Economic Evaluation of Influenza Vaccination in Thai Chronic Obstructive Pulmonary Disease Patients†

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Abstract

To determine the cost-effectiveness and cost-benefit of influenza vaccination in chronic obstructive pulmonary disease (COPD) patients the authors conducted a stratified randomized, double-blind, placebo-controlled trial from June 1997 to November 1998 at a university hospital in Thailand. A total of 125 COPD patients were stratified based on their FEV1 as mild COPD (FEV1 $\geq$ 70% predicted), moderate COPD (FEV1 50-69% predicted) and severe COPD (FEV1 < 50% predicted) and in each severity stratum they were randomized to the vaccine group (received intramuscular injection with purified trivalent split-virus vaccine containing A/Texas/36/91 (H1N1), A/Nanchang 1933/95 (H3N2) and B/Harbin 107/94) or the placebo group (received in tramuscular injection with vit B1). Number of episodes of acute respiratory illness (ARI) related to influenza (clinical ARI + a serum hemagglutination inhibition antibody titre of 38 or greater and a four fold titre increase in convalescent serum compared to acute serum) as well as severity of each ARI (outpatient treatment, hospitalization or required mechanical ventilation) and costs of treatment (direct medical costs comprised real drug costs from the hospital dispensary in outpatient cases and real charges in hospitalization cases) were collected and analyzed for the cost-effectiveness and cost-benefit of influenza vaccination.

The incidence of influenza-related ARI in the study year was 27 per cent in the placebo group and 6.4 per cent in the vaccine group (relative risk [RR] 0.24, vaccine effectiveness 76%). The incidence was 27.3 per cent, 23.5 per cent and 29.2 per cent in mild, moderate and severe COPD respectively in the placebo group and 4.3 per cent, 12.5 per cent, and 4.3 per cent in the mild, moderate and severe COPD respectively in the vaccine group (RR 0.16, 0.53 and 0.15; vaccine effectiveness 84%, 47%, and 85% respectively). The incremental cost-effectiveness ratios demonstrated that for every 100 patients with mild COPD whom the authors decided to vaccinate, the cost would be 24,840 baht more and would prevent 18.2 outpatients, 4.8 hospitalizations and 0 patient from mechanical ventilation due to ARI related to influenza. Likewise, the authors would have prevented 5.1 outpatients, 5.9 hospitalizations, 5.9 mechanical ventilation and 20.8 outpatients, 3.9 hospitalizations, 8.3 mechanical ventilation for every 100 moderate COPD and every 100 severe COPD patients vaccinated respectively. More than 90 per cent of the costs of treatment of influenza-related ARI were costs of hospitalization and for patients with moderate and severe airflow obstruction, more than 90 per cent of these costs were attributed to the costs of treating the patients who required mechanical ventilation. Predicted cost

savings for every 100 mild COPD, 100 moderate COPD and 100 severe COPD patients vaccinated were 125,629 baht, 538,184.3 baht, and 680,647.1 baht respectively.

In conclusion : Influenza vaccination is highly effective in the prevention of acute respiratory illness related to influenza virus infection in COPD, regardless of severity of airflow obstruction. Vaccination is more cost-effective in preventing mechanical ventilation episodes and more cost-benefit in patients with more severe airflow obstruction. Influenza vaccination should be recommended to all patients with COPD with the higher priority provided to patients with more severe airflow obstruction.

Key word : COPD, Viral Infection, Acute Respiratory Illness, Acute Exacerbation, Hospitalization, Mechanical Ventilation, Cost-Effectiveness, Cost-Benefit

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Chronic obstructive pulmonary disease (COPD) is a common disease and evidence shows that the prevalence of COPD is increasing worldwide. Because of its chronic and progressive nature and the unsatisfactory outcome of the available current therapy, COPD imposes a large financial burden on the health service. It now ranks fifth in terms of global burden of disease[1].

