour
 - c) Checking full blood count everyday
 - d) Restricting protein intake
6. If this patient had found you in emergency room with signs of dehydration, what type of IV Fluid would have you administered him while waiting for the doctor to come and examine him?
- a) Dextrose 5%
 - b) Dextrose 10%
 - c) Normal saline
 - d) Hemacel
7. Which of the following sign or symptom is supportive of the diagnosis of dehydration?
- a) Diffuse skin rash
 - b) Dry oral mucosa
 - c) Chest pain
 - d) Abdominal pain

Supplementary file 3. Assessment of availability, importance and acceptability of AKI clinical practice guideline

A. Availability of AKI guideline

I have previously used AKI guideline yes No

If yes local guideline international guideline

B. Importance of AKI guideline

1. A guideline on the management of AKI is needed in the hospital

strongly agree agree neutral disagree strongly disagree

2. The guideline will improve the knowledge of health providers about AKI

strongly agree agree neutral disagree strongly disagree

3. This guideline will improve clinical outcomes of AKI patients in our hospital

strongly agree agree neutral disagree strongly disagree

4. The guideline will improve health care service in this hospital

strongly agree agree neutral disagree strongly disagree

5. The guideline will decrease the number of unnecessary transfers to higher level

strongly agree agree neutral disagree strongly disagree

C. Acceptability of AKI guideline

6. I will follow the guideline if available in the hospital

strongly agree agree neutral disagree strongly disagree

Supplementary File 4. Assessment for hospital capacity to diagnose and manage AKI:

1. wards:

1.1 staff present during daily clinical ward rounds

- Doctor (General practitioner): always frequently rarely never
- Registered Nurse: always frequently rarely never
- Doctor and nurse round together always frequently rarely never

1.2 Equipment readily available on wards:

- Thermometer always available frequently available rarely available never available
- Stethoscope; always available frequently available rarely available never available
- Blood pressure apparatus: always available frequently available rarely available never available
- Weighing scales; always available frequently available rarely available never available

2. Laboratory capacity on daily basis:

- Blood count, always available frequently available rarely available never available
- Blood culture always available frequently available rarely available never available
- Serum glucose always available frequently available rarely available never available
- Glucometer always available frequently unavailable rarely available never available
- Glucose strips always available frequently available rarely available never available
- Blood smear for malaria parasites
 always available frequently available rarely available never available
- Urine dipstick stick for proteins and RBC
 always available frequently available rarely available never available
- Urine culture always available frequently available rarely available never available
- Serum creatinine always available frequently available rarely available never available
- Serum urea always available frequently available rarely available never available
- Serum potassium always available frequently available rarely available never available
- Serum sodium always available frequently available rarely available never available
- Arterial blood gas yes No
- Urine microscopic exam always available frequently available rarely available never available
- Microscope always available frequently available rarely available never available
- Centrifuge always available frequently available rarely available never available

3. Imaging

- Sonographer by training yes No
- Clinician with ultrasound skills yes No
- ultra-sonogram machine always available frequently available rarely available never available
- Type of the sonograph machine
- Radiology technician always available frequently available rarely available never available
- Xray machine always available frequently available rarely available never available
- CT scan machine always available frequently available rarely available never available
- Isosmolar contrast media yes No
- Hyposmolar contrast media yes No

4. Pharmacy:

- Urine catheters** always available frequently available rarely available never available
- urine bags** always available frequently available rarely available never available
- graduated urine containers** always available frequently available rarely available never available

IV set always available frequently available rarely available never available

Presence of Intravenous fluids

Ringers lactate always available frequently available rarely available never available

Normal saline always available frequently available rarely available never available

D5W always available frequently available rarely available never available

D50% always available frequently available rarely available never available

Hemacel always available frequently available rarely available never available

Presence of oral rehydration solution

always available frequently available rarely available never available

Broad spectrum antibiotics for septic patients:

Vancomycin always available frequently available rarely available never available

Carbapenems always available frequently available rarely available never available

Aminoglycosides always available frequently available rarely available never available

Cephalosporin 3rd generation (ceftriaxone, cefotaxime, etc.)

always available frequently available rarely available never available

Amoxiclav always available frequently available rarely available never available

Ciprofloxacin always available frequently available rarely available never available

anti-malarials (coartem and artesunate): always available frequently unavailable rarely available never available

Potassium resin exchange always available frequently available rarely available never available

Calcium gluconate IV always available frequently available rarely available never available

Insulin rapid acting always available frequently available rarely available never available

IV furosemide always available frequently available rarely available never available

blood transfusion products

RBC always available frequently available rarely available never available

Pressors

Norepinephrine always available frequently available rarely available never available

Dopamine always available frequently available rarely available never available

Others

bicarbonate ampoules always available frequently available rarely available never available

Advanced treatment options that are available

Peritoneal dialysis

always available frequently available rarely available never available

Hemodialysis

always available frequently available rarely available never available

Buffer bath for hemodialysis bicarbonate lactate

5. Infrastructure and facilities:

Clean water source within the facility

always available frequently available rarely available never available

Electric power within the facility

always available frequently available rarely available never available

Nutritional support to patients by the hospital

always available frequently available rarely available never available

Ambulance for transportation of sick patients

always available frequently available rarely available never available