we thought it prudent to put these ILI patients in single rooms.[9,10] Since the viral etiology of ILIs was known by PCR, it was thought that cohorting would decrease the bed burden, but cohorting was of limited value because ILIs of the same type were not in hospital at the same time. Single room availability was further limited by the prolonged LOS of some ILI viruses—for example, RSV (8.1 days) and R/E (8 days). Although there were relatively few HPIV-3 cases, HPIV-3 LOS was the most protracted (19 days), with a disproportionate effect on bed availability. The five HPIV-3 patients were also the most ill, with 1 death due to HPIV-3 pneumonia.

We continued to provide single rooms for ILI patients for the first 3 weeks of January, but by week 4, bed availability became critical and we were forced to cohort ILIs of different viral etiologies as the influenza epidemic self-terminated. From an IC perspective we prefer diagnostic precision by PCR testing with ILIs. However, during influenza epidemics, knowing the specific viral ILI type may not be helpful when bed availability becomes severely limited.

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The Economics of a Chickenpox Outbreak in an Oncology Center in Eastern India

To the Editor—There is a lack of robust data on the health, infection control, and economic consequences of chickenpox (varicella) among healthcare workers. Chickenpox is potentially fatal, and adults contribute to most cases of chickenpox-related mortality.[1] From 1985 to 1997 there was an average of 9.22 case fatalities per 100,000 population in England and Wales due to chickenpox.[1] Many individuals in the tropics, especially those coming from rural areas, may be nonimmune to varicella. For instance, only 5 (3.3%) of 153 urban adults were seronegative for varicella zoster virus (VZV) immunoglobulin G (IgG) in India compared with 74 (30.1%) of 246 rural adults. Ninety-six percent of urban adults were immune by the age of 25, compared with 42% in the rural group.[2] In our center, of the 956 VZV IgG tests performed for immunity, 593 (62%) were found to be reactive (immune to varicella) from May 2011 to June 2015; also, 26 samples had indeterminate VZV IgG reactivity. The live attenuated varicella vaccine (contraindicated in immunosuppressed or pregnant patients as well as those with previous anaphylaxis) is relatively safe with few adverse effects (injection site pain, redness, or mild rash in 10% of adults).[3] Although many developed countries offer the varicella vaccine (eg, National Health Service, United Kingdom) to nonimmune healthcare workers,

in India and many other developing countries this vaccine is not offered free to staff mainly because of cost issues. A single dose of varicella vaccine costs 1,200 rupees (US $20) and for an adult 2 doses are needed, spaced 4–8 weeks apart.[3,4]

In this report we document the economic cost of a chickenpox outbreak in an oncology center in eastern India. We consider which is a more favorable option in terms of staff health and health economics: free varicella vaccination to nonimmune staff or allowing the virus to take its natural course and infect susceptible contacts. From November 1, 2014, through June 30, 2015, there were 32 cases of chickenpox documented among healthcare workers of Tata Medical Center. This included 13 nurses (41%), 1 radiology technologist (3%), 12 housekeeping (HK) staff (38%), 4 customer care staff (13%), and 2 doctors (6%). The median (range) age of the affected staff was 25 (20–37) years. There were 12 men (38%) and 20 women (63%). None of the female staff affected were pregnant. The median (range) duration of rash was 5 (4–8) days. Complete data about the rash were not available for 3 staff. Complete information about antiviral (acyclovir) therapy (800 mg 5 times daily for 7 days orally) was available in 21 (66%) of 32 staff, and all of them had taken the prescribed antiviral medication. Data for antiviral therapy was not available for the remaining 11 affected staff (these were housekeeping staff who were seen externally by other staff health physicians). Complications (eg, hepatitis, pneumonitis, encephalitis) were found in none of the affected staff. Previous VZV IgG serology was known in 16 of 32 staff; of these 16 staff, 15 (94%) were found to be nonreactive to VZV IgG, suggesting absence of immunity against chickenpox. None of the staff who were nonimmune had previously received VZV vaccination. The suspected index case (source patient) was known in 10 (31%) of the 32 cases. The apparent source of infection was the hospital in 15 cases (47%), staff hostel in 5 (16%), and unknown in 12 (38%). The total number of staff days lost was 555 days for the 32 staff; the median (range) was 14 (4–53) days. The median (range) duration of leave beyond the resolution of rash was 9 (0–47) days. Data about sick leave taken were not available for 3 staff. No deaths occurred. We performed additional investigations as follows: complete blood count (2 cases), renal function tests (urea, creatinine, sodium, potassium; 1 case), liver function tests (2), chest radiograph (2), bacterial culture (1), and other viral serology (0). The total cost of management of all the cases (eg, investigations, medicines [antiviral agents, antipyretic]) was 18,464 rupees (US $290). The median cost was 805 rupees (US $13). In terms of human resource days lost, the total cost was 220,667 rupees (US $3,678); the median cost was 6,750 rupees (US $112) (online Table 1).