Most of the morbidity, mortality and health care costs of the COPD patients are related to the exacerbation of COPD[2,3]. Viral infection plays an important role in the exacerbation of COPD[4,5]. It may be the cause of one third of these exacerbations. A significant causative virus related to exacerbation of COPD is the influenza virus. Furthermore, viral infections may impair host defenses[6,7] which lead to increased colonization or infection with pathogenic bacteria. Thus, prevention of influenza virus infection in COPD patients may substantially contribute towards the decrease in morbidity, mortality and medical resources utilization.

At present, most of the guidelines for the management of COPD recommend influenza vaccination in every COPD patient[8-10]. These recommendations are implied from substantial evidence regarding the efficacy and cost-effectiveness of influenza vaccination in the reduction of influenza hospitalizations, pneumonia and deaths among elderly persons [11-13] and persons with high-risk chronic conditions [14,15]. However, there is still no direct information regarding the effectiveness of influenza immunization in COPD patients. What is more, patients with COPD are a heterogeneous group owing to the range of severity of airflow obstruction. Hence, it would be preferable to define a target population at risk, based on severity of the disease to determine who will benefit most from influenza vaccination. In developed countries, influenza vaccination rates vary and depend on the effective targeting of high risk patients, the patients' willingness to receive the vaccination when offered and vaccination reimbursement programs under national or social health insurance[16,

17). Therefore, appropriately categorized priority of patients at risk is crucial, especially in limited resources, developing countries. Also, COPD patients are elderly with chronic illness which may lead to lower immune response to immunization and lower vaccine effectiveness(18,19). Thus, the authors conducted a randomized, double-blind, placebo-controlled trial to determine the cost-effectiveness and cost-benefit of influenza vaccination in COPD patients, with focus on the relation to the degree of airflow obstruction.

METHOD

A stratified randomized double-blind placebo-controlled study was conducted from June 1997 to October 1998. Subjects were recruited from patients with COPD who attended our COPD clinic regularly. They were eligible for this trial if they had a clinical diagnosis of COPD together with a forced expiatory volume in one second (FEV1) of less than 70 per cent of the forced vital capacity (FVC) and less than 15 per cent increase of FEV1 after inhaled bronchodilator. Patients were excluded when they had a history of allergy to eggs, were immunocompromised or receiving any immunosuppressive drug except corticosteroids, had associated malignancy or any disease that would cause survival to be less than one year.

Study protocol and testing

The demographic data, comorbid diseases and history of cigarette smoking of all studied patients were collected. The patients were placed on a standard treatment regimen according to the Thai guidelines for management of chronic obstructive pulmonary disease(20). The study comprised baseline evaluation of clinical symptoms and lung functions. When stable, not having an acute respiratory illness, patients were seen at our COPD clinic at 4-week intervals. The patients were told to notify the center immediately whenever they had an acute respiratory illness. At each monthly visit, they were also rechecked for episodes of respiratory illness during the past month. The study protocol was approved by the institutional ethics committee, and informed consent was obtained from all the subjects.

Randomization and vaccination

All participants were stratified based on their FEV1 as mild COPD (FEV1 $\geq$ 70% of predicted value), moderate COPD (FEV1 50-69% of predicted value) and severe COPD (FEV1 < 50% of predicted value). In each severity stratum, each patient was numbered consecutively. These numbers had been previously randomized into vaccine group or placebo group.

At the vaccination session, the patients received an intramuscular injection with influenza vaccine or placebo in the deltoid muscle according to the previously randomized identification number. These processes of checking the identification number and vaccine or placebo injection were performed solely by a nurse who did not participate in the care of these patients.

The vaccine used was the purified trivalent split-virus vaccine manufactured by Pasteur Merieux, Lyon-France. Each dose (0.5 ml) contained influenza A/Texas/36/91 (H1N1), A/Nanchang/933/95 (H3N2) and B/Harbin/07/94, all with 15 mg of hemagglutinin. These antigens were in accordance with the recommendation of the World Health Organization. A 0.5 ml of vitamin B1 was used as placebo. Every patient received two doses of the vaccine or placebo; the second dose was administered four weeks after the first dose.

