Influenza outbreak in a Canadian correctional facility

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Abstract

Correctional facilities face increased risk of communicable disease transmission and outbreaks. We describe the progression of an influenza outbreak in a Canadian remand facility and suggest strategies for preventing, identifying and responding to outbreaks in this setting. In total, six inmates had laboratory-confirmed influenza resulting in 144 exposed contacts. Control measures included enhanced isolation precautions, restricting admissions to affected living units, targeted vaccination and antiviral prophylaxis. This report highlights the importance of setting specific outbreak guidelines in addressing population and environmental challenges, as well as implementation of effective infection prevention and control (IPAC) and public health measures when managing influenza and other communicable disease outbreaks.

Keywords

Influenza, outbreak, incarceration, infection prevention and control, vulnerable populations

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Introduction

More than 30 million individuals worldwide are incarcerated every year (United Nations Office on Drugs and Crime, 2016). Of these, 2.5 million are awaiting trial and are held in pre-trial detention or remand centres with short stays, high turnover rates and continuous interactions between the community and sentenced correctional facilities (Walmsley, 2014).

Influenza outbreaks may cause serious morbidity and mortality, particularly in incarcerated populations (Maruschak et al., 2009). However, correctional facilities present unique challenges in outbreak management due to high staff and inmate turnover, limited hand-hygiene resources and personal protective equipment, overcrowding, poor ventilation, higher prevalence of infectious and chronic diseases and the prioritisation of security over healthcare initiatives (Bick, 2007; Centers for Disease Control and Prevention, 2012; Guthrie et al., 2012). These factors increase the risk of facility transmission of influenza while the high volume of inmate movement between correctional facilities and the community upon release, poses an increased risk of spread to new populations.

While incarcerated populations are predisposed to influenza outbreaks, outbreak management guidelines have been orientated towards conventional healthcare settings and may not address the specific challenges within the non-traditional setting of a correctional facility. Further, availability of published reports of influenza outbreaks within the correctional setting to guide management is limited (Awofeso et al., 2011; Bick, 2007; Chao et al., 2015; Gomez-Pintado et al., 2010; Guthrie et al., 2012; Quinton, 1890; Turner and Levy, 2010; Young et al., 2005). To address this gap and to aid in pandemic influenza planning, several national public health, infection prevention and control and correctional

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agencies have developed guidelines specific to this setting (Alberta Health Services, 2012a; Centers for Disease Control and Prevention, 2009; Federal Bureau of Prisons, 2013; Public Health England, 2015).

To our knowledge in Canada, there are no national guidelines for influenza outbreak management within short-term correctional facilities (remand or sentences of two years or less). We describe the practical application of adapted regional guidelines in the control of an influenza outbreak in a large remand facility. The steps outlined could be useful to others having to manage influenza outbreaks in such non-traditional settings.

Methods

Clinical setting

This outbreak occurred in a large maximum security Canadian remand facility with a capacity of approximately 2000 inmates, 700 correctional and 200 healthcare staff. There are seven self-contained pods consisting of four living units with approximately 300 beds per pod (72 beds per unit). The monthly average census in 2013 was 1108; however, during the time of the outbreak, it increased to approximately 1200.

Patient definitions

A patient with clinical influenza-like illness (ILI) was defined as acute onset of fever and cough with one or more of the following: sore throat; arthralgia; myalgia; or prostration (Alberta Health Services, 2012a; Public Health Agency of Canada, 2016). Confirmed influenza was defined as clinical ILI with laboratory detection of influenza RNA detection by nucleic acid amplification test (NAAT) from an appropriate clinical specimen (Alberta Health Services, 2012a; Public Health Agency of Canada, 2016).

Influenza outbreak was defined as two or more patients with ILI within a seven-day period, with a common epidemiological link (e.g. evidence of correctional centre-associated transmission such as a shared cell, unit or attendance at same inmate educational or work program) of which at least one is laboratory-confirmed (Alberta Health Services, 2012a; Public Health Agency of Canada, 2016).

The typical influenza incubation period is one to four days with an average of two days (Fiore et al., 2008). Period of communicability was defined as from the day before the onset of symptoms up to seven days after the onset of symptoms (Alberta Health, 2014¹). An exposure may occur through direct or indirect contact with respiratory droplets. Droplet spread occurs over approximately 1 m and thus

anyone within 1 m would be considered exposed (Fiore et al., 2008).

