

A B S T R A C T

Influenza causes high morbidity and hospitalization rates in residents of seniors lodges,¹ causing increased pressure on emergency departments and hospital beds every winter. This quasi-experimental study assessed the prevention of influenza outbreaks and their consequences in Calgary lodges. A multidisciplinary team worked to improve communication between health professionals, increase resident and staff immunization coverage, obtain weights and creatinines prior to influenza season, and facilitate amantadine prophylaxis during influenza A outbreaks.

We had an increase in standing orders for amantadine and up to 56% of residents from one lodge had documented creatinine levels. Amantadine was administered to residents within two days of outbreak notification.

Influenza morbidity in lodge outbreaks decreased from a rate of 37% to 9% over the three years and hospitalization rates decreased from 9% to 1%.

We recommend that other regions consider a similar approach to decreasing influenza morbidity and hospitalization in lodge residents.

A B R É G É

La grippe fait grimper les taux de morbidité et d'hospitalisation chez les résidents de foyers pour personnes âgées, ce qui exerce une pression accrue sur les salles d'urgence et les lits d'hôpitaux l'hiver. Notre étude quasi expérimentale évaluait la prévention des épidémies de grippe et ses conséquences dans des foyers de Calgary. Une équipe multidisciplinaire s'est employée à améliorer la communication entre les professionnels de la santé, à accroître la couverture vaccinale des résidents et du personnel, à recenser le poids et les taux de créatinine avant la saison grippe et à faciliter la prophylaxie par l'amantadine durant les épidémies de grippe A. Nous avons constaté une augmentation des commandes permanentes d'amantadine et, dans l'un des foyers, documenté des niveaux de créatinine chez 56 % des résidents. L'amantadine a été administrée aux résidents dans les deux jours qui ont suivi l'avis d'épidémie.

La morbidité due à la grippe dans les foyers a diminué, passant de 37 % à 9 % sur trois ans, et les taux d'hospitalisation ont baissé de 9 % à 1 %. Nous recommandons à d'autres régions d'envisager une stratégie semblable pour réduire la morbidité et les hospitalisations dues à la grippe chez les résidents de foyers.

Decreasing Influenza Impact in Lodges: 1997-2000 Calgary Regional Health Authority

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Despite influenza vaccination programs and the availability of antiviral medication over the past 20 years, there continue to be large numbers of emergency room visits or hospital admissions across Canada during flu season.² During the 1997/98 season, influenza caused large numbers of residents to be hospitalized and contributed to a bed shortage.¹ Risk of influenza mortality is high among seniors, especially among those residing in nursing homes.^{1,3} As many as 60% of residents in a single facility may contract influenza when viruses are circulating in the community.^{4,5}

Even when immunization programs are implemented, outbreaks can occur in long term care (LTC) facilities because of poor vaccine response in the elderly.^{6,7} The use of amantadine prophylaxis has been shown to be cost-effective in controlling influenza A outbreaks in LTC facilities.^{4,7}

Lodges offer accommodation and a combination of support and personal care services to enable residents to remain in the community. Lodges differ from LTC facilities in that most do not have central health records or full-time on-site nursing or medical care. Medical care is accessed through each resident's physician. As a result, the rapid control of influenza outbreaks in lodges poses a challenge.

Currently, there are 30 lodges in the Calgary area with a total of 2,344 residents, 75% female. The average age of these lodge residents is 85.

We hypothesized that a multi-pronged approach to influenza A outbreak in seniors lodges would improve reporting, facilitate amantadine prophylaxis, and

result in a decrease in influenza-related illness, hospitalizations and death.

Based on previous successful interventions in LTC,¹ and the severe impact from influenza on seniors lodges in the previous two years, the CRHA targeted lodges in the 1999/2000 season to improve outbreak control.

This paper describes a quasi-experimental study of morbidity, mortality, and hospitalization from influenza A in lodge residents, using a multi-pronged approach to influenza outbreak prevention and control, looking at outcome measures before and after the interventions.

