

# Purple urine bag syndrome in a skilled nursing facility during the COVID-19 pandemic

BY NATE GIPE AND SUSAN LAABS, MD

**P**urple urine bag syndrome (PUBS) is a rare syndrome associated with chronic urinary catheterization.<sup>1,2,3</sup> It is caused by red and blue pigments produced by bacterial enzymes depositing on the synthetic material of the urine collecting bag, resulting in purple discoloration of the bag, but not the urine itself.<sup>4,5</sup> PUBS is underdiagnosed and, while often benign, can cause distress in patients and healthcare providers unfamiliar with the syndrome. It can be indicative of underlying urinary tract infection (UTI).<sup>1,6,7,8</sup> We report a case of PUBS in a skilled nursing facility (SNF) during the COVID-19 pandemic.

## Case report

A 76-year-old male SNF resident with a history of residual cognitive impairment following traumatic brain injury, bronchiectasis, and chronic Foley catheterization for urinary retention was found to have purple discoloration of his urine collecting bag (Figure 1). The patient denied symptoms suggestive of UTI. His temperature and vital signs were normal. Urinalysis showed 5-10 white blood cells (WBCs)/hpf, trace bacteria, positive nitrates, and moderately elevated leukocyte esterase. A diagnosis of asymptomatic bacteriuria was made. His catheter was changed, and purple discoloration of the urinary collecting system recurred. After discussion with the patient, he chose monitoring with a plan to treat only if he developed symptoms of infection. He remained asymptomatic until 6 weeks later, when he was found febrile and unresponsive. He was found to have supraventricular tachycardia with aberrancy; synchronized cardioversion was performed. He was transported to the Emergency Department where laboratory data was notable for urinalysis showing 50-100 WBCs/hpf and bacteriuria. His urine was orange and cloudy. WBC count was elevated at  $10.4 \times 10^3/\mu\text{L}$ , his lactate was 8 and venous blood gas

showed primary respiratory acidosis with secondary metabolic acidosis with partial compensation. Blood cultures were positive for *Enterococcus faecalis* and *Pseudomonas aeruginosa*. The patient was treated with ceftriaxone and vancomycin, and intravenous fluids, and his urinary catheter was changed. He returned to his baseline state of health and PUBS resolved.

## Discussion

PUBS pathogenesis begins in the intestine, where gut microbiota metabolizes tryptophan to indole. Indole is converted to the red pigment indirubin and the blue pigment indigo by bacteria in the urinary tract.<sup>1,5</sup> These pigments precipitate on the polyvinyl chloride of urine bags and cause purple discoloration.<sup>9</sup> Common bacterial species associated with PUBS are *E. coli*, *Morganella morganii*, *Pseudomonas aeruginosa*, *Enterococcus*, *Proteus*, and *Klebsiella*.<sup>2,3</sup> Risk factors for PUBS include female sex, advanced age, chronic catheterization, immobilization, institutionalization, dementia, constipation, recurrent UTIs, and alkaline urine.<sup>5,6,7,10</sup> There are no accepted guidelines for treating PUBS and the literature is conflicting as to whether it definitively indicates the presence of urinary tract infection, but general recommendations include patient counseling, catheter replacement, improving catheter hygiene, and consideration of antibiotics.<sup>9,11,12</sup> The use of antibiotics in asymptomatic cases is controversial as some fear it may needlessly contribute to antibacterial resistance.<sup>9,13</sup> While often benign, PUBS has been reported to progress to Fournier's gangrene or urosepsis.<sup>5,9,11,14</sup> It is important for physicians to be aware of PUBS so that they can make a timely diagnosis and implement monitoring and treatment. **MM**

Nate Gipe is a second-year student, Mayo Clinic Alix School of Medicine. Susan Laabs, MD, is a family medicine physician with the Mayo Clinic Health System, North Mankato.



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