

EFFECTS OF AN INFLUENZA PREVENTION PROGRAM USING NON-PHARMACEUTICAL PREVENTION MEASURES TO IMPROVE THE KNOWLEDGE, ATTITUDES AND PRACTICES OF ELEMENTARY SCHOOL STUDENTS IN NAKHON PHANOM PROVINCE, THAILAND

Nutcharat Mangklakeeree, Somdej Pinitsoontorn and Sompong Srisaenpang

Department of Community Medicine, Faculty of Medicine, Khon Kaen University,
Khon Kaen, Thailand

Abstract. We evaluated an influenza prevention educational program using educational media, e-books and cartoons conducted among students in grades 4 through 6. The course was 8 hours long. The study was conducted at 4 schools; 230 students at each school were in the experimental group and 224 students at each school were in the control group (no educational intervention). The data were analyzed using the Wilcoxon matched-pair signed-rank test. The students in the experimental group had significantly greater knowledge ($p < 0.001$), attitudes ($p < 0.001$) and practices ($p < 0.001$) scores after the intervention. However, the control group also had significantly greater knowledge ($p < 0.001$) and attitudes ($p < 0.001$) scores but not practices scores ($p = 0.326$). Further studies are needed to determine the factors that influenced these differences.

Keywords: influenza, non-pharmaceutical, prevention program, elementary schools, Thailand

INTRODUCTION

Influenza is an ongoing public health problem, especially among children. Influenza is associated with morbidity and mortality and has significant national and international public health consequences. Worldwide, more than 214 countries have reported laboratory confirmed cases of pandemic 2009 influenza A (H1N1), resulting in over 18,000 deaths (WHO, 2010b). The most active areas for H1N1

virus transmission include West Africa, the Caribbean, and Southeast Asia (WHO, 2010b). The H1N1 and seasonal influenza viruses co-circulate in many parts of the world and will continue to spread for many years to come (CDC, 2010).

Despite concerns H1N1 influenza could be more dangerous than seasonal influenza, especially among patients with respiratory disease and the young, there is insufficient vaccine to prevent an influenza pandemic (WHO, 2009). Although public awareness and concerns about influenza have decreased, public health officials still need to monitor the disease. Monitoring influenza viruses is important because new viruses may occur and may not behave in the same way

Correspondence: Assoc Prof Somdej Pinitsoontorn, Department of Community Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.
Tel: 081 5441004, 086 8520131
E-mail: sampinit@hotmail.com

as previous strains of influenza viruses (WHO, 2010a). Influenza prevention by vaccination has been found to be effective in reducing morbidity and mortality rates by 60-90%, but the side effect profile of the vaccine has been little studied (Ward and Draper, 2006). Primary health service provision facilities and rural areas may have poor access to the vaccine. Problem areas include: 1) physicians who do not understand the importance of the epidemiological connection between children and adults, 2) a deficiency in equipment and vaccines, and 3) current technology is deficient and costly (Van *et al*, 2010).

Outbreaks may occur in schools, which may lead to even more severe epidemics. Primary school students are at high risk for contacting H1N1 influenza (National Association of School Psychologists, 2009). The benefits of influenza control include less strain on healthcare facilities, fewer school days missed by students and less risk to the community (Novel swine-origin influenza A (H1N1) virus investigation team, 2009). Educational facilities are at high risk for rapid spread of diseases among students, teachers and staff which then spread to the general community (Van *et al*, 2010).

When influenza epidemics occur in communities, many preventive methods are required: hand washing, separating suspected patients, avoidance of crowds during epidemics and use of hygienic masks (CDC, 2008). A study by Bowen *et al* (2007) found intensive hand washing reduced diarrhea and respiratory disease incidences. Hand washing programs in 87 schools in China found children missed 2 days/100 children/ week prior to conducting the program and 1-2 days/ 100 children/ week after the program. Mingchai (2009) found social support, coordination and participation were factors that

affected the control of avian influenza: hygiene education reduced diseases of the respiratory system, including influenza, by 49.7% and reduced diseases of the gastrointestinal system by 28.9% (Dyer *et al*, 2000).

