

## Section 1 - Infectious Agent

**Agent Name:** *Providencia stuarti*

**Agent Type:** Bacteria

**Taxonomy:**

Family: Enterobacteriaceae

Genus: *Providencia*

Species: *P. stuartii*

Subspecies/Strain/Clonal Isolate:

### Synonym/Cross Reference

### Characteristics

**Brief Description:** *Providencia stuartii* is a Gram negative bacterium that is commonly found in soil, water, and sewage.

**Properties:** Properties that contribute to risk, such as modifications (i.e., from a parental strain), sporulation, toxin production, oxygen requirements, enzymatic activity, life cycle (if relevant), reproduction.

## Section 2 - Hazard Identification

### Pathogenicity/Toxicity

*P. stuartii* is the most frequently encountered human pathogen within the genus. *Providencia stuartii* is a bacterium normally found in patients with indwelling urinary catheters, where it causes urinary tract infections. These infections may progress to bacteremia. Diarrhea, peritonitis, meningitis, and infections of burn wounds, the endocarditis and the brain abscess attributed to *P. stuartii* have also been reported.

**Predisposing Factors:** Elderly at greater risk of infection likely because of indwelling urinary catheters.

### Communicability

Outline the various ways in which the infectious agent can be transmitted from one host to another: ingestion, injection (including vectors), mucous membrane/skin contact (or genitourinary), inhalation (airborne or aerosols). What is the likelihood of transmission by direct (intimate, casual) or indirect (fomites, vectors) contact? Is the same true for humans and animals? What is the preferred mode of transmission (e.g., influenza viruses typically are transmitted by inhalation of infectious aerosols)?

### Epidemiology

Worldwide.

### Host Range

**Natural Host(s):** humans, mammals, birds, reptiles and insects.

**Other Host(s):** Not applicable.

### Infectious Dose

Unknown.

### Incubation Period

Unknown.

## Section 3 - Dissemination

### Reservoir

*Providencia* species are found in multiple animal reservoirs, including flies, birds, cats, dogs, cattle,

sheep, guinea pigs, and penguins, and are resident oral flora in reptiles such as pythons, vipers, and boas. *Providencia* species are also found commonly in soil, water, and sewage.

#### **Vectors**

None

#### **Zoonosis / Reverse Zoonosis**

None.

### **Section 4 - Dissemination**

#### **Drug Susceptibility**

Carbapenems are the best choice for empirical therapy in life-threatening infections or nosocomial outbreaks suspected to be caused by *P. stuartii* until speciation is confirmed. Amikacin and beta-lactam/beta-lactamase inhibitors such as piperacillin/tazobactam are good first-line agents in non-life-threatening infections.

#### **Drug Resistance**

amoxicillin-clavulanate, ampicillin-sulbactam, gentamicin, and ciprofloxacin.

#### **Susceptibility to Disinfectants**

What disinfectants are capable of destroying the pathogen (including its toxins and/or spores (if applicable) and, if known, what conditions are necessary to achieve disinfection (concentration, contact time, temperature)? If unknown, are there disinfectants that are effective against a class of pathogens (e.g., Gram positive bacteria)? Are there disinfectants or classes of disinfectant to which the pathogen is resistant?

#### **Physical Inactivation**

Can the infectious substance be inactivated by other means (e.g., UV irradiation, gamma irradiation, dry or moist heat, pH) and, if known, what are the effective parameters (method, duration, environmental conditions). If unknown, are there physical inactivation methods that are effective against a class of pathogens?

#### **Survival Outside Host**

Is there documentation of survival times for the infectious agent outside of its host environment (e.g., is the infectious agent still viable in collected blood, semen, or other fluids? Is it viable in dried blood, on surfaces, or in aerosol form?). If so, how long is it documented to survive? Note that survival on lab surfaces or in the environment is more relevant in terms of assessing risk than survival at -80°C.

### **Section 5 - First Aid and Medical**

#### **Surveillance**

Medical care of *Providencia* infection includes initiation of an antimicrobial agent to eradicate infection. Selection of an empirical agent (while awaiting microbiological identification of the organism and susceptibility testing) should be based on known resistance patterns in the patient's locality (eg, community, hospital, long-term care facility). Once the species of the infecting *Providencia* pathogen has been identified (but before susceptibilities are available), selection of an empiric antimicrobial agent can be based on known patterns of susceptibility across species.

#### **First Aid / Treatment**

Once the identity of the pathogen and its susceptibility profile are known, target therapy with the most narrow-spectrum agent to which the organism is susceptible.

Duration of therapy should range from 1-3 weeks, depending on the site of infection (14 days for bacteremia; 14-21 days for complicated or catheter-associated urinary tract infection).

#### **Immunization**

None.

**Prophylaxis**

Based on the medical surveillance program, what pre- or post-exposure prophylaxis is recommended? Are these recommendations universal, or based on the activities being performed or other factors? Are there specific cofactors (e.g., pregnancy) that would change the recommendations?

**Section 6 - Laboratory Hazards****Laboratory Acquired Infections**

None reported.

**Sources / Specimens**

Urine (most common), stool, and blood, as well as from sputum, skin, and wound cultures.

**Primary Hazards**

Direct contact of skin or mucous membranes with the infectious material, accidental parenteral inoculation of the bacteria, and ingestion of the bacteria.

**Special Hazards**

Exposure to infectious aerosols generated during manipulation of broth cultures or tissue homogenates may cause pulmonary disease in laboratory personnel

**Section 7 - Exposure Controls and Personal Protection****Risk Group Classification**

What is the Risk Group classification in humans and animals for the pathogen?

Human Risk Group Classification RG2 Animal Risk Group Classification RG1

**Containment Requirements**

Containment Level: CL2

**Containment Zone Requirements:**

Containment Level 2 facilities, equipment, and operational practices for work involving infectious or potentially infectious materials, animals, or cultures.

**Protective Clothing**

Lab coat. Gloves when direct skin contact with infected materials or animals is unavoidable. Eye protection must be used where there is a known or potential risk of exposure to splashes. If there are no special hazards for this agent enter "none".

**Other Precautions**

All procedures that may produce aerosols, or involve high concentrations or large volumes should be conducted in a biological safety cabinet (BSC). The use of needles, syringes, and other sharp objects should be strictly limited. Additional precautions should be considered with work involving animals or large scale activities.

**Section 8 - Handling and Storage****Spills**

Allow aerosols to settle. Wearing protective clothing, gently cover the spill with absorbent paper towel and apply suitable disinfectant, starting at the perimeter and working towards the centre. Allow sufficient contact time before clean up.

**Disposal**

Decontaminate all wastes that contain or have come in contact with the infectious organism by autoclave, chemical disinfection, gamma irradiation, or incineration before disposing.

**Storage**

The infectious agent should be stored in appropriately labelled leak-proof containers in a locked area.

Containers of infectious material or toxins stored outside the containment zone must be labelled, leakproof, impact resistant, and kept either in locked storage equipment or within an area with limited access.

## Section 9 - Regulatory Information

The import, transport, and use of pathogens in Canada is regulated under many regulatory bodies, including the Public Health Agency of Canada, Health Canada, Canadian Food Inspection Agency, Environment Canada, and Transport Canada. Users are responsible for ensuring they are compliant with all relevant acts, regulations, guidelines, and standards.

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### References

Risk Group determination from "PHAC Biological Agent Search".

Providencia Infections (2017) Charbek, E., Patel, N.; Medscape (<https://emedicine.medscape.com/article/226541-overview#a5>).

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