MedicalXpress

Coordinated response could reduce spread of emerging superbug in health facilities

April 12 2016

A simulation of how the so-called "superbug" carbapenem-resistant Enterobacteriaceae (CRE) might spread among health care facilities found that coordinated efforts prevented more than 75 percent of the often-severe infections that would have otherwise occurred over a five-year period.

The study was led by researchers at the Johns Hopkins Bloomberg School of Public Health and published last month in the *American Journal of Epidemiology*.

Superbugs such as CRE are antibiotic-resistant bacteria for which there are limited or no treatments. CRE is most commonly found in health care facilities and the CDC says the germ can kill up to half of those it infects. Patients in hospitals and nursing homes are thought to be more susceptible to superbugs in general because of the potentially high rate of exposure among vulnerable patients, many of whom transfer from one facility to another while infected, bringing the bugs with them. Superbugs are considered a serious public health threat and the U.S. Centers for Disease Control and Prevention (CDC) has issued a "tool kit" to assist health care facilities to create plans to stem their spread - a blue print that walks management through steps from persuading leadership to measuring outcomes.

For their new analysis, the researchers simulated how CRE would spread across health care facilities in Orange County, California, under three scenarios. The first involved no extra interventions. The second involved

interventions at individual facilities, including testing transfer patients for CRE upon admission and, for patients who test positive, using contact precautions such as gloves and gowns. The third scenario used those same two interventions but coordinate efforts among facilities when the number of CRE cases reached a certain threshold. The researchers did not detail how facilities would communicate but assumed that an advance communications plan would be in place.

For their analysis, the researchers used the Regional Healthcare Ecosystem Analyst model, a platform the team developed to run numbers and scenarios on regional health care systems. In this study, the researchers drew from patient data for the 28 acute care hospitals and 74 nursing homes serving adult patients in Orange County and the patients moving among the facilities in 2011 and 2012.

Orange County was selected in part for its size—it's the sixth-largest county in the U.S.— and its diversity. The county is also more enclosed than many counties, meaning most residents both live and work there, which means the potential for an infectious disease to spread among facilities is in theory less likely than a more porous region. The researchers note that the numbers might be higher with a less contained population.

The research team found that a coordinated approach prevented 2,789, or 77 percent of total infections, by the fifth year, while moderate control measures averted 408 transmissions, or 21.3 percent, after five years. Adding no new infection-control measures to the mix in the event of a CRE outbreak—an unlikely scenario, but a possible outcome the researchers highlight—would result in CRE being present in nearly all Orange County facilities within a decade.

"It's like a neighborhood watch program where neighbors work with and watch out for each other," says Bruce Y. Lee, MD, MBA, associate

professor in the Bloomberg School's Department of International Health. "This approach tends to be more effective than a homeowner doing it alone. When it comes to health care facilities and superbugs, the same principles of communication and coordination apply."

While the findings may not be a total surprise, they underscore the importance of advance planning. Lee notes there are three main barriers to health care facilities taking a coordinated approach to superbug infection control: culture, competition and practicality. Culturally, many facilities are stretched thin keeping up with patient demands, so stepping back and focusing on something that may or may not unfold is not a priority.

From a competitive standpoint, a hospital or nursing home with even a single superbug case may not want to advertise it among its rivals, despite the obvious public health benefits of sharing the information. Practically, facilities that may want to work together face structural and legal obstacles.

While there has not yet been a serious outbreak of CRE, within the first six months of 2012, 3.9 percent of acute care hospitals and 17.8 percent of long-term acute care hospitals reported at least one CRE infection. Additionally, as of February 2015, CRE has been confirmed in 48 states.

A looming concern about superbugs like CRE is that they are antibiotic-resistant; superbugs already cause an estimated two million illnesses and approximately 23,000 deaths a year in the U.S., according to the CDC. There is growing concern that without hospital and regional coordination, including establishing protocols that involve sharing patient information, an outbreak could intensify and spread in light of patient transfers and mobility.

More information: Bruce Y. Lee et al. The Potential Trajectory of

Carbapenem-Resistant , an Emerging Threat to Health-Care Facilities, and the Impact of the Centers for Disease Control and Prevention Toolkit , *American Journal of Epidemiology* (2016). DOI: 10.1093/aje/kwv299