Invasive Group A Strep (GAS) in Ontario

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An outbreak of invasive bacterial disease has broken out in Thunder Bay, Ontario. In an average year, the bacteria responsible for this illness—called invasive GAS, or group A *Streptococcus pyogenes*—causes about six people to fall ill in the Thunder Bay area. However, in the past year, about 75 people have fallen ill due to invasive GAS and 10 have died.

As winter approaches and people tend to spend more time indoors in more crowded conditions, there is a chance that invasive GAS infections may become more common in Thunder Bay, particularly among people with weakened immune systems. And, as infected people travel from city to city, it is possible that the outbreak could spread to other communities.

Know your germs

GAS can often be found on the skin or tonsils and under normal conditions does not usually cause serious disease in most people. For instance, these bacteria can cause sore throats (called Strep throat) in children but the disease is not usually life-threatening and children build up immunity to the bacteria.

Spread

GAS can be spread by contact with droplets from an infected person’s saliva or nasal fluids. So, being in close quarters with infected people increases the risk of getting these bacteria. However, GAS usually only becomes serious when these bacteria manage to get past the skin into deeper tissues. Outbreaks of invasive GAS have occurred in Canada from time to time but usually these have been restricted to hospitals, nursing homes or other care facilities. The community-based outbreak recently reported in Thunder Bay, however, is part of an eastward-moving series of such outbreaks since 2006.

The first line of defense

The skin is our major defense against many germs because it forms a barrier that blocks them from easily entering the body. Germs can get past this barrier by finding cuts, wounds or punctures to enter. Once inside those openings, they can try to burrow deeper into the skin. But there are immune system cells in the skin and GAS can only escape them with help—a weakened immune system.

Who is at risk?

The risk of developing invasive GAS disease is increased by the following factors:

- being very young (for example, babies)
- being 65 years or older
- alcohol abuse
- cancer
- diabetes
- heart attack
- lung disease
stroke
kidney dysfunction
obesity
use of NSAIDS (non-steroidal anti-inflammatory agents)—medicines commonly used to relieve pain appear to be linked to invasive GAS. Some examples of over-the-counter NSAIDs include Aspirin, ibuprofen (Advil, Motrin), acetaminophen (Tylenol)

substance use
sharing needles for injecting and not disinfecting the skin before injecting
hepatitis B or C viral infections
chicken pox
HIV/AIDS

A range of illness

As noted earlier, ordinarily, GAS can live on the skin or in the throat without causing problems. However, under certain conditions it can cause disease. And in the presence of cuts, bruises, wounds, punctures or a weakened immune system, GAS can penetrate the skin, spread into the blood and attack organs deep within the body. As a result, symptoms of GAS can vary depending on the severity of infection and a person’s health.

A change over time

In the 1920s, when antibiotics were not available and doctors were first studying invasive Strep infections, particularly Strep gangrene, death rates were around 20%. The availability of antibiotics, such as penicillin, later made invasive GAS uncommon; when it did occur, this disease was seen mostly in babies or the elderly. In middle-aged adults, invasive GAS might occur but it was limited to people with surgical wounds and women with an inflamed uterus because of childbirth.

In the 1990s, reports emerged of increasing cases of invasive GAS in otherwise healthy adults between the ages of 20 and 50 years in North America, Western Europe, Asia and elsewhere. Some of these cases were linked to sharing equipment for injecting street drugs, others to immune deficiency from viral infections or cancer.

Today, death rates from invasive GAS can range between 20% and 70%. Researchers are deeply puzzled by this because antibiotics, ventilators and kidney dialysis were not available back when death rates were much lower in the 1920s.

Here is a range of scenarios of illness caused by GAS:

- **Strep throat**: this can cause sore throat, fever, headache and lack of energy. Children may also develop nausea, vomiting and abdominal pain.

- **non-invasive GAS in soft tissue**: the affected skin can become red, swollen and tender.

- **necrotising fasciitis** (streptococcal gangrene): this is an infection of tissue deep within the skin. The initial site of infection may, at first, seem to be only mildly inflamed. However, this form of GAS disease can spread rapidly to nearby tissues, causing skin to die and fall off. If left untreated this condition can lead to amputation of the affected limb or death.