Data sources and analysis

A retrospective chart review of health records for the six influenza patients was conducted to obtain demographic and clinical information. Descriptive data analysis was carried out. Study ethics approval was granted by the University of Alberta Health Ethics Research Board.

Results

Epidemiological description of outbreak

On 6 December 2013, a 24-year-old healthy man (patient 1) was transferred from another correctional facility that was experiencing increased influenza activity. On 10 December, he presented from living Unit B with cough, fever (38.9°C) and a sore throat of unknown duration. Contact/droplet precautions were initiated that day. He had been immunised with the seasonal influenza vaccine on 23 October 2013. A nasopharyngeal (NP) swab confirmed influenza A(H1N1)pdm09 by NAAT.

Also on 6 December 2013, a 54-year-old influenza unimmunised diabetic man (patient 2) was admitted to the correctional facility from the community. On 12 December, he presented from living Unit A with a cough, fever (39.5°C) and a sore throat of unknown duration. He was placed on contact/droplet precautions on 13 December. A NP swab taken on 13 December, reported on 16 December, confirmed influenza A(H1N1)pdm09.

On 17 December, an influenza outbreak was declared after it was established that patients 1 and 2 met the clinical definition of an outbreak. Both patients shared an epidemiological link with concomitant entry into the correctional facility's admission unit and thus underwent security and healthcare processing at the same time, representing potential intra-facility spread. Both were asymptomatic upon entry to the facility. Patient 1 may represent inter-facility transmission as he developed symptoms within a typical incubation period of leaving the influenza-affected facility. Patient 2 was not diagnosed within the typical incubation period. This may be due to delayed reporting of symptoms or, given the high turnover in the facility, there was high probability that multiple inmates were exposed and may not have reported symptoms or were released/transferred before the onset of symptoms.

The progression of the outbreak is described in Figure 1. Patient 1 led to a secondary patient (patient 6) in living Unit B and patient 2 led to three secondary patients in living Unit A (patients 3–5). Two patients had received seasonal influenza vaccine more than two weeks prior to the onset of ILI symptoms. All patients remained on contact/droplet precautions for five days from the onset of acute illness or until resolution of acute illness and afebrile for 48 h. The

¹The 2013 version of these guidelines were used during the time of the outbreak; however, these guidelines are no longer available and current guidelines (2014) have not changed.

Figure 1. (a) Influenza outbreak timeline showing patients (n = 6) by location and patient-location links. (b) Patients with ILI by date of onset in Edmonton, Alberta, 10–16 December 2013.

outbreak was declared over on 31 December (after two incubation periods of four days each had elapsed).

Characteristics of patients with confirmed influenza

During 10–18 December 2013, six patients developed laboratory-confirmed influenza A. All patients were men, with an average age of 41 (age range, 24–54). One patient had a co-morbidity of diabetes mellitus. Three patients were

Canadian-born non-Indigenous, two were Canadian-born Indigenous and one was foreign-born. Two vaccinated patients represented breakthrough disease. There were no serious complications, hospitalisations or deaths.

Outbreak response

Figure 2 outlines the outbreak response (Alberta Health Services, 2012a, 2012b). After outbreak identification, admissions and inmate movement were restricted on

Figure 2. Correctional health ILI algorithm (Alberta Health Services, 2012b).

affected units. Symptomatic patients were moved to the medical infirmary in order to contain further transmission. During the outbreak, only healthcare staff who had been vaccinated at least 14 days prior or were taking oseltamivir prophylaxis were permitted to work on affected living units.

Infection prevention and control (IPAC) at the facility provided education to affected living units and staff, informing them of increased influenza activity, importance

of routine practices and additional precautions, respiratory etiquette and influenza vaccination.

All inmates on each of the two affected living units were considered exposed (72 inmates per unit; 144 total). Individuals with high-risk co-morbidities associated with severe influenza were offered oseltamivir post-exposure prophylaxis (75 mg once daily for ten days or until outbreak is declared over) (Ayoki et al., 2012). Influenza

vaccination was offered to all inmates on affected living units regardless of co-morbidities. Only four of these had received seasonal influenza vaccination greater than 14 days prior to the outbreak. However, 138 of these accepted vaccination during the outbreak.

Daily teleconferences were held with facility security and healthcare administration, IPAC, public health and occupational health and safety to manage all aspects of the outbreak.

Discussion

In contrast to healthcare settings, there have been few reports of influenza outbreaks and management in correctional settings. As this population is particularly vulnerable, it is imperative that more is known about effective outbreak prevention and management in this environment with unique challenges (Centers for Disease Control and Prevention, 2012; Guthrie et al., 2009; Maruschak et al., 2009).