Blood tests

Ten ml of venous blood was taken from each patient at the first dose of vaccine or placebo injection (B1), at the second dose of vaccine or placebo injection (B2), at 4 weeks after the second dose of vaccine or placebo injection (B3), at 6 months (B4) and at one year (B5) after the first dose of vaccine or placebo injection. These venous blood samples were tested for influenza antibody titre by means of the hemagglutination inhibition test.

Protocol during an acute respiratory illness

Whenever the patients developed an acute respiratory illness (ARI), their clinical characteristics were recorded. The clinical characteristics of each ARI were classified as one of four types: common cold, influenza-like illness, acute exacerbation of

COPD and pneumonia. The criteria of each clinical type were as follows; common cold was defined as an infection of the upper respiratory tract with predominating rhinitis and pharyngitis[21]; influenza-like illness was defined when the patients had symptoms of generalized aches, fever and headache with or without upper respiratory tract symptoms[21]; acute exacerbation of COPD was defined by these criteria[22]: 1) increased dyspnea, 2) increased sputum volume, 3) increased sputum purulence; exacerbation was diagnosed when at least two of the three symptoms or one of these three symptoms in addition to at least one of the following findings : a) upper respiratory tract infection (sore throat, nasal discharge) within the past 5 days, b) fever without other cause, c) increased wheezing, d) increased cough e) increase in respiratory rate or heart rate by 20 per cent compared with the baseline; pneumonia was diagnosed when the patients had compatible symptoms plus new infiltrate shown in their chest radiographs. For each ARI, the severity was classified as out patient treatment, needed hospitalization and requiring mechanical ventilation. In case of hospitalization, the duration of admission as well as the outcome of treatment (improved or dead) were also recorded.

For each ARI, a venous blood sample was taken from the patient at the first visit to test for influenza hemagglutination inhibition antibody (acute serum titre designated Ba) and 4-6 weeks afterwards (convalescent serum titre designated Bc). If the duration of the ARI episode was less than 6 days, a throat swab, a nasal swab and a sputum specimen were also collected for viral culture.

Laboratory measurements

Antibodies to influenza viruses were detected by a hemagglutination inhibition test (HI). The influenza virus strains of the vaccine were used for the titrations. Nasal swabs, throat swabs and sputum obtained were placed in 3 ml of viral transport media and used for viral isolation. Pellets of sputum specimens were further investigated for the presence of respiratory viral antigen by indirect immunofluorescence (FA).

Diagnostic criteria

A fourfold HI titre increase in convalescent serum compared to acute serum with a titre of 38 or greater, or any specimen culture which yielded the influenza virus were considered as meeting the criteria of influenza virus infection[23].

Cost analysis

The cost of treatment in this study was derived from direct medical cost from the health care provider's perspectives. There were two types of cost: 1) the cost of treatment as an out-patient (OPD), and 2) the cost of hospitalization. The direct medical costs at OPD were real drug costs from the hospital dispensary. The costs of hospitalization were real charges of the patients who were hospitalized including their treatment, hotel cost, food, monitoring and ventilatory support if needed. If the patients were treated as outpatient at a private hospital, their real costs of treatment were recorded. If the patients were hospitalized in a private hospital, their hospitalization data were collected and then adjusted into costs of a government hospital by multiplying the duration of hospitalization with the mean cost of our hospital, which is a government, tertiary care hospital. Cost of vaccine was the price of vaccine in 1997. The estimated annual vaccination cost of each patient was 248.40 baht. All costs were not discounted because the study took only one year.

Cost-effectiveness evaluation

Cost-effectiveness was evaluated using incremental cost-effectiveness ratio as the following formula :

$$\text{Incremental cost-effectiveness ratio} = \frac{C_{vaccine} - C_{placebo}}{E_{vaccine} - E_{placebo}}$$

where $C_{vaccine}$ is the cost of vaccination of 100 patients in the vaccinated group. $C_{placebo}$ is the cost of vaccination of 100 patients in the placebo group. $E_{vaccine}$ is the per cent of vaccinated patients who had no ARI related to influenza infection. $E_{placebo}$ is the per cent of patients in the placebo group who had no ARI related to influenza infection.