- **Strep toxic shock syndrome** (Strep TSS): initial symptoms can include a flu-like syndrome of fever, chills, muscle pain, nausea, vomiting and diarrhea. A day or two later, blood pressure starts to fall and changes in personality can happen in about half of the affected people; they become more aggressive, confused, or both. Infection of the brain, lungs and joints can occur. Without treatment, death is the most likely result.

The fight between invasive GAS and the immune system is complex. Strep bacteria produce proteins that rapidly over-stimulate the immune system and its ability to respond to the bacterial invasion. Overwhelmed by bacterial proteins, the immune system becomes dysfunctional and inadvertently suppresses its ability to contain GAS. This conflict leads to complications that can become life threatening.

With reduced blood pressure, there is less blood reaching the tissues and they do not get enough oxygen. To compensate, the heart beats faster, trying to pump more blood, and breathing becomes more rapid to get more oxygen into the lungs and eventually the blood. Fever continues as the body tries to kill the invading bacteria and
The soft tissues where the bacteria originally entered the body become extremely painful. The body’s blood-clotting ability is thrown out of balance as an excess of tiny blood clots forms in blood vessels deep within the body, further reducing blood circulation, and organs become dysfunctional as they are starved of oxygen. In the final stages of Strep TSS, the clotting balance in the blood may shift yet again, perhaps because of proteins produced by the bacteria, leading to uncontrolled bleeding. People can go into shock. Obviously Strep TSS can lead to a rapid death, even in hospitalized patients.

**Treatment**

The course of treatment for GAS will vary. For milder forms of illness, treatment with oral or injectable penicillin or other antibiotics may be used. For invasive GAS, depending on the severity of illness, treatment in an intensive care unit may be necessary and a combination of antibiotics, such as penicillin and clindamycin, are used. Intravenous fluids, dialysis and other interventions may be needed in extreme cases of Strep TSS.

**Reducing the risk of invasive GAS**

To limit your risk of developing these dreadful complications, a number of steps can be taken to help you keep bacteria at bay and stay healthy, as follows:

**Hygiene**

Keeping the skin clean is essential. Regular hand washing and daily bathing with warm water and soap are very important.

**Sore throats**

Everyone gets a sore throat from time to time. By itself, a sore throat does not indicate Strep throat. However, if you have a weakened immune system, see your medical team to have your doctor or nurse examine your throat and do tests to find out if Strep is present.

**Skin health**

All wounds, insect bites, punctures, abrasions—any damaged skin—needs to be cleaned (with soap and warm water) and then have disinfectant applied. Also, damaged skin needs to be watched for any signs of inflammation, including infection. People at high risk for GAS should seek medical care for skin wounds, particularly if fever occurs.

**Flu shots**

Getting vaccinated against influenza appears to enhance resistance to GAS.

**Underlying conditions**

If you have a weakened immune system (because of alcohol abuse, diabetes, viral infections or other reasons) be sure to have these underlying conditions monitored and treated so that your health is as strong as possible. If you are at risk for diabetes perhaps because of being overweight, get tested and monitored. If you are at risk for HIV and viral illnesses because of unprotected sex or sharing needles, seek counselling and testing.

**Living conditions**

Being in crowded environments, such as prisons, nursing homes, homeless shelters and army barracks, likely increases the risk of acquiring and transmitting GAS.

**In case of contact**

Transmission of GAS is quite common, and many people carry the bacteria in the nose and throat, but progression to invasive disease is not common. Because invasive disease is uncommon, only close contacts of people with
severe invasive disease are normally given preventive antibiotic therapy. Close contact includes living with an infected person, sharing saliva, having sex, sharing needles, etc. As noted above, underlying conditions (weakened immunity), open skin wounds or unsafe behaviour (such as sharing needles for injection) increase the risk that a person will develop invasive disease. So, close contacts of people with invasive GAS disease who have these risk factors should make extra effort to seek out preventive antibiotic therapy.

Appreciation

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—Sean R. Hosein

REFERENCES:


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