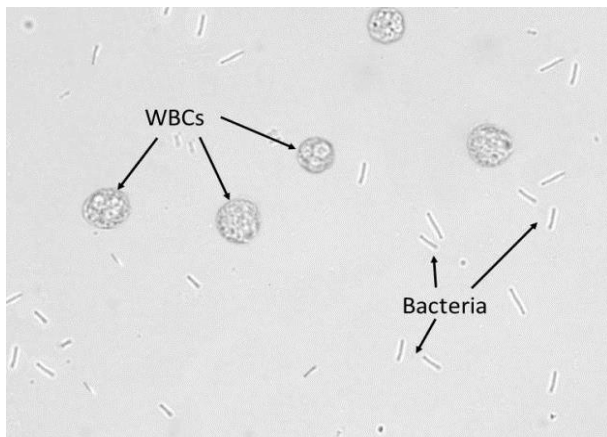
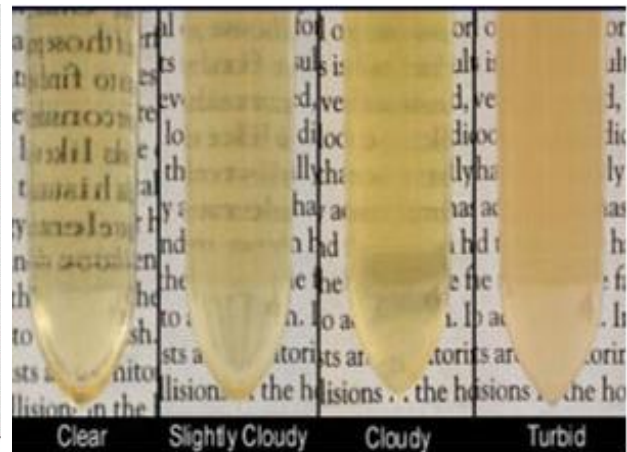


## Urinary tract infection (UTI):

Is an infection that affects parts of the urinary tract. When it affects the lower urinary tract it is known as a bladder infection (cystitis) and when it affects the upper urinary tract it is known as kidney infection (pyelonephritis).



White blood cells (WBC) and bacteria in urine as seen under a microscope.



Different urine sample appearance

## General Urine Exam:

GUE is the important screening procedure in clinical settings because it gives diagnostically important information about the presence of disease inside and outside the urinary tract by urine analysis screen for renal or urinary tract disease and help to detect metabolic and systemic disease, because they don't show clear symptoms.

## What is being tested?

A urine analysis is a group of physical, chemical, and microscopic tests then visual observation or macroscopic tests. The tests detect and/or measure several substances in the urine, such as byproducts of normal and abnormal metabolism, cells, cellular fragments, and bacteria.

### **Aim of the test**

An etiological diagnosis of bacterial urinary tract infection by quantitative cultivation of the urine with identification and susceptibility test of the isolated bacteria.

### **Types of specimen**

Laboratory urine specimens are classified by the type of collection conducted or by the collection procedure used to obtain the specimen.

- 1. Random Specimen:** As the name implies, the random specimen can be collected at any time. This specimen most commonly sent to the laboratory for analysis, primarily because it is the easiest to obtain and is readily available. It is usually submitted for urine analysis and microscopic analysis, although it is not the specimen of choice for either of these tests. Random specimens can sometimes give an inaccurate view of a patient's health if the specimen is too diluted and analyte values are artificially lowered. Pediatric specimens, which routinely undergo chemistry and microscopic analysis, are generally of this type. Although there are no specific guidelines for how the collection should be conducted, avoiding the introduction of contaminants into the specimen is recommended. This requires explicit instructions to patients so that they do not touch the inside of the cup or cup lid.
- 2. First Morning Specimen:** This is the specimen of choice for urinalysis and microscopic analysis, since the urine is generally more concentrated (due to the length of time the urine is allowed to remain in the bladder) and, therefore, contains relatively higher levels of cellular elements and analytes such as protein, if present. Also called an 8-hour specimen, the first morning specimen is collected when the patient first wakes up in the morning, having emptied the bladder before going to sleep. Since the urine can be collected over any eight-hour period, collection is practical for patients who have atypical work/sleep schedules. Proper collection practices and accurate recording of the collection time are

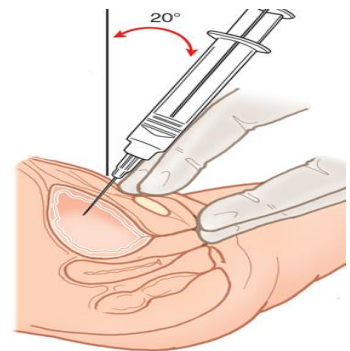
important criteria of a first morning specimen. Note: Any urine that is voided from the bladder during the eight-hour collection period should be pooled and refrigerated, so that a true 8-hour specimen is obtained.