METHOD

Data from Calgary lodge influenza A outbreaks were collected for three flu seasons (1997/98, 1998/99, 1999/2000). Prior to the intervention in 1998, reporting of outbreaks may have been incomplete. The Outbreak Coordinator was notified by the lodge manager or home care nurses if an outbreak occurred. Information collected on standard outbreak reporting forms by lodge staff was entered onto Microsoft Excel by the coordinator. Illness onset dates, illness duration, age, weight, immunization status if known, hospitalization, prescription for amantadine, blood work, side effects, and staff hours were tracked and summary reports generated from collected data. Data were analyzed using Stata software to perform a Poisson regression.

A regional outbreak guideline was developed in the fall of 1998 to improve outbreak reporting to public health and to initiate amantadine prophylaxis on residents who were Home Care (HC) clients. However, it was difficult to implement the guidelines. In preparation for the 1999/2000 season, a systematic, integrated

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TABLE I
Lodge Outbreaks – 3 Year Comparison

Year	Number of Lodges with Outbreaks	Total Residents* in Lodges with Outbreaks	Morbidity		Mortality		Hospitalization	
			Total # Ill	Mean Morbidity Rate (Range)	Total # Deaths	Mean Mortality Rate (Range)	Total # Hospitalized	Mean Hospitalization Rate (Range)
1997-98	7/30	596	220	36.9 % (13.8 - 59.3 %)	2	0.3 % (0 - 0.7 %)	52	8.7 % (0 - 23.4 %)
1998-99	3/30	255	72	28.2 % (13.3 - 35.6 %)	4	1.6 % (0 - 2.3 %)	24	9.4 % (6.3 - 12.1 %)
1999-2000	2/30	170	16	9.4 % (4.8 - 22.2 %)	0	0 % (0 %)	2	1.2 % (0.8 - 2.2 %)

* Total residents in lodges with outbreaks decreased due to fewer lodges having outbreaks over the 3 years. There was no change in the number of residents per lodge.

approach for implementing amantadine to all lodge residents during outbreaks was developed.

Pre-outbreak strategies

- *CRHA Public Health Update* - the monthly newsletter to physicians explained the plans, asked them to promote influenza vaccine and get weights and creatinines done for seniors living in lodges.
- *Letter to lodge physicians* - physicians identified as having lodge patients received letters explaining the risks of influenza to the elderly. They were asked to encourage vaccination, get creatinine and weight, and have the resulting amantadine dosage on the patient's chart.
- *Standing orders for amantadine* - lodges with on-site nursing staff were asked to obtain amantadine standing orders from residents' physicians.
- *Letter to lodge staff* - lodge staff received letters describing the importance of flu vaccination for staff in protecting the elderly.
- *Letter to lodge residents* - residents were advised of the need for pneumococcal and annual flu vaccinations, the need for amantadine prophylaxis in the event of an outbreak, and to make an appointment with their physician for blood work and weight.
- *Flu meeting* - all lodge managers, vendor agency staff, and other community-based nurses and managers who worked in the lodge setting were invited to a meeting to discuss the proposed strategies.
- *Resident profile forms* - a template for documenting resident information was developed and lodge managers were asked to

TABLE II
Nursing Hours Required for Outbreak Control in CRHA Lodges 1999/2000

Assisted Living Sites	Total Residents	Total Nursing Hours	Hours per Resident
A	45	111	2.5
B	125	105	0.8
Total	270	216	Average = 1.65

