

## Gonorrhoea: what goes around comes around

**N** *Neisseria gonorrhoea* is rapidly evolving into a multi-resistant bacteria, recalcitrant to all single-dose antibiotics in common use including second- and third-generation cephalosporins. Without serious attention, multiresistant gonorrhoea will spread globally, causing increased rates of pelvic inflammatory disease and urethritis. Worse, it will promote antibiotic resistance in nongonococcal microbes by direct gene transfer and other mechanisms as it travels around the world. As a result, life-threatening infections may become untreatable.

For control of gonorrhoea, an antibiotic must be effective in 95% or more of cases. The story about resistance to ciprofloxacin is telling.<sup>1</sup> Stopping treatment of gonorrhoea with ciprofloxacin did not decrease the rate of resistance to ciprofloxacin — in fact, rates continue to increase. As shown in recent surveys in the United States, Australia and the European Union,<sup>2-4</sup> the current front-line antibiotics cefixime and ceftriaxone are next to become useless in treating gonorrhoea. In the EU, resistance to cefixime has risen from less than 5% in 2008 to 8% in 2010.<sup>4</sup> Japan has reported the world's first instance of multiresistant gonorrhoea, including resistance to cefixime and ceftriaxone.<sup>5</sup>

We have few options in fighting ever-increasing rates of resistance. Can we use older antibiotics such as spectinomycin? Unfortunately, this antibiotic is too toxic, and resistance is already an issue. What about antibiotic combinations? This approach would be far more costly and again, treatment failures have already been reported.<sup>6</sup> Should we consider newer, more potent drugs like carbapenems? Because gonorrhoea readily shares its antibiotic resistance genes, using carbapenems not only would be very expensive but also would invariably result in increased resistance to carbapenem in other microbes. This life-saving antimicrobial would then have been “wasted” on the non-life-threatening gonococcal infections.

How then do we address this public health threat? What about a vaccine? *N. gonorrhoea* is a wily organism that evades host defences, thereby permitting reinfection. Because of rapid mutation and complex biology, all attempts to develop a vaccine have failed. New reverse vaccinology techniques may work but not in time to avert the impending crisis.

In the interim, greater worldwide antimicrobial surveillance for gonococcal resistance must be done to inform local treatment guidelines. We anticipate a problem with this recommendation in countries where nucleic acid amplification testing (NAAT) for gonorrhoea is predominately used. Although NAAT tests facilitate concurrent testing for both chlamydia and gonorrhoea on the same patient-collected specimen, they do not allow for antimicrobial sensitivity testing. A compromise would be to strengthen sentinel sites and surveillance networks to collect specimens for culture and sensitivity testing.

To slow the spread of multiresistant gonorrhoea, overall prevalence and risk of infection must be decreased. A combi-

nation of general approaches and strategies targeted at high-risk groups seems justified. Young people would be one such group, given that they are the focus of the gonococcal epidemic, with prevalence rates at 1.9/1000 in 15- to 19-year-old females and 1.7/1000 in 20- to 24-year-old males in Canada in 2008 ([www.phac-aspc.gc.ca/std-mts/report/sti-its2008/04-eng.php](http://www.phac-aspc.gc.ca/std-mts/report/sti-its2008/04-eng.php)). Prevalence is likely to be much higher because as many as 50% of females and 10% of males are asymptomatic.

Rates of infection also vary widely from sexual network to sexual network. Unless a person is in a monogamous long-term relationship, he or she is part of a network. A person who is having sex with at least one person who is or has had sex with someone else has joined a sexual network, willingly or not. Networks are often large and complex, with no one person in a network knowing its extent. Complex networks are especially common among young people.

Motivating asymptomatic young people to come forward for screening is difficult. Creative and humorous marketing tools, such as the Alberta government's [www.plentyofsyph.com](http://www.plentyofsyph.com) campaign and British Columbia's notification program for sexually transmitted infections ([www.gender-focus.com/2011/08/08/std-notification-by-e-card-starts-in](http://www.gender-focus.com/2011/08/08/std-notification-by-e-card-starts-in)) are a good start. Alberta's campaign resulted in a 15% to 20% increase in testing for sexually transmitted infections in the month it was released (Dr. André Corriveau, Chief Medical Officer of Health, Alberta Health and Wellness, Edmonton, Alta.: personal communication, 2011). Barriers to testing and care must be minimized. Practising safe sex, such as consistently using condoms, now becomes imperative for preventing not only infection with HIV but also gonorrhoea. Negotiating consistent condom use with unwilling partners is difficult, so young people need more training and support from public and social networks.

The spectre of widespread multiresistant gonorrhoea demands an urgent public health, community and individual response. Without action, we are heading back to the pre-antibiotic era, with an escalation in the number of deaths from other multi-resistant organisms as well as rampant gonococcal infections — with treatment options for urethritis limited to painkillers, baths and catheterization for strictures. Ouch!

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For references, see Appendix 1, available at [www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.111393/-/DC1](http://www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.111393/-/DC1)

**Competing interests:** See [www.cmaj.ca/site/misc/cmaj\\_staff.xhtml](http://www.cmaj.ca/site/misc/cmaj_staff.xhtml)

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CMAJ 2011. DOI:10.1503/cmaj.111393