Students, teachers and other school personnel must all be involved in the process of influenza prevention and control. When persons display symptoms resembling influenza in schools, the family must be notified. Health education regarding influenza can improve knowledge, attitudes and practices (Siriwatanamethanon *et al*, 2010). We studied the use of non-pharmaceutical measures to prevent spread of influenza. We studied the effect of a program to modify risk behavior and its integration into the curriculum of an influenza control program on the knowledge, attitudes and practices of elementary school students in Nakhon Phanom Province, Thailand.

MATERIALS AND METHODS

This quasi-experimental study was conducted at four medium-sized elementary schools between January 2011 and March 2012. A questionnaire was used to evaluate the knowledge, attitudes and practices of elementary school students regarding influenza. The content validity of the questionnaire was assessed by five professionals: a physician, two public health instructors, a professor in education working at a Faculty of Education and an elementary school teacher. Cluster sampling was used to determine the study schools in the district. After passing exclusion criteria, the study population was comprised of 230 subjects and the control population was comprised of 224 subjects. School registration in 2011 was lower than projected, so our study population

was less than expected. The researchers, therefore, increased the number of schools in the experimental and control groups to two in each group.

The study subjects were students in grades 4 to 6 who were to be taught about health and disease prevention for a total of 8 hours using educational media (simple to understand content provided and guided by medical professionals), e-books and cartoons. The students were tested for their knowledge and skills regarding preventing the spread of germs after 1-6 months. The control group received routine education. Both the experimental and control groups were tested at the same time following intervention activities with the same instruments.

The instruments used in the experiment consisted of an influenza handbook and student healthcare handbooks of which content validity were evaluated by a panel of five experts consisting of a medical physician, two public health instructors, a professor in education area working at a faculty of education and an elementary school teacher. Data collection consisted of a questionnaire about influenza with three choices for responses: right, wrong and uncertain. A questionnaire about attitudes towards influenza contained seventeen questions, each with three possible answers: strongly agree (highly applicable to the situation at hand), moderately agree (moderately applicable to the situation at hand) and slightly agree (only slightly applicable to the situation at hand). The form used to assess influenza prevention behavior asked whether students practiced these behaviors daily, sometimes or seldom, using 14 questions. The assessment form was tested among 30 students living in areas with influenza epidemics. Knowledge was analyzed with the Kuder-Richardson

(KR 20) statistic, and a reliability of 0.80 was obtained. Attitudes and practices were analyzed using the Cronbach's alpha coefficient which yielded reliability values of 0.81 and 0.82, respectively.

Data regarding knowledge, attitudes and practices were analyzed using basic statistics. Comparisons of scores for knowledge, attitudes and practices before and after the program and pre-test comparisons were made using the paired *t*-test or the Wilcoxon matched-pair signed-rank test where appropriate.

We obtained written informed consent from teachers, parents and students. This study was approved by the Ethics Committee of Khon Kaen University on Research in Human Subjects (HE531376). The experimental intervention was used at the control schools at the conclusion of the study.

RESULTS

Thirty-three percent, 45.5% and 21.4% of the students in the control group were from grades 4, 5 and 6, respectively; while 26.5, 31.7 and 41.7% of students were from the study group, respectively. Sixty-four point seven percent of students in the control group had parents with an elementary level of education while 82.2% of students in the study group had parents with an elementary education. Seventy-seven point seven percent of students in the control group had parents who were daily workers or agricultural workers, while 86.4% of students in the study group had parents who were daily workers or agricultural workers.

The mean pre-test score for knowledge was 8.1 (SD = 2.4) and the mean post-test score was 11.4 (SD = 1.9) in the study group. The mean pre-test score for attitudes was 39.8 (SD = 4.7) and the mean

Table 1
Pre- and post-test score differences in the study group.

Area examined	Higher score on post-test (n)	Pre- and post-test scores are same (n)	Lower score on the post-test (n)	Total	Percent increase in the mean post-test score	p-value
Knowledge	138	85	7	230	60.0	<0.001
Attitudes	167	58	5	230	72.6	<0.001
Practices	111	97	22	230	48.3	<0.001

Table 2
Pre- and post-test score differences in the control group.