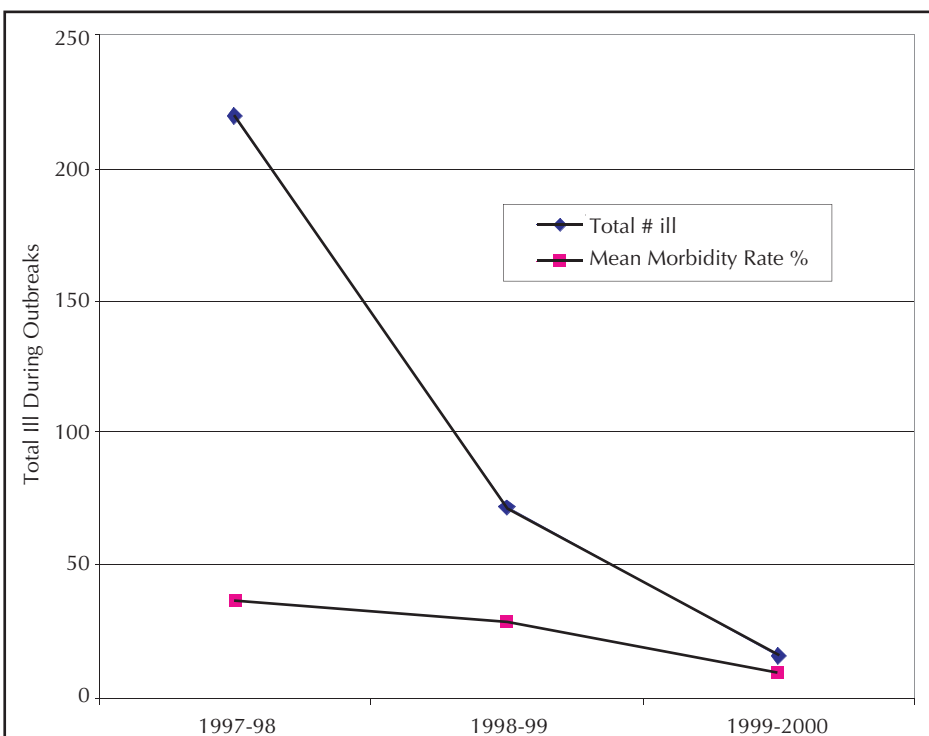


Figure 1. Influenza-related morbidity in CRHA lodges

- keep the list updated. In the event of an outbreak, public health requested resident's name, date of birth, attending physician, and flu vaccination date.
- *Nasopharyngeal specimen (NPS) collection* - key community-based nurses were trained to take an NPS.
- *Rapid viral testing* - Provincial Laboratory of Southern Alberta tested all NPS.

- *Mobile Lab for blood work* - Calgary Laboratory Services provided on-site blood collection for creatinines in the event of an outbreak.

Outbreak protocol

As soon as an influenza-like-illness (ILI) outbreak (3 cases or more) was reported, NP swabs were taken on the cases by community-based nurses. Once influenza

