Renal & Urinary System & Reproductive Systems

United States Medical Licensing Examination (USMLE) Step 1

7 to 13% of Step 2 CK · 9 sections · content outline and specifications

This system covers the kidneys and urinary tract, fluids, electrolytes and acid-base balance, and the male and female reproductive organs outside pregnancy. Step 2 CK asks what to do next: the most likely diagnosis, the best first test, the most accurate test, the first-line drug, and screening by current US guidance. Many questions turn on one number, such as the fractional excretion of sodium, the anion gap, or the FSH level. Others turn on safety, such as treating a dangerous potassium before anything else. Pregnancy is a separate system and is not covered here.

You should be able to: After this guide, a learner can pick the next test and the next step for kidney injury, salt, potassium and acid problems, stones, urinary and sexually transmitted infections, and the common reproductive problems, and can apply current US screening rules for prostate, breast, and cervical cancer.

Every section: the key point and the trap

1 Acute kidney injury

Sort acute kidney injury into prerenal, intrinsic, and postrenal causes.

Trap: Diuretics raise urine sodium, so the fractional excretion of sodium is unreliable in a patient who takes them; use the fractional excretion of urea (under 35% means prerenal).

2 Sodium and potassium disorders

Hyponatremia: first check serum osmolality, then volume status, then urine osmolality and urine sodium.

Trap: A high potassium with no ECG change and a hemolyzed sample needs a repeat test, not emergency treatment; a wide QRS needs calcium before any repeat.

3 Acid-base problems

Read the pH, then the bicarbonate and PaCO2, to name the main disorder.

Trap: Salicylate poisoning often shows both a respiratory alkalosis and a metabolic acidosis; a PaCO2 lower than Winter's formula predicts means a second, respiratory disorder.

4 Glomerular disease and chronic kidney disease

Nephritic: blood, red cell casts, high blood pressure, mild protein. Nephrotic: protein above 3.5 g a day, low albumin, edema, high lipids.

Trap: Do not combine an ACE inhibitor with an ARB: dual blockade raises potassium and kidney injury without benefit.

5 Kidney stones and urinary tract infection

Best test for a suspected stone: low-dose noncontrast CT; ultrasound first in pregnancy and in children.

Trap: In an older adult with confusion and a positive urine culture but no urinary symptoms or fever, look for another cause before treating the urine.

6 Prostate, testis, and sexually transmitted infections

PSA screening at 55 to 69 years is a shared decision (USPSTF); do not screen from 70.

Trap: Lifting the testis that eases pain (Prehn sign) points to epididymitis, but it is not reliable enough to rule out torsion.

7 Contraception, menstrual problems, amenorrhea, and infertility

The most effective methods are the implant and intrauterine devices; they suit teens and women who have never been pregnant.

Trap: A runner with no periods and low weight needs more food and less training, not a contraceptive pill, which hides the problem and does not protect bone.

8 Breast masses and cervical cancer screening

A palpable mass at 30 years or older: diagnostic mammogram and ultrasound, then a core needle biopsy if suspicious.

Trap: A normal mammogram does not rule out cancer in a woman with a suspicious palpable mass; the mass still needs ultrasound and a biopsy.

9 Gynecologic cancers and menopause

Postmenopausal bleeding: transvaginal ultrasound or endometrial biopsy; an endometrium above 4 mm needs a biopsy.

Trap: Never give estrogen alone to a woman who still has a uterus: it raises the risk of endometrial cancer.

Key terms

Fractional excretion of sodium: The share of filtered sodium that leaves in the urine; it helps tell prerenal injury from tubular injury.

Anion gap: Sodium minus chloride minus bicarbonate; a high value means an unmeasured acid.

Osmolal gap: Measured minus calculated serum osmolality; a high value suggests a toxic alcohol.

Nephritic syndrome: Glomerular disease with blood and red cell casts in the urine, high blood pressure, and mild protein loss.

Nephrotic syndrome: Glomerular disease with heavy protein loss, low albumin, edema, and high lipids.

Hydronephrosis: Swelling of the kidney because urine cannot drain.

Asymptomatic bacteriuria: Bacteria in the urine without symptoms of infection.

Functional hypothalamic amenorrhea: Loss of periods because the brain makes less GnRH, often from low food intake, stress, or heavy exercise.

Unopposed estrogen: Estrogen without progesterone, which makes the uterine lining grow and can lead to cancer.

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