Implementing optimal infection control procedures within correctional facilities is challenging. As the primary objective of a correctional facility is security, they are not constructed with consideration of infection control needs. Releases, transfers and transportation of affected inmates need to be considered in outbreak planning, as does the ability of the correctional facility to isolate affected inmates from the general population, limit or restrict movement on affected living units, and provide security-approved personal protective equipment.

To overcome population and environmental challenges within the correctional setting, collaboration between public health, IPAC and correctional facility health and security administration is critical. Our outbreak response was facilitated by two important features. First, healthcare service delivery in our setting integrates correctional healthcare into the provincial public healthcare system. This model facilitates access by correctional healthcare services to IPAC and public health resources (including vaccine and antiviral supply) and expertise. Outbreak management within any context is labour-intensive and this may be exaggerated within the often resource-limited correctional setting. Appropriate staffing for increased medical needs during an outbreak, availability of medical records to determine vaccination status and medical conditions, and insufficient supply of vaccinations and antivirals have all been cited as potential limitations (Centers for Disease Control and Prevention, 2012). These were addressed in this outbreak through our integrated healthcare model. Second, reports of previous influenza outbreaks have emphasised the need for corrections-specific guidelines (Centers for Disease Control and Prevention, 2012). We developed collaborative influenza outbreak guidelines to direct all aspects of ILI outbreak response and prevention in advance of an outbreak (Alberta Health Services, 2012a). This allowed us to contain the outbreak effectively with only six patients and 144 contacts and no hospitalisations or deaths.

Correctional facilities present a unique opportunity to provide preventive care to a large number of vulnerable individuals who often experience barriers to accessing care in the community. Canadian influenza guidelines recommend vaccination for everyone over six months of age, focusing on those at high risk for influenza-related complications or for transmission to those at high risk (Ayoki et al., 2012). Inmates meet one or both indications. Low baseline vaccination rates in our outbreak highlights the need for seasonal influenza vaccination programs (Bick, 2007). Given the 'revolving door' between correctional centres and the community, this could prevent influenza spread to the communities into which inmates are released and re-introduction into the facility. A continuous vaccine program throughout influenza season is required to maintain vaccination rates in high volume short-stay correctional settings.

Inmate influenza vaccine programs alone may not be sufficient to prevent correctional facility outbreaks. First, employees play an important role in intra-facility influenza transmission and annual vaccination must target all populations within the correctional environment including both healthcare and correctional facility staff (Public Health Agency of Canada, 2013). Additionally, staff self-monitoring and reporting of ILI symptoms with possible work restrictions for symptomatic staff should be considered. Second, routine ILI surveillance is essential to identify potential influenza entering correctional settings so that IPAC protocols can be promptly implemented to halt transmission. Vigilant ILI screening, education and vaccination are critical during influenza season and should occur during admission assessment (Public Health Agency of Canada, 2013). Finally, given the frequency of inmate transfers between correctional facilities, enhanced communication regarding influenza activity is required to limit spread (Bick, 2007). It is recommended that inmates with influenza not be transferred until asymptomatic for 24 h (Federal Bureau of Prisons, 2012).

Our outbreak description has some limitations. First, patients and contacts were not specifically interviewed at the time of the outbreak in order to determine closeness of contact within the facility making it difficult to determine the strength of epidemiological links and degree of exposure. However, this would have been impossible to do without breaching confidentiality through identification of patients. Further, due to the high turnover and movement within and out of the facility, it would be impossible to track all potential exposures. Second, we relied on self-reporting of symptoms in order to identify patients. Inmates may have chosen to delay or avoid disclosing symptoms for a variety of reasons including fear of triggering restrictions to unit movement or prompting transfer to the infirmary. Third, we only recorded the date patients presented with symptoms and not onset of symptoms, making it difficult to confirm precise incubation period and period of communicability. Lastly, as time of symptom onset was not recorded, the epidemiological curve (Figure

1b) reports disease onset in daily increments, rather than 12-h intervals which would be preferable given the typical incubation period of influenza. These limitations highlight the challenges to implementing effective IPAC control measures in a setting focused primarily on security rather than health.

In summary, we describe an influenza outbreak that occurred in a large Canadian remand facility. This report highlights the vulnerability of this population to outbreaks and emphasises the importance of planning for this population and environmental challenges in implementation of effective IPAC and public health measures in this setting.

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