Area examined	Higher score on post-test (n)	Pre- and post-test scores are same (n)	Lower score on the post-test (n)	Total	Mean percent increase on post-test score	p-value
Knowledge	68	129	27	224	30.4	<0.001
Attitudes	7	216	1	224	3.1	0.017
Practices	60	92	72	224	26.8	0.326

post-test score was 47.5 (SD = 2.8) in the study group. The mean pre-test score for practices was 34.2 (SD = 4.3) and the mean post-test score was 38.1 (SD = 2.8) in the study group. The pre- and post-test scores in the study group were significantly different ($p < 0.001$).

The knowledge, attitudes and practices scores in the study group increased by 60.0, 72.6 and 48.3%, respectively (Table 1).

The mean pre-test score for knowledge was 8.0 (SD = 2.3) and the mean post-test score was 9.4 (SD = 2.4) in the control group. The mean pre-test score for attitudes was 39.8 (SD = 4.7) and the mean post-test score was 40.0 (SD = 4.7) in the control group. The mean pre-test score for practices was 33.8 (SD = 5.1) and the mean post-test score for practices was 34.2 (SD = 3.6) in the control group.

The knowledge, attitudes and practices scores in the control group increased by 30.4% ($p < 0.001$), 3.1% ($p < 0.05$) and 26.8% ($p = 0.326$) (Table 2).

Both the study and control groups had significant improvement in knowledge and attitudes on the post-test, but only the experimental group had improvement in practices on the post-test.

DISCUSSION

A similar study from Italy among poultry workers showed improvement in knowledge, attitudes and practices on the post-test after educational intervention (Abbate *et al*, 2006). Siriwatanamethanon *et al* (2010) found students who participated in an influenza prevention program for elementary school students had improved knowledge, attitudes and

practices after an influenza control program was integrated into the elementary school curriculum.

Larson *et al* (2010) compared the impact of three household preventive interventions on respiratory infections, including influenza; the knowledge, attitudes and practices scores at baseline were low but improved significantly in all groups by the end of the study suggesting participation in the educational program improved knowledge, attitudes and practices to prevent influenza. Park *et al* (2010) found Korean students had an increased frequency of hand hygiene practices during the pandemic, with significant sex differences in the attitudes and behaviors related to the use of hand hygiene as a means of disease prevention.

A study from Hong Kong by Cowling *et al* (2009) compared a group that practiced hand washing and wore hygienic masks with a group that practiced hand washing without wearing hygienic masks; the results showed no differences between the two groups. Patients with symptoms of illness have been recommend to be the only persons to wear hygienic masks to prevent disease transmission (Department of Disease Control, 2009). Aiello *et al* (2010) found the price of hygienic masks increased many times during an outbreak and wearing masks by people with symptoms of illness had benefits to the public.

We discovered a gap in knowledge and attitudes among subjects in our study. The study and the control groups in our study were located in different districts. Differences in results may have been caused by the control group receiving knowledge from various media and activities provided by public health agencies.

A difficulty in conducting the study was school activities sometimes conflicted

with the intervention program, which had to be postponed at times.

Our data show the influenza prevention program was effective in primary school and appeared to be more effective in changing practices than the usual influenza intervention program. Further studies are needed to determine which factors are most effective in influenza intervention training since the control group also had a significant improvement in knowledge and attitudes, but not practices.

ACKNOWLEDGEMENTS

The researchers would like to thank the Nakhon Phanom Primary Educational Service Area Office 1 and the Nakhon Phanom Public Health Office for providing assistance. This research was funded by the Faculty of Medicine, Khon Kaen University and the Higher Education Research Promotion Project of Thailand, Office of the Higher Education Commission.