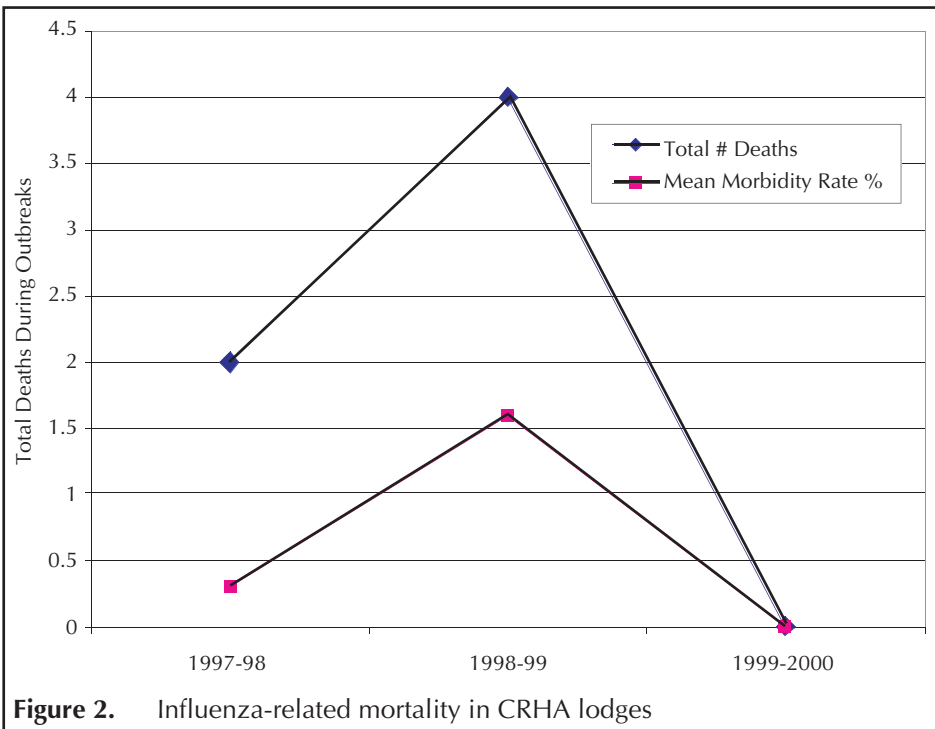


Figure 2. Influenza-related mortality in CRHA lodges

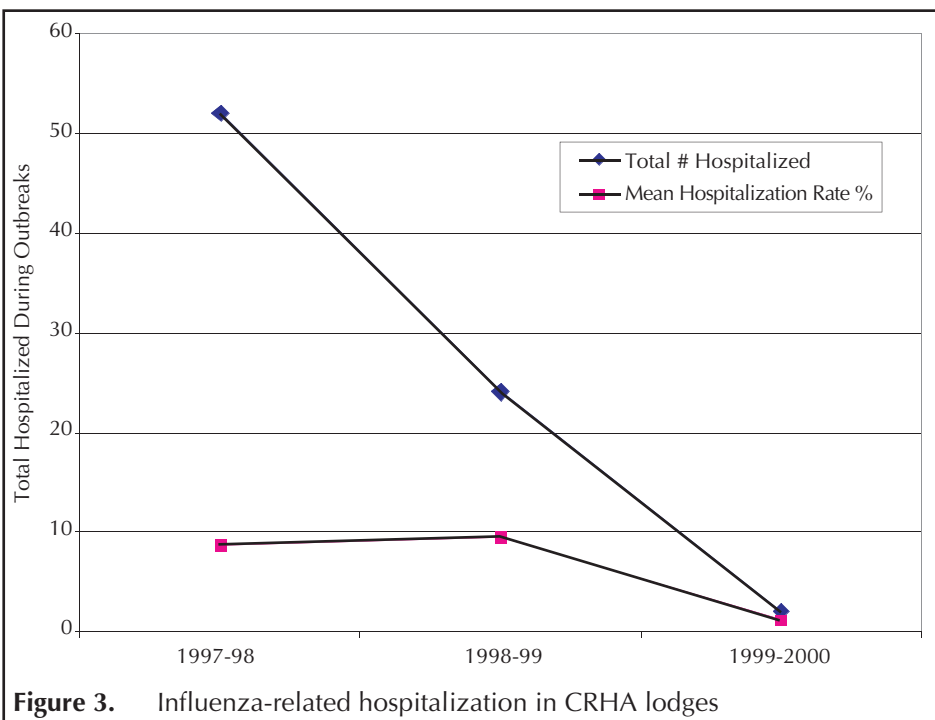


Figure 3. Influenza-related hospitalization in CRHA lodges

A was confirmed, an Outbreak Team was formed, consisting of the Outbreak Coordinator, Public Health (PH), Home Care (HC) and Communicable Disease (CD) nurses, as well as lodge staff and the Medical Officer of Health.

Lodge staff and residents were advised of outbreak control measures including keeping cases in their rooms, canceling

group social events, postponing admissions, vaccinating unimmunized residents and staff, and recommending unvaccinated staff take amantadine prophylaxis. PH or HC nurses visited each resident to obtain verbal consents for prophylaxis and blood work if necessary, take weights and address individual concerns. Arrangements were made for mobile lab to collect blood

creatinines at the lodge as rapidly as possible.

The pharmacy most frequently used by the lodge was contacted to process standing amantadine orders, and prepare for prescriptions being called in by physicians. The Outbreak Team phoned the physicians of residents without orders. If the physician had a pre-calculated amantadine dosage, it was phoned directly to the pharmacy. If the resident's renal function was unknown, a standard dose of 100 mg daily was prescribed, and dosage adjusted once creatinine results were available.

ETHICS

The Alberta Public Health Act permits access to health information by public health staff as needed to control outbreaks. Lodge managers only shared information on a need-to-know basis. Informed consents were obtained for prophylaxis.

RESULTS

Despite increased surveillance, only 2/30 (6.7%) lodges had confirmed influenza A outbreaks in 1999/2000 compared to at least 7 in 1997/98 and 3 in 1998/99. Three other (10%) lodges reported suspected ILI cases in 1999/2000 but viral cultures were negative. Surveillance by HC nurses in the remaining lodges did not detect any outbreaks.