Cost-benefit evaluation

Cost-benefit was evaluated by changing all effectiveness into monetary unit and calculating cost savings associated with the vaccination using the following formula:

$$\text{Cost savings per 100 vaccinated patients} = T_{placebo} - (C_{vaccine} + T_{vaccine})$$

Table 1. Baseline characteristics of all the study subjects.

	Vaccine group (n = 62)	%	Placebo group (n = 63)	%	P-value*
Age (years)	67.6 ± 8		69.1 ± 7.5		0.3
Sex (Male : Female)	59 : 3		59 : 4		
Smoking history					
Non smoker	3	4.8	2	3.2	0.7
Current smoker	12	19.3	12	19	1
Exsmoker	47	75.8	49	77.8	0.8
Severity of COPD					
Mild COPD (FEV1 ≥ 70% predicted)	23	37.1	22	34.9	0.8
Moderate COPD (FEV1 50 -69% predicted)	16	25.8	17	27	0.9
Severe COPD (FEV1 < 50% predicted)	23	37.1	24	38.1	0.9
Having co-morbid diseases	23	37.1	18	28.6	0.3
Systemic steroid use	1	1.6	0	0	0.5

* Comparing between vaccine group and placebo group using Chi-square analysis.

Table 2. Number and severity of episodes of acute repiratory illness related to influenza and the cost of treatment stratified according to severity of airflow obstruction.

	Mild		Moderate		Severe		Total	
	Placebo (n = 22)	Vaccine (n = 23)	Placebo (n = 17)	Vaccine (n = 16)	Placebo (n = 24)	Vaccine (n = 23)	Placebo (n = 63)	Vaccine (n = 62)
Outpatient								
Episode	4	0	3	2	5	0	12	2*
Total cost	3,949	0	665	1,534	2,021	0	6,635	1,534
Hospitalization								
Episode	2	1	1	0	2	1	5	2
Hospitalization day	20	10	48	0	50	12	118	22
Total cost	33,052	4,075	96,679	0	184,314	16,309	314,045	20,384
Required ventilatory support								
Episode	0	0	1	0	2	0	3	0
Total Cost	0	0	96,679	0	184,314	0	280,993	0
Number of deaths	0	0	0	0	1	0	1	0
Total								
Episode	6	1*	4	2	7	1*	17	4*
Total cost	37,001	4,075	97,344	1,534	186,335	16,309	320,680	21,918
Mean cost/patient	1,682	177	5,726	96	7,765	709	5,090	354

Each patient had only 1 episode of ARI related to influenza.
Number of episodes and cost of hospitalization also included number of episodes and cost of ventilatory support.
* $p < 0.05$, comparing the number of episodes of ARI related to influenza between vaccine group and placebo group.
Cost in Thai baht.

where $T_{placebo}$ is the total costs of treatment of ARI related to influenza infection of 100 unvaccinated patients. $C_{vaccine}$ is the cost of vaccination of 100 patients in the vaccinated group. $T_{vaccine}$ is the total costs of treatment of ARI related to influenza infection of 100 vaccinated patients.

RESULTS

125 COPD patients were recruited to this study with 62 patients in the vaccine group and 63 patients in the placebo group. During the study period there were three dropout patients one of whom was in the vaccine group and two patients were in the placebo group. Five patients in the vaccine group and three patients in the placebo group died because of diseases or conditions not related to acute respiratory illness. The baseline characteristics of both groups are shown in Table 1. About 30 per cent of the patients in each group had co-morbid diseases which were hypertension, coronary artery diseases and diabetes mellitus.

The number and severity of episodes of ARI related to influenza viruses infection and the costs of treatment are shown in Table 2. The episodes of ARI related to influenza was significantly lower among the vaccinated patients than the unvaccinated patients with the overall effectiveness (relative risk reduction) of influenza vaccination of 76.3 per cent. When stratified to the severity subgroups of COPD, the effectiveness of influenza vaccination was 84.2 per cent, 46.8 per cent and 85.3 per cent for mild, moderate and severe COPD respectively as shown in Table 3. The mean costs of treatment of ARI related to influenza appeared to be lower in the vaccinated patients than the unvaccinated patients in all comparisons except the moderate COPD patients who were treated as outpatients, but the differences were not statistically significant.

