

Nontyphoidal *Salmonella* (NTS) Infection: Information for Clinicians

Background:

Salmonella spp. are gram negative bacteria that are among the most common causes of bacterial gastroenteritis and foodborne illness. *Salmonella* serotypes are generally distinguished into two broad classes:

1) *Salmonella* Typhi and *Salmonella* Paratyphi

S. Typhi and *S. Paratyphi* are associated with enteric fever, a systemic illness requiring antibiotic treatment in all hosts. The reservoir of *S. Typhi* is infected or colonized (carrier) humans, with disease spread from human to human either directly or via fecal contamination of food or water.

2) Nontyphoidal *Salmonella* (NTS)

NTS usually cause a self limited acute gastroenteritis in healthy hosts

There are over 1500 NTS serotypes, the most common are *Salmonella* Enteritidis, *S. Typhimurium* and *S. Heidelberg*, and are primarily transmitted to humans directly or indirectly from animal sources. NTS are found worldwide in domestic and wild animals (including birds and amphibians), and is primarily a foodborne illness (most often from chicken or eggs).

This document addresses the clinical presentation, diagnosis and treatment of NTS infection.

Epidemiology:

The incidence of NTS infection in Ontario is estimated to be 18.9 per 100, 000 in 2009. Similar rates were reported in the United States in 2007, with an incidence of NTS infection of 14.86 per 100, 000 population (FoodNet). Transmission of NTS to humans can occur by many routes, including consumption of food animal products (especially eggs, poultry, undercooked ground meat and dairy products), consumption of fresh produce (eg. bean sprouts) that has been contaminated with animal waste, contact with animals or their environment (eg. turtles), and contaminated water. Cases may be sporadic, or associated with foodborne outbreaks.

Clinical Presentation:

Acute gastroenteritis is the most common presentation of NTS infection. Typical symptoms include non-bloody diarrhea, nausea, and/ or vomiting. Fever, abdominal cramps, bloody diarrhea may also be reported. Asymptomatic carriage can occur in as many as 4.7% of healthy hosts (Sirinavin, 2004).

Two to eight percent of NTS infections are associated with bacteremia, and are not always preceded by gastroenteritis. Risk factors for NTS bacteremia include immunocompromise (including HIV, malignancy, chemotherapy, steroid therapy) and extremes of age (< 3 month and greater than 50 years old). Risk factors are not apparent in up to one third of cases of NTS bacteremia (Matheson N , 2010). Extraintestinal focal infections (eg. arthritis, meningitis, pneumonia) occur in 5-10% of those with bacteremia.

Diagnosis:

Nontyphoidal *Salmonella* infection is diagnosed by culture. If acute gastroenteritis is suspected, stool specimens should be collected in the appropriate stool transport media (e.g. Cary-Blair) ,and sent to a local laboratory for testing. If NTS bacteremia is suspected, two sets of blood cultures should be collected and sent to a local laboratory for testing. Serology is not available to diagnose NTS infection.

Recommended treatment of nontyphoidal *Salmonella* infection:

Clinical Presentation	Immune status	Risk Factors	Treatment	Notes
Acute diarrhea	Immunocompetent	None	Supportive including rehydration	Studies suggest that there is no change in duration of symptoms with the use of antimicrobials in the treatment of NTS in these circumstances. Treatment has been associated with prolonged fecal shedding and increased risk of relapse.
		<ul style="list-style-type: none"> Age < 3 months or > 50 years Severe diarrhea Comorbid conditions (prostheses, valvular heart disease, severe atherosclerosis, diabetes) 	May consider treatment *	<p>Antibiotic resistance is becoming more common in NTS to all classes of antimicrobials.</p> <p>If antibiotics are prescribed, empiric choices should be reviewed when susceptibility is available. Initial choices for adults with normal renal function include:</p> <ul style="list-style-type: none"> Ciprofloxacin 500 mg PO BID Trimethoprim- sulfamethoxazole 1 DS tab PO BID Ceftriaxone 1 gm IV q24 <p>For uncomplicated gastroenteritis, suggested duration of therapy is usually 5-7 days.</p> <p>For pediatric options, please refer to 2001 IDSA gastroenteritis guidelines at http://www.journals.uchicago.edu/doi/pdf/10.1086/318514</p>
	Immunocompromised	HIV +, chemotherapy, steroid therapy, malignancy, renal failure, cirrhosis	Treatment recommended *	<p>Please see above</p> <p>Duration of antimicrobial agents generally extended to 14 days or longer if relapsing disease.</p>
Confirmed or suspected NTS bacteremia or other extraintestinal NTS infection			Treatment recommended	<p>If possible, consultation with an infectious diseases specialist or microbiologist is advised.</p> <p>Ciprofloxacin and ceftriaxone are reasonable initial empiric choices for suspected or confirmed NTS bacteremia and invasive disease. Clinical and microbiologic follow-up is required.</p>
Asymptomatic carriers			No role for antimicrobial treatment	

*Please note: All laboratories will perform susceptibility testing on NTS isolated from blood or a culture of a normally sterile site. Antibiotic susceptibilities are not performed routinely on stool isolates of NTS at the OAHPP-public health laboratories (PHL) unless specified on the requisition that the patient is immunocompromised. If treatment is being considered for NTS gastroenteritis, please phone the OAHPP PHL at 416 526 -5441 to ensure that the antibiotic susceptibility will be performed.

Additional considerations:

Additional consideration should be given in follow up of individuals infected with NTS who work or live in high risk environments (such as food handlers, daycare workers, and those who live or work closely with immunocompromised). Please consult with your local public health unit for details about work restrictions and need for follow-up cultures.

References:

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This document is intended to assist physicians in clinical decision-making by describing a range of generally acceptable approaches for diagnosis and management. This document should not be considered inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the same results. The ultimate judgment regarding care of a particular patient must be made by the physician in light of the individual circumstances presented by the patient. OAHPP is not responsible for the results of the use by anyone of this document.