Development of Cost-effectiveness Model for the Evaluation of Smoking Cessation Program in Community Pharmacy

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Rationales of the Study

• Smoking is a major cause of preventable illness
• Smoking cessation has been shown to reduce the risk of developing diseases
• Pharmacists can play a role in such services
  – Pharmacologic and non-pharmacologic therapy
• Thai Pharmacy network for tobacco control support this role of pharmacists
Smoking Cessation Services

• More than 1,000 pharmacists were trained
• Services have been provided in pharmacy setting
• However, many obstacles were reported
• Lack of reimbursement, though not cited, but is one of a major concern for diffusion of the services
• Policy makers are concerned about the cost of smoking cessation products and cessation services
Objective

To determine a cost-effectiveness of pharmacist-based smoking cessation services compared to self-quitting
Overall study design

- A total 10,000 of a 40-years-old male and female who smoke 10-20 cigarettes/day regularly are simulated
- Using a decision analytic modeling combining “Decision tree and Markov Model”
- Lifetime horizon, using health care system perspective, and discount rate of 3%
Construction of Decision Tree

• We construct the tree with two alternatives (smoking cessation program by community pharmacist and self-quit attempt)

• In each alternative, subjects have a certain probability of becoming successful or failure in quitting after the quit date
Probabilities for Decision Tree

- No available long term efficacy of smoking cessation provision by community pharmacy in Thailand now
- We cited 1-year abstinence rate of smoking cessation by community pharmacist from the study of Maguire (2001)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstinence at 1 year</td>
<td>14.3%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Type of probabilities</td>
<td>Methods used to obtained</td>
<td>Sources</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>COPD</td>
<td>10-years CI are converted to Tp among smokers and ex-smokers</td>
<td>Lindberg et al, 2005</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>8-years CI are converted to Tp among smokers and ex-smokers</td>
<td>Haimen et al, 2006</td>
</tr>
</tbody>
</table>
Probability of Having CHD & Stroke

Framingham risk equation (Johannesson et.al, 1991)

$$X = \text{constant} + b_1 \times \text{age} + b_2 \times \text{age}^2 + b_3 \times \text{cholesterol} + b_4 \times \text{cholesterol} \times \text{age} + b_5 \times \text{blood pressure} + b_6 \times \text{smoking}$$

8-year risk = \( \frac{1}{1 + e^{-X}} \)

1-year risk = \( -\frac{1}{8} \times \ln\left( \frac{1}{1 + e^{-X}} \right) \)
Other Probabilities

• Thai age-specific mortality

• Disease specific mortalities (except lung cancer) are estimated based on the relative risk of death from a disease

• Risk of death from lung cancer is based on the Lung cancer registry in Siriraj Hospital in 2005 and assumed to reduce gradually for 5 years
## Cost of Smoking Cessation Program

<table>
<thead>
<tr>
<th>Types of Cost</th>
<th>Base Case</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provision by community pharmacist</td>
<td>6,305.75</td>
<td>Estimated from Nantamongkol et al (2006), Thananithisak (2006), and DMSIC*</td>
</tr>
<tr>
<td>Self-quit attempt</td>
<td>2,701.48</td>
<td></td>
</tr>
</tbody>
</table>

*Drug and Medical Supply Information Center*
# Cost of Smoking Related Diseases

<table>
<thead>
<tr>
<th>Type of Costs</th>
<th>Values (2005)</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung cancer</td>
<td>53,980.96</td>
<td>Kanthanraj, 1996</td>
</tr>
<tr>
<td>COPD</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AMI</td>
<td>31,911.00</td>
<td>Jirakhup, 2006</td>
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<tr>
<td>MI unrecognized</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CHF</td>
<td>29,738.00</td>
<td></td>
</tr>
<tr>
<td>Angina</td>
<td>22,892.00</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>50,331.50</td>
<td>Youngkong, 2002</td>
</tr>
</tbody>
</table>
Uncertainty Handling

- A series of one-way sensitivity analysis
- Threshold analysis
- Best-worst case analysis
- Second order Monte Carlo simulation
  - The mean expected value and 95% confidence interval (95% CI) of risk of smoking related diseases, risk of death, discount rate, and direct medical costs are estimated
Future plan

• Completing all data collection (COPD cost)
• Validation process
• Using the model to answer other questions
  – CEA of other health interventions for smoking cessation
Acknowledgement

• Thai Health Promotion Foundation
• Thai Pharmacy network for tobacco control
• Research Team
  • Assistant Professor Dr Piyarat Nimpitakpong
  • Kednapa Thavorn
  • Chuanchom Thannanithisak
Questions?