More than 90 per cent of the total costs of treatment were costs of hospitalization regardless of severity of airflow obstruction. All of the unvaccinated patients with moderate and severe COPD who were hospitalized required mechanical ventilatory support, but none of the unvaccinated patients with mild COPD and none of the vaccinated patients required mechanical ventilation as shown in Table 2. For the patients with moderate and severe COPD, more than 90 per cent of the total cost of treatment were attributed to the costs of treating the patients who required mechanical ventilation.

Cost-effectiveness

An example of incremental cost-effectiveness ratio calculation for the severe COPD patients are as follows:

$$\text{Incremental cost - effectiveness ratio} = \frac{C_{vaccine} - C_{placebo}}{E_{vaccine} - E_{placebo}}$$

$$= \frac{24{,}840 - 0}{\frac{(22 \times 100)}{23} - \frac{(17 \times 100)}{24}}$$

$$= \frac{24{,}840}{24.9}$$

Table 3. Incidence of acute respiratory illness related to influenza and the effectiveness of influenza vaccination stratified by severity of airflow obstruction.

	Incidence of ARI related to influenza per 100 person-years											
	Outpatient			Hospitalization			Mechanical ventilation			Total ARI		
	P	V	Diff	P	V	Diff	P	V	Diff	P	V	Diff
Mild	18.2	0	18.2	9.1	4.3	4.8	0	0	0	27.3	4.3	23
Moderate	17.6	12.5	5.1	5.9	0	5.9	5.9	0	5.9	23.5	12.5	11
Severe	20.8	0	20.8	8.3	4.3	4	8.3	0	8.3	29.2	4.3	24.9
Total	19	3.2	15.8	7.9	3.2	4.7	4.8	0	4.8	27	6.4	20.6

Definition of abbreviations: P = placebo group, V = vaccine group, Diff = difference between placebo group and vaccine group.
Incidence of hospitalization also included incidence of mechanical ventilation.
Effectiveness = relative risk reduction = per cent difference in the incidence of influenza-related ARI between placebo group and vaccine group/incidence of influenza-related ARI in placebo group = [Diff / P] x 100.
Overall effectiveness of influenza vaccination = (20.6 / 27) x 100 = 76.3%,
Effectiveness of influenza vaccination in mild COPD = (23 / 27.3) x 100 = 84.2%,
Effectiveness of influenza vaccination in moderate COPD = (11 / 23.5) x 100 = 46.8%,
Effectiveness of influenza vaccination in severe COPD = (24.9 / 29.2) x 100 = 85.3%.

which means that for every 100 severe COPD patients who were vaccinated, 24,840 baht more will be spent and will prevent 24.9 patients from ARI related to influenza per year, or 1001.61 baht per episode of ARI related to influenza per year. The effectiveness of influenza vaccination in the prevention of ARI related to influenza stratified by the severity of airflow obstruction and the severity of ARI is shown in Table 3 and the predicted number of preventable episodes of influenza-related ARI for every 100 COPD patients vaccinated is shown in Table 4.

The cost-effectiveness of vaccination in the prevention of ARI related to influenza appeared not to correlate with the severity of airflow obstruction. However, when focused on the subgroup of patients who required ventilatory support during hospitalization, the vaccination was more cost-effective in the patients who had more severe airflow obstruction as shown in Table 4.

Cost-benefit

An example of cost savings calculation for the severe COPD patients are as follows:

$$\text{Cost savings} = T_{placebo} - (C_{vaccine} + T_{vaccine})$$

$$= \frac{[(2{,}021 + 184{,}314) \times 100]}{24} - \frac{[24{,}840 + (16{,}309 + 0) \times 100]}{23}$$

$$= 680{,}647.10 \text{ baht}$$

which means that for every 100 severe COPD patients who were vaccinated, a total of 680,647.10 baht per year was saved. The predicted cost savings per 100 vaccinated patients stratified by the severity of airflow obstruction and the severity of ARI are shown in Table 5. It appeared that more cost-benefit was achieved in the more severe COPD patients during their hospitalization due to severe episodes of ARI.

