

# Urinary Tract Infections in Special Populations

## Diabetes, Renal Transplant, HIV Infection, and Spinal Cord Injury

Lindsay E. Nicolle, MD, FRCPC

### KEYWORDS

- Urinary infection • Cystitis • Pyelonephritis • Asymptomatic bacteriuria • Diabetes
- Renal transplant • HIV infection • Spinal cord injury

### KEY POINTS

- Patients with diabetes are more likely to present with complications of urinary infection, such as abscesses and emphysematous cystitis or pyelonephritis.
- Renal transplant patients have a high frequency of urinary infection because of multiple risk factors that may predate transplant, are associated with technical aspects of transplant surgery, or follow transplant.
- There is limited, if any, increased frequency of urinary tract infection directly attributable to HIV infection.
- Prevention of urinary tract infections in individuals with spinal cord injuries requires appropriate bladder management to maintain a low-pressure bladder, and avoidance of indwelling devices if possible.

### INTRODUCTION

Some populations have unique considerations relevant to urinary tract infection. This article addresses 4 of these groups: patients with diabetes, patients with a renal transplant, patients with HIV infection, and patients with a spinal cord injury. Urinary tract infection occurring in these individuals is considered within the clinical category of complicated urinary infection; that is, infection that occurs in a patient with functional or structural abnormalities of the genitourinary tract. It is always important to distinguish between symptomatic urinary infection and asymptomatic infection, also referred to as bacteriuria, for optimal management of infection.

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Health Sciences Centre, Room GG443, 820 Sherbrook Street, Winnipeg, Manitoba R3A 1R9, Canada

*E-mail address:* [lnicolle@hsc.mb.ca](mailto:lnicolle@hsc.mb.ca)

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## PATIENTS WITH DIABETES

### *Unique Aspects of Urinary Infection*

It is generally accepted that persons with diabetes have an increased frequency of urinary infection,<sup>1,2</sup> but there is limited evidence confirming the magnitude of excess risk.<sup>3</sup> In addition, the diabetic population is heterogeneous and the risk of urinary infection varies with patient characteristics. Several explanations have been proposed to explain an increased risk for infection, including glucosuria and impaired immune or leukocyte function,<sup>2</sup> but experimental studies have not consistently supported any single mechanism. The important diabetes-specific risk factors for urinary infection are usually duration of diabetes or presence of long-term complications, such as neuropathy, rather than current glucose control (Table 1).<sup>4</sup> There is limited evidence describing aspects of urinary infection in diabetic men. Of interest, the SGLT2 (serum glucose cotransporter-2) inhibitors, a new class of agents for treatment of diabetes that produce high levels of glucosuria, are associated with only a small increase in symptomatic urinary infection for both men and women.<sup>7</sup>

### *Epidemiology*

Rates of urinary infection were compared between diabetic women enrolled in the epidemiology of diabetes interventions and complications study (Uro-EDIC) and nondiabetic women in the National Health and Nutrition Examination Survey III. The adjusted prevalence of cystitis in the preceding 12 months was similar (odds ratio [OR] 0.78; 95% confidence interval [CI]: 0.51, 1.22).<sup>8</sup> In the Uro-EDIC study, only sexual intercourse was associated with cystitis (OR 8.28; 95% CI 1.45, 158.32), similar to the nondiabetic population. Neither cystitis nor pyelonephritis was associated with duration of diabetes, hemoglobin A1c, retinopathy, neuropathy, nephropathy, vascular complications, or glycemic therapy. A prospective study from the Netherlands also reported that only sexual intercourse was associated with symptomatic infection in women with type 1 diabetes (relative risk [RR] 3.6;  $P = .004$ ), whereas asymptomatic bacteriuria was the only significant association for type 2 diabetes (RR 1.65; 95% CI 1.02, 2.67).<sup>5</sup> Another prospective study enrolling women in a US health maintenance organization reported increased symptomatic urinary infection in postmenopausal women with diabetes (OR 2.2; 95% CI 1.6–3.0) for subjects receiving oral diabetes medication or insulin.<sup>9</sup> A retrospective record review of patients attending primary care practices in the Netherlands reported recurrent urinary infection was increased for women with diabetes (OR 2.0; 95% CI 1.4–2.9).<sup>4</sup> The increased risk was independently associated with type 2 diabetes, diabetes of 5 or more years' duration, receiving oral or insulin therapy, or retinopathy. Hemoglobin A1c was not a risk factor. Studies that have used administrative databases or retrospective record

**Table 1**

**Variables associated with symptomatic urinary tract infection or asymptomatic bacteriuria in women with Type 2 diabetes**

	Risk Factors for Infection (Ref.)	
	Symptomatic <sup>4,5</sup>	Asymptomatic <sup>6</sup>
Not diabetes associated	Age	Age
Diabetes associated	<ul style="list-style-type: none"> <li>• Retinopathy</li> <li>• Oral hypoglycemic or insulin therapy</li> <li>• Diabetes <math>\geq 5</math> y</li> </ul>	<ul style="list-style-type: none"> <li>• Any long-term complication</li> <li>• Heart disease</li> <li>• Duration of diabetes</li> <li>• Oral hypoglycemic therapy</li> </ul>

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