

Purple Urine



Figure 1. Patient urine on admission.

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AN ELDERLY FRAIL WOMAN WITH DEMENTIA WAS ADMITTED TO THE INTERNAL medicine service because of malfunction of her percutaneous gastrostomy tube. The patient had a history of recurrent hospitalizations for pneumonia and urinary tract infections. She had a permanent indwelling urinary catheter because of repeated episodes of urinary retention. The gastrostomy tube was replaced.

During admission a nurse noticed that the color of the urine was purple (FIGURE 1). A urine dipstick analysis revealed +2 leukocytes, +1 red blood cells, positive nitrites, and a urinary pH of 8.2.

What Would You Do Next?

- A Order a urinalysis for porphyrins
- B Order a urine culture and replace the catheter
- C Review the patient's medications
- D Screen the urine for toxic substances

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Diagnosis

Purple urine bag syndrome (PUBS)

What to Do Next

B. Order a urine culture and replace the catheter

The key finding that suggests the diagnosis of PUBS is the purple color of the urine in the bag and tubing. In most cases, the color of the urine entering the catheter is normal and later becomes purple. Many pathogens have been associated with purple urine, including *Pseudomonas aeruginosa*, *Escherichia coli*, *Proteus mirabilis*, *Proteus vulgaris*, *Providencia rettgeri*, *Providencia stuartii*, *Morganella morganii*, *Klebsiella pneumoniae*, and *Enterococcus* species.

Comment

Abnormal urine color may imply a variety of pathologic or normal clinical states.¹ White or cloudy urine may be due to pyuria, whereas pink or red urine is usually due to hematuria, hemoglobinuria, or myoglobinuria. Dark yellow urine may suggest dehydration, and dark brown urine can be seen with bilirubinuria. Some medications such as rifampicin or phenazopyridine can yield an orange-colored urine. In porphyria cutanea tarda, the urine is red to brown in natural light and pink to red in fluorescent light.²

PUBS was first reported more than 30 years ago.³ Although rarely encoun-



Figure 2. Patient urine after treatment.

tered, this medical condition typically occurs in elderly female patients with permanent indwelling urinary catheters. Alkaline urine, constipation (which allows increased absorption of tryptophan), dehydration, and renal failure are risk factors.

The purple discoloration of the urine results from a series of chemical reactions. Tryptophan in the diet is metabolized by bacteria in the gastrointestinal tract to produce indole, which is absorbed into the portal circulation and converted in the liver to indoxyl sulfate, which is excreted in the urine. In PUBS, gram-negative bacteria that colonize the catheter produce indoxyl sulfatase and phosphatase, which further convert the indoxyl sulfate to indirubin (red color) and indigo (blue color).^{4,5}

The clinical course is usually benign. In asymptomatic patients, antibiotic treatment is not required. Alleviation of constipation along with catheter replacement usually leads to resolution. Some argue in favor of antibiotic treatment directed at the specific organisms detected in the urine culture.^{6,7} In this patient, both *P mirabilis* and *K pneumoniae* were detected in the urine. The patient's urine color became clear after replacement of the indwelling urinary catheter (FIGURE 2).

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