DISCUSSION

The strengths of the present study include the use of the randomized, double-blind, placebo-controlled method which resulted in comparable baseline characteristics between the vaccinated and unvaccinated patients. The authors applied strict criteria to diagnose influenza related ARI rather than only respiratory symptoms as has been done by many previous studies[12,14,24]. Many COPD patients always experience symptoms of cough and sputum production. Sometimes it is difficult to differentiate between the new episode of ARI and the baseline chronic respiratory symptoms of these patients. In addition, the study year was a nonepidemic influenza period. Thus, inclu-

Table 4. Predicted number of preventable episodes of influenza-related ARI per 100 vaccinated patients.

	Predicted number of preventable episodes of influenza-related ARI per 100 vaccinated patients			
	Outpatient	Hospitalization	Mechanical ventilation	Total ARI
Mild	18.2	4.8	-	23
Moderate	5.1	5.9	5.9	11
Severe	20.8	4	8.3	24.9
Total	15.8	4.7	4.8	20.6

Episodes of hospitalization also included episodes of mechanical ventilation.
Cost of vaccination for 100 patients = 24,840 baht.

Table 5. Cost savings of influenza vaccination stratified by severity of airflow obstruction and severity of acute respiratory illness.

	Outpatient	Hospitalization	Mechanical ventilation	Total
Mild	-6,890	150,236.4	-24,840	125,629
Moderate	-5,675.7	543,860	543,860	538,184.3
Severe	-16,419.2	672,226.3	743,135	680,647.1
Total	-16,782.4	440,766.7	421,180.6	448,824.3

Cost of hospitalization also included cost of mechanical ventilation.

sion of the unproved cases of ARI related to influenza would lead to more false positive cases and confusing results as has been demonstrated in the study by Govaert et al[13].

Cost-effectiveness analysis was used to calculate the net medical care costs and net health effects in terms of changes in mortality or morbidity and its implications for the medical sector. Likewise, cost-benefit analysis was intended to evaluate the effects of the vaccination throughout society by value those health effects in monetary terms. Both help to evaluate the appropriateness of the influenza vaccination for different subgroups of patients. The onset of respiratory failure is a major event in the life of a patient with COPD[8]. It badly impacts both physical and psychological morbidities as well as the mortality of patients. It also required highly expensive and prolonged life-preserving medical technology. It was confirmed in the present study that more than 90 per cent of the total costs of treatment were attributed to the costs of treating patients who required mechanical ventilatory support. As a result, the authors focused on it separately in the analysis of cost-effectiveness. The cost-effectiveness of vaccination in the prevention of mechanical ventilation episodes were distinctively shown in patients with moderate and severe airflow obstruction and the results of cost-benefit analysis confirmed that COPD patients with more severity consumed much higher costs, which is mainly attributed to the costs of taking care patients who required mechanical ventilatory support, and influenza vaccination presented more cost savings in these patients. Therefore, in terms of mechanical ventilation prevention and to be more cost-beneficial, the patients with more severe airflow obstruction should be given first priority to receive influenza vaccination.

The authors did not analyze the effectiveness of influenza vaccination on mortality from influenza because the number of deaths in the present study was too small as only one patient died from an illness related to influenza.

The result of economic analysis would be sensitive to the change in vaccine effectiveness, incidence of ARI related to influenza and vaccination cost. Analysis of the present study used a vaccine effectiveness of 76 per cent. Because the study year was a nonepidemic influenza period, it would be expected that in an epidemic year the number of influenza cases would be higher and, with the same effectiveness of influenza vaccination, the cost savings would be higher. The cost of vaccination in Thailand was still higher than in the USA with the cost of Group Health's influenza vaccination program averaging only $ 4 (144 baht) per person vaccinated. One reason for this higher cost is the influenza vaccine was first available in Thailand in 1997. In the future, when it is used widely, the cost of vaccination is expected to be lower and the cost-effectiveness ratios as well as the cost savings will be predictably improved. There was no costs of treatment of adverse reactions to the vaccination included in this economic analysis as they were minimal adverse reactions and needed no specific treatment. The present study used only direct medical costs in the analysis. Non medical costs such as transportation and time loss of relatives to visit the patients and intangible costs such as suffering were not included as these data were unavailable. The indirect costs of influenza may be as much as four times greater than the direct costs[25]. Therefore, the real cost savings of influenza vaccination in COPD patients may be more remarkable. Also, the authors did not take into account the survivors' medical costs and productivity gain in the analysis because these costs are second-order effects of the vaccination program. There is no consensus on whether a cost-effectiveness analysis should include these costs[15].