The average reporting time of suspected ILI outbreaks decreased dramatically to 1 day in 1999/2000, from 18 (1998/99) and 9 days (1997/98). Lab confirmation of influenza A was available within 24 to 48 hours of outbreak notification in the 1999/2000 season, compared to a range of 4 to 7 days in 1997/98. Residents commenced amantadine within 24 to 48 hours of influenza A confirmation. Only one resident had to discontinue prophylaxis due to dizziness. One of the outbreak lodges obtained 19 standing orders for amantadine prior to the outbreak. Up to 56% of the residents in the same lodge had documented creatinine levels, indicating cooperation from family physicians doing blood work prior to influenza season. Dosage adjustments were done once creatinine levels were available, usually within 48 hours.

Morbidity and hospitalization rates were markedly lower than in previous years (see Table I and Figures 1, 2 & 3). Poisson regression showed statistically significant differences in illness and hospitalization ($p < 0.005$ and $p = 0.011$ respectively) but no statistical difference in deaths. All rates are calculated with a denominator of residents in lodges with outbreaks, as lodges without outbreaks were not included in the outbreak phase of the intervention.

Both outbreaks stopped abruptly with no new cases of ILI reported after the initiation of amantadine. Duration of outbreaks (from the onset of the first case until the outbreak was declared over) averaged 10 days in 1999/2000, compared to 26 (1998/99) and 17 days (1997/98).

A total of 216 hours for CRHA community nursing staff were required to implement prophylaxis in the two lodges (see Table II).

DISCUSSION

There were two major goals of this study. The first was to put in place a process of increased vaccination, education of physicians, lodge managers and residents, improved notification of outbreaks in lodges and better outbreak management using rapid amantadine administration. The second was improved morbidity, mortality and decreased hospitalization from influenza in lodge residents.

The first goal was achieved with great success. Although unable to measure vaccination coverage, we improved communication between multiple players: physicians, pharmacists, laboratory, home care nurses, public health nurses, lodge managers and residents. Getting weights and creatinines done in advance or at the onset of the outbreak allowed residents to be given amantadine rapidly, resulting in prompt cessation of outbreaks. Side effects were closely monitored.

Statistically significant decreases in morbidity and hospitalization were shown. These may not be due exclusively to the interventions, however, due to the following limitations. There was no control group and we did not randomize lodges to receive the

intervention. However, given that we were applying the standard of care, it was unethical to deprive any lodge of the intervention. We were only able, therefore, to compare rates before and after the interventions.

There are other possible causes for the apparent success of this intervention. The virulence of the influenza virus strain and effectiveness of vaccine can vary from year to year. In 1997/98, the vaccine was not a good match for the circulating strain, A/Sydney, so the rates of illness were much higher than in previous or subsequent years. However, in 1998/99 and 1999/2000, the vaccines were good matches to the circulating virus strains, but we still saw a decrease in morbidity and hospitalization following our interventions. Due to incomplete reporting of outbreaks in 1997/98 prior to the intervention, there may have been even more ill and hospitalized lodge residents than we were aware of, so the decrease due to the intervention may have been even greater than observed.

Hospitalization rates are not only dependent on pressure to admit because of illness, but also on bed availability. During the past three years, there was little change in Calgary bed availability per capita. The decrease of hospitalization could not have been influenced by the bed availability.

A further limitation is that we have not done a cost-benefit analysis. The intervention was costly in terms of CRHA staff hours, medications and blood tests, but it resulted in decreased hospital admissions. Even a few admissions prevented would likely have covered the costs of the intervention program. However, the cost of the program was incurred by the public health and home care sectors, and the savings accrued to the acute care sector. Further research should be done to look at the cost benefit of the interventions.

A comparative study of two similar regions, one using the intervention and one not, would be valuable. Future research should include improving identification of physicians who have lodge patients, and documenting vaccination coverage.

We think that the benefit of this influenza control program in improving

our outbreak management process was substantial. Although the observed decrease in morbidity, mortality and acute care admissions cannot be proven to be due to our interventions, the results are promising enough that we will continue this intervention in our region. We encourage other regions to consider similar approaches.

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