From a health economic point of view, the issue of universal screening of all staff followed by universal vaccination of susceptible staff is complex. In our institution we have screened all medical, nursing, and technical staff free at a cost of 600 rupees (US $10) per VZV IgG screen. The hospital has followed a free screening policy but relied on a voluntary—but not free—VZV vaccination policy. A cost-effectiveness model of varicella vaccination supported the "screen, then vaccinate" strategy of employees. In the model, vaccination of all employees prevented 35 employee infections and 674 patient exposures for every 10,000 potentially susceptible employees. The cost of preventing 1 employee infection was approximately US $15,000, and the cost of preventing 1 patient exposure was approximately US $775.[5] The hidden cost of a chickenpox outbreak among staff must also be taken into account. This includes the chance of spread of disease to vulnerable patients in a cancer hospital as well as staff absenteeism. It appears reasonable to offer free varicella vaccine for those staff who are in close contact with severely immunocompromised patients. Preventing outbreaks would require greater staff awareness and more-affordable varicella vaccines.

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SUPPLEMENTARY MATERIAL

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Outbreak of Shigellosis in a Homeless Shelter With Healthcare Worker Transmission—British Columbia, April 2015

To the Editor—Shigellosis is a highly infectious bacterial infection with symptoms from mild, self-limiting gastroenteritis to severe illness. *Shigella flexneri* and *S. sonnei* are the 2 most common species in British Columbia.[1] Most cases (62%) in British Columbia are travel related. Domestic outbreaks in daycares and through sexual contact are common owing to type of contact and low infectious dose for *Shigella* species—10 or fewer organisms.[2] Outbreaks in homeless populations are a concern owing to client vulnerability and risk of widespread transmission from inadequate sanitation. Healthcare workers are considered at high risk of transmission to others if they are ill with shigellosis; however, transmission of *Shigella* to healthcare workers is rarely documented in outbreak investigations. In April 2015, British Columbia public health officials investigated a shigellosis outbreak among persons associated with a homeless shelter and their attending healthcare providers.

Patient A, a middle-aged man with medical history including cirrhosis and hepatocellular carcinoma secondary to hepatitis B and C infection, developed bloody diarrhea and abdominal cramping on March 31, 2015, that persisted for 1 week before hospital admission on April 7, 2015. Episodes of uncontrollable loose bowel movements resulted in fecal contamination of his living environments, including a shelter day-program. Blood and stool cultures collected on April 7 grew *S. sonnei*. He was treated with ceftriaxone but remained in the hospital until April 30, 2015, owing to complications of his underlying medical conditions.

Patient B, a middle-aged man with a history of injection drug abuse and chronic hepatitis C, developed fever, confusion, and profuse diarrhea on April 1, 2015, while at the same shelter day-program patient A attended. Emergency services attended to him at the shelter and transported him to the hospital. On admission, he was covered in stool, was febrile (temperature, 39°C), and had delirium and decreased level of consciousness requiring sedation and intubation. Stool cultures collected on April 3 grew *S. sonnei*. He was treated with piperacillin/tazomycin while in the hospital. He left the hospital against medical advice on April 4.

Patient C, a previously healthy middle-aged man, was part of the first responder team who attended patient B at the shelter on April 1, including transferring and handling his soiled clothes. Patient C sprayed his contaminated boots, removed his gloves, and cleaned his hands with alcohol-based hand sanitizer. He developed symptoms of bloody diarrhea and abdominal discomfort on April 4; stool culture collected on April 11 grew *S. sonnei*.

Patient D, a previously healthy middle-aged healthcare worker, attended to patient B in the emergency department on April 1. She donned gown and gloves and followed hand hygiene per usual contact precautions but noted that patient B's thrashing was spreading feces widely. She developed diarrhea on April 3; stool culture collected on April 10 grew *S. sonnei*.

Pulsed-field gel electrophoresis using both Xba and Bln enzymes are routinely performed on all *S. sonnei* in British Columbia using PulseNet Canada protocol.[3] Pulsed-field gel electrophoresis patterns of *S. sonnei*, subgroup D, for 3 of the 4 ill persons' stool specimens were identical by both enzymes. Patient C had a closely related Xba pattern and identical Bln pattern. Susceptibility testing showed varying multidrug-resistance patterns, but all 4 isolates were resistant to ciprofloxacin and trimethoprim/sulfamethoxazole. Isolates of patients A and C were susceptible to ampicillin and ceftriaxone, whereas those of patients B and D were not. Patient B's isolate was initially reported as resistant to azithromycin, but according to *Salmonella* Typhi minimal inhibitory concentration breakpoints for azithromycin sensitivity against *Shigella*, both patients B and D were sensitive to azithromycin.

We evaluated the potential exposures from each patient and conducted an environmental assessment to determine the risk for further disease transmission. Public health actions at the shelter included active case finding of other clients and staff, which revealed no additional cases. Shelter management and outreach medical clinic staff received education on transmission of diarrheal illness, and signage was posted to reinforce good personal hygiene. Thorough disinfection and cleaning of the shelter were undertaken.

Staff at the local hospital were notified of the outbreak and alerted to contact public health immediately with any additional suspect cases. All cases of shigellosis reported from March 25 through April 20, 2015, were reviewed for potential linkage to this cluster.

S. sonnei generally causes milder diarrheal illness compared with other *Shigella* species.[4] The severity of illness in patients A and B was likely related to chronic comorbid conditions, a consideration for treating shigellosis in a homeless population. Incomplete treatment of patient B posed a risk to the patient and risk of transmission of a multidrug-resistant strain. Recent reports that 87% of *S. sonnei* isolates in the United States were nonsusceptible to ciprofloxacin have raised awareness of drug resistance and the need for rational antibiotic treatment.[5] Laboratory testing of isolates from