In conclusion, influenza vaccination is highly effective in the prevention of acute respiratory illness related to influenza virus infection regardless of severity of COPD. More than 90 per cent of the costs of treatment of influenza-related ARI were costs of hospitalization and in patients with moderate and severe airflow obstruction, more than 90 per cent of these costs were attributed to the costs of treating the patients who required mechanical ventilation. Influenza vaccination was more cost-effective in preventing mechanical ventilation episodes and more cost-beneficial in patients with more severe airflow obstruction. Influenza vaccination should be recommended to all patients with COPD with the higher priority provided to the patients with more severe COPD.

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การประเมินเศรษฐศาสตร์คลินิกของการให้วัคซีนป้องกันไข้หวัดใหญ่แก่ผู้ป่วย โรคปอดอุดกั้นเรื้อรังในประเทศไทย†

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คณะผู้รายงานได้ทำการศึกษาเพื่อประเมินต้นทุน-ประสิทธิผลและต้นทุน-ผลได้ ของการให้วัคซีนป้องกันไข้หวัดใหญ่ในผู้ป่วยโรคปอดอุดกั้นเรื้อรัง โดยทำการศึกษาที่โรงพยาบาลศิริราช ประเทศไทยตั้งแต่เดือนมิถุนายน พ.ศ. 2540 ถึงเดือนพฤศจิกายน พ.ศ. 2541 รูปแบบของการศึกษาเป็นแบบ Stratified randomized, double blind, placebo-controlled trial ผู้ป่วยโรคปอดอุดกั้นเรื้อรังจำนวน 125 คน ถูกแบ่งตามความรุนแรงของภาวะหลอดลมอุดกั้นเป็น 3 กลุ่ม คือความรุนแรงน้อย ความรุนแรงปานกลาง และความรุนแรงมาก ในแต่ละกลุ่มความรุนแรงผู้ป่วยถูกสุ่มแบ่งเป็น 2 กลุ่มคือ 1) กลุ่มวัคซีนได้รับวัคซีนป้องกันไข้หวัดใหญ่ชนิด purified trivalent split virus ฉีดเข้ากล้ามเนื้อ 2) กลุ่มยาหลอกได้รับวิตามิน B1 ฉีดเข้ากล้ามเนื้อ ผู้ป่วยทั้ง 2 กลุ่ม ได้รับการติดตามเก็บข้อมูลดังต่อไปนี้คือ 1). จำนวนครั้งของ acute respiratory illness (ARI) ซึ่งสัมพันธ์กับการติดเชื้อไข้หวัดใหญ่ 2) ความรุนแรงของ ARI (โดยแบ่งเป็นรับการรักษาแบบผู้ป่วยนอก รับการรักษาแบบผู้ป่วยใน หรือใส่เครื่องช่วยหายใจ) และ 3) ต้นทุนของการรักษา (ต้นทุนทางการแพทย์ประกอบด้วย ค่ายาจากห้องยาสำหรับผู้ป่วยนอก และค่าใช้จ่ายจริงทั้งหมดสำหรับผู้ป่วยใน) ข้อมูลเหล่านี้ถูกนำมาคำนวณหาต้นทุน-ประสิทธิผล