

Social dynamics beats penicillin in stopping syphilis outbreaks

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Syphilis, among the more pernicious sexually-transmitted infections, is on the rise; nearly 16,000 cases were reported in the U.S. in 2012, according to the Centers for Disease Control and Prevention (CDC).

Public health officials looking to stem the tide should consider focusing more attention on patterns of sexual behavior, say SFI Omidyar Fellow Ben Althouse and SFI Postdoctoral Fellow Laurent Hébert-Dufresne in a new paper, "Epidemic Cycles Driven by Host Behavior," published in the *Journal of the Royal Society Interface*.

Right now, "the front line is a shot of penicillin, which works very well," Althouse says. But well-timed messaging aimed at stopping the disease's spread could be even more effective.

The two came to that conclusion while exploring the cycles of syphilis infection since the early 1960s. In the past, researchers assumed immunity drove those cycles. "The thought was, an epidemic sweeps through, people become immune, the incidence goes down," and then people become susceptible once again, Althouse says. But there's little solid evidence that syphilis immunity is long lasting enough to account for the dips.

If not cycles of immunity, what was behind the pattern?

The answer, Althouse and Hébert-Dufresne say, lies in human behavior and social networks. At the onset of a syphilis outbreak, the disease can

spread rapidly through a network of sexual partners, but when someone's [sexual partners](#) find out he – it's usually men who contract syphilis these days, usually from other men – has the disease, they'll stop having sex with him. On a wide scale, that helps stem the tide of infection, but once the outbreak subsides, people reconnect and a new outbreak can begin.

"You can get quite a bit of the dynamics from just changing your partners – disconnecting from people who are visibly sick and reconnecting to those who are not," Althouse says.

Having figured out that simple social behavior could be driving observed syphilis cycles, the researchers turned their attention to how to stop them.

By simulating syphilis epidemics on a computer, they found that education and awareness campaigns were often a better choice than widespread treatment for mitigating an epidemic.

Surprisingly their model suggests that campaigns are most effective at the height of an outbreak, when officials can focus on stopping the next outbreak before it starts.

"Our model is really a proof of concept," Althouse says, but he hopes that coupled with the current and effective medicines used to treat syphilis, understanding these importance of these dynamics "could make a big difference in [syphilis](#) transmission."

More information: Read the paper in the *Journal of the Royal Society Interface* (August 6, 2014): [rsif.royalsocietypublishing.org ... /11/99/20140575.full](http://rsif.royalsocietypublishing.org/11/99/20140575.full)

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