REFERENCES

- Abbate R, Giuseppe GD, *et al*. Knowledge, attitude, and practice of avian influenza poultry workers, Italy. *Emerg Infect Dis* 2006; 12: 1762-4.
- Aiello AE, Murray GF, Perez V, *et al*. Mask use, hand hygiene, and seasonal influenza-like illness among young adults: a randomized intervention trial. *J Infect Dis* 2010; 201: 491-8.
- Bowen A, Ma H, Ou J, *et al*. A cluster-randomized controlled trial evaluating the effect of a hand washing-promotion program in Chinese primary schools. *Am J Trop Med Hyg* 2007; 76: 1166-73.
- Centers for Disease Control and Prevention. Summary of interim recommendations for facemask and respirator use. Atlanta: CDC, 2008. [Cited 2009 Apr 28]. Available

- from: URL: <http://www.cdc.gov/Features/MasksRespirators/>
- Centers for Disease Control and Prevention . 2009 H1N1 flu: situation update. Atlanta: CDC, August 11, 2010. [Cited 2012 Dec 15]. Available from: URL: <http://www.cdc.gov/h1n1flu/>
- Cowling BJ, Kwok-Hung Chan, Fang VJ, *et al.* Facemasks and hand hygiene to prevent influenza transmission in households: a cluster randomized trial. *Ann Intern Med* 2009; 151: 437-46.
- Department of Disease Control, Ministry of Public Health. Public Health Advice No. 8 Subject: Pandemic H1N1 2009. Bangkok: Department of Disease Control, 2009. [Cited 2012 Dec 15]. Available from: URL: <http://www.moph.go.th>
- Dyer DL, Shinder A, Shinder F. Alcohol-free instant hand sanitizer reduces elementary school illness absenteeism. *Farm Med* 2000; 32: 633-8.
- Larson EL, Ferng YH, Wong-McLoughlin J, *et al.* Impact of non-pharmaceutical interventions on URIs and influenza in crowded, urban households. *Public Health Rep* 2010; 125: 178-91.
- Mingchai C. Factors related to the measure for avian influenza control and prevention in Uttaradit Province, Thailand. Proceedings of the Agardir International Conference, 12-14 November 2009.
- Novel swine-origin influenza A (H1N1) virus investigation team. Emergency of a novel swine-origin influenza A (H1N1) virus in humans. *N Engl J Med* 2009; 360: 2605-15.
- National Association of School Psychologists (NASP). Talking to children about the flu (Novel H1N1): a parent resource. Bethesda: NASP, 2009. [Cited 2009 Apr 8]. Available from: URL: <http://www.nasponline.org/resources/swineflu.aspx>
- Park JH, Cheong HK, Cheong HK, *et al.* Perceptions and behaviors related to hand hygiene for the prevention of H1N1 influenza transmission among Korean university students during the peak pandemic period. *BMC Infect Dis* 2010; 10: 222.
- Siriwatanamethanon J, Buatee S, Dodgson JLA. Effects of swine flu A (H1N1) 2009 prevention program in primary school students. *J Nurs Sci Health* 2010; 34: 92-100.
- Van D, McLaws ML, Crimmins J, *et al.* University life and pandemic influenza: Attitudes and intended behavior of staff and students towards pandemic (H1N1) 2009. *BMC Pub Health* 2010; 10: 130.
- Ward L, Draper J. A review of the factors involved in older people's decision making with regard to influenza vaccination: a literature review. *J Clin Nurs* 2006; 26:5-16.
- World Health Organization (WHO). Preparing for the second wave: lessons from current outbreaks. Geneva: WHO, 2009. [Cited 2009 Sep 1]. Available from: URL: http://www.who.int/csr/disease/swineflu/notes/h1n1_second_wave_20090828/en/index.html
- World Health Organization (WHO). WHO recommendations for the post-pandemic period. Geneva: WHO, 2010a. [Cited 2010 Aug 10]. Available from: URL: http://www.who.int/csr/disease/swineflu/notes/briefing_20100810/en/index.html
- World Health Organization (WHO). Pandemic (H1N1). Geneva: WHO, 2010b. [Cited 2010 May 7]. Available from: URL: http://www.who.int/esr/don/2010_05_07/en/index.html