- 3. Midstream Clean Catch Specimen:** This is the preferred type of specimen for culture and sensitivity testing because of the reduced incidence of cellular and microbial contamination. Patients are required to first cleanse the urethral area with a castile soap towelette. The patient should then void the first portion of the urine stream into the toilet. These first steps significantly reduce the opportunities for contaminants to enter into the urine stream. The urine midstream is then collected into a clean container (any excess urine should be voided into the toilet). This method of collection can be conducted at any time of day or night.
- 4. Timed Collection:** Specimen Among the most commonly performed tests requiring timed specimens are those measuring creatinine, urine urea nitrogen, glucose, sodium, potassium, or analytes such as catechol amines and 17-hydroxysteroids that are affected by diurnal variations. A timed specimen is collected to measure the concentration of these substances in urine over a specified length of time, usually 8 or 24 hours. In this collection method, the bladder is emptied prior to beginning the timed collection. Then, for the duration of the designated time period, all urine is collected and pooled into a collection container, with the final collection taking place at the very end of that period. The specimen should be refrigerated during the collection period, unless otherwise requested by the physician. Accurate timing is critical to the calculations that are conducted to determine analyte concentrations and ratios. Interpretations based on faulty calculations can result in improper diagnoses or medical treatment.

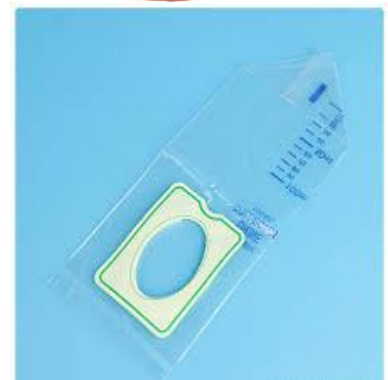
**5. Catheter Collection Specimen:** This assisted procedure is conducted when a patient is bedridden or cannot urinate independently. The healthcare provider inserts a foley catheter into the bladder through the urethra to collect the urine specimen. (Specimens may also be collected through an existing foley catheter.) Specimens may be collected directly from a foley into an evacuated tube or transferred from a syringe into a tube or cup.



**6. Suprapubic Aspiration Specimen:** This method is used when a bedridden patient cannot be catheterized or a sterile specimen is required. The urine specimen is collected by needle aspiration through the abdominal wall into the bladder.



**7. Pediatric Specimen:** For infants and small children, a special urine collection bag is adhered to the skin surrounding the urethral area. Once the collection is completed, the urine is poured into a collection cup or transferred directly into an evacuated tube with a transfer straw. Urine collected from a diaper is not recommended for laboratory testing since contamination from the diaper material may affect test results.



### **Criteria of specimen rejection.**

Un-refrigerated specimen older than 2 hours may be subject to overgrowth and may not yield valid results; unlabeled specimen; mislabeled specimen; specimen in expired transport container; 24 hours urine specimens.

**Pathogens and commensals.**

<b>Urine specimen</b>	
<b>Common pathogens</b>	<b>commensal flora</b>
<i>Neisseria gonorrhoeae</i>	the urine is sterile except for the urethral mucosa which support the growth of microflora as:
<i>E. coli</i> and other Enterobacteriaceae	
<i>Enterococcus</i> spp.	Diphtheroid bacilli
<i>Staphylococcus aureus</i>	<i>Lactobacillus</i> spp
<i>Staph saprophyticus</i>	Coagulase negative <i>Staphylococci</i>
<i>Corynebacterium jeikeium</i>	$\alpha$ Haemolytic <i>Streptococci</i>
<i>Acinetobacter</i> spp	<i>Bacillus</i> spp
<i>Pseudomonas</i> spp	Non pathogenic <i>Neisseria</i> spp.
<i>Gardnerella vaginalis</i>	Anaerobic cocci
$\beta$ -haemolytic streptococci	Commensal <i>Mycobacterium</i>
<i>Salmonella</i> spp (early stage of infec	Commensal <i>Mycoplasma</i> spp.

**Specimen processing.**

**Microscopic Urinalysis:** A sample of well-mixed urine (usually 10-15 ml) is centrifuged in a test tube at relatively low speed (about 2-3,000 rpm) for 5-10 minutes until a moderately cohesive button is produced at the bottom of the tube. The supernatant is decanted and a volume of 0.2 to 0.5 ml is left inside the tube. The sediment is re\_ suspended in the remaining supernatant by flicking the bottom of the tube several times. A drop of resuspended sediment is poured onto a glass slide and cover slipped.

**Media.**

1. Blood Agar.
2. MacConkey Agar.
3. Nutrient Agar.

### **Culturing procedure**

- 1-Mix the urine sample to re-suspend microorganism present.
- 2- Dip 1  $\mu$ l calibrated loop in vertical position in the urine and remove the loop and use the collected fluid to inoculate a nutrient agar plate that will be used for urine plate count.
- 3-Take another loop to streak Blood agar and another loop to streak MacConkey agar plates.
- 4- Streak the Nutrient agar plate to cover all surface area. A plate count of 10,000 CFU/ml of pure culture should be considered positive and isolated organism should be identified and sensitivity test will be performed.