และต้นทุน-ผลได้ของการให้วัคซีนป้องกันไข้หวัดใหญ่ ผลการศึกษาพบว่าในช่วงระยะเวลาการศึกษา 1 ปี พบอุบัติการณ์ของ ARI ซึ่งสัมพันธ์กับไข้หวัดใหญ่ในกลุ่มยาหลอก 27% และในกลุ่มวัคซีน 6.4% (ความเสี่ยงสัมพัทธ์ [RR] 0.24 ประสิทธิผลของวัคซีน 76%) การประเมินต้นทุน-ประสิทธิผล พบว่าถ้าให้วัคซีนป้องกันไข้หวัดใหญ่แก่ผู้ป่วยโรคปอดอุดกั้นเรื้อรังที่มีความรุนแรงน้อย จำนวน 100 คน จะเสียค่าใช้จ่ายเพิ่มขึ้น 24,840 บาท และจะป้องกันการเกิด ARI ซึ่งสัมพันธ์กับไข้หวัดใหญ่ ซึ่งรับการรักษาแบบผู้ป่วยนอกจำนวน 18.2 ครั้ง รับการรักษาแบบผู้ป่วยในจำนวน 4.8 ครั้ง และใช้เครื่องช่วยหายใจ จำนวน 0 ครั้ง ในทำนองเดียวกันถ้าให้วัคซีนป้องกันไข้หวัดใหญ่แก่ผู้ป่วยที่มีความรุนแรงปานกลางจำนวน 100 คน จะป้องกันการเกิด ARI ซึ่งสัมพันธ์กับไข้หวัดใหญ่ซึ่งรับการรักษาแบบผู้ป่วยนอกจำนวน 5.1 ครั้ง รับการรักษาแบบผู้ป่วยใน จำนวน 5.9 ครั้ง และใส่เครื่องช่วยหายใจจำนวน 5.9 ครั้ง และถ้าให้วัคซีนป้องกันไข้หวัดใหญ่แก่ผู้ป่วยที่มีความรุนแรงมากจำนวน 100 คน จะป้องกันการเกิด ARI ซึ่งสัมพันธ์กับไข้หวัดใหญ่ซึ่งรับการรักษาแบบผู้ป่วยนอก จำนวน 20.8 ครั้ง รับการรักษาแบบผู้ป่วยในจำนวน 3.9 ครั้ง และใส่เครื่องช่วยหายใจ จำนวน 8.3 ครั้ง การประเมินต้นทุน-ผลได้พบว่า ถ้าให้วัคซีนป้องกันไข้หวัดใหญ่ แก่ผู้ป่วยโรคปอดอุดกั้นเรื้อรังที่มีความรุนแรงน้อย 100 คน ความรุนแรงปานกลาง 100 คน และความรุนแรงมาก 100 คน จะประหยัดค่าใช้จ่าย 125,629 บาท, 538,184.3 บาท และ 680,647.1 บาท ตามลำดับ

โดยสรุป : การให้วัคซีนป้องกันไข้หวัดใหญ่ในผู้ป่วยโรคปอดอุดกั้นเรื้อรังมีประสิทธิผลสูงในการป้องกันการเกิด acute respiratory illness ซึ่งสัมพันธ์กับการติดเชื้อไข้หวัดใหญ่ การให้วัคซีนป้องกันไข้หวัดใหญ่จะได้ประสิทธิผลต่อต้นทุนที่สูงขึ้นและจะประหยัดค่าใช้จ่ายได้มากขึ้น ในผู้ป่วยที่มีภาวะหลอดลมอุดกั้นรุนแรงมากขึ้น ผู้ป่วยโรคปอดอุดกั้นเรื้อรังทุกรายควรได้รับการฉีดวัคซีนป้องกันไข้หวัดใหญ่ โดยควรให้ความสำคัญแก่ผู้ป่วยที่มีภาวะหลอดลมอุดกั้นรุนแรงมากกว่าก่อน

คำสำคัญ : การติดเชื้อไวรัส, อาการเจ็บป่วยทางระบบทางเดินหายใจเฉียบพลัน, อาการกำเริบของโรคปอดอุดกั้นเรื้อรัง, การรักษาแบบผู้ป่วยใน, การใช้เครื่องช่วยหายใจ, ต้นทุน-ประสิทธิผล, ต้นทุน-ผลได้

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