Cost-Effectiveness Analysis of a Low Intensity Nurse-led Stage-matched Smoking Cessation Intervention to Cardiac Patients in Hong Kong

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Introduction (1)
- Hong Kong, the most Westernized city in China, has the lowest smoking prevalence of 11.8% and better availability of smoking cessation service, yet smoking accounted for 1/5 of kills of total deaths and US$688 millions medical cost.¹,²
- Heart disease is a leading cause of death in Hong Kong and China. Smoking is a well-known cause of coronary heart diseases (CHD).³,⁴

Introduction (2)
- In Hong Kong, age-standardized death rates due to coronary heart disease were 48.4 for male and 26.0 for female per 100,000 standard population in 2008. 1.6% of people aged 15 and above had doctor-diagnosed coronary heart disease based on Population Health Survey 2003/04.⁵
- Smoking is a major causal factor for recurrent events in patients with coronary heart disease and smoking cessation can benefit CHD patients with substantial reduction in morbidity and mortality.⁶,⁷

Introduction (3)
- Smoking cessation in cardiac patients is highly cost-effective and recommended by clinical practical guidelines.⁸
- Formulation of optimal health care policy requires an analysis of the costs of recommended interventions relative to their clinical effectiveness.
- We have conducted a randomized controlled trial (RCT) on a nurse-led stage-matched intervention to help cardiac patients to quit smoking in Hong Kong to examine its cost-effectiveness.⁹
Objective

- To examine the cost-effectiveness of the nurse-led stage-matched smoking cessation intervention to cardiac patients in Hong Kong

Study design: A randomised controlled trial

Study Sites:
- Cardiac outpatient clinics of ten major hospitals in Hong Kong

Study Period:
- March 2002 to December 2004

Sample Size:
- 1860 cardiac patients who are current daily smokers
  - Intervention group: 938 patients
  - Control group: 922 patients

Inclusion and exclusion criteria

Inclusion Criteria:
- Admitted to the participating centers
- Current smoker who has smoked daily in the past 7 days prior to hospitalization
- Patient speaks and reads Cantonese/Chinese

Exclusion Criteria:
- Clinically too ill and not suitable to complete questionnaire and/or receive intervention
- Does not speak or read Chinese

The Low Intensity Intervention

- Intervention provider: nurse smoking cessation counselor
- Intervention content: stage-matched face-to-face counseling and telephone reminders at 1 week and again at 1 month after the initial contact based on the Transtheoretical Model of Change.\textsuperscript{10}
  - Pre-contemplation stage: focused on revealing ambivalence in the perceived cons of smoking and pros of cessation
  - Contemplation stage: aimed to resolve ambivalence in favor of cessation.
  - Preparation stage: prepared the subject for cessation by working out a cessation plan.
  - Action stage: focused on effective cessation strategies which reinforced smoking cessation attempts and relapse prevention skills.
- Intervention duration: face-to-face counseling usually lasted for 20-30 minutes, telephone reminder was about 10 minutes.
Study protocol

- Determine eligibility of subjects to enter RCT
  - Eligible
  - Not eligible

Patient to sign consent form and complete Baseline Questionnaire

Randomisation (n=1860)
- Open envelop following serial number
  - Control Group (n=922)
  - Intervention Group (n=938)

- Placebo “healthy diet” intervention + usual care
- Stage-matched intervention, 1 week and 1 month reminder

Follow up study 3, 6, 12 months

Methods: Analysis

Total Cost
- Development
  - Developing health education materials
- Implementation
  - Cost of nurse counseling time
- Evaluation
  - Salary of nurses (cost of completing questionnaire)
  - Developing cost for self-help manuals
  - Salary of research staff
  - Biochemical validation
  - Printing questionnaires

# All costs were adjusted by using 2006 Consumer Price Index

Result: Baseline demographic

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Intervention (n = 938)</th>
<th>Control (n = 922)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD), y</td>
<td>58.02 (14.14)</td>
<td>58.60 (14.00)</td>
<td>.38</td>
</tr>
<tr>
<td>Male, No. (%)</td>
<td>859 (91.6)</td>
<td>834 (90.5)</td>
<td>.22</td>
</tr>
<tr>
<td>Secondary education or above, No. (%)</td>
<td>459 (49.9)</td>
<td>482 (61.9)</td>
<td>.40</td>
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<tr>
<td>Marital status, No. (%)</td>
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<td></td>
</tr>
<tr>
<td>Single</td>
<td>103 (11.0)</td>
<td>84 (9.1)</td>
<td>.45</td>
</tr>
<tr>
<td>Married/Cohabitating</td>
<td>710 (75.7)</td>
<td>699 (73.8)</td>
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<tr>
<td>Divorced</td>
<td>54 (5.8)</td>
<td>61 (6.6)</td>
<td></td>
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<tr>
<td>Widowed</td>
<td>71 (7.6)</td>
<td>78 (8.8)</td>
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<tr>
<td>Fagerström score, No. (%)</td>
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</tr>
<tr>
<td>Low</td>
<td>614 (65.5)</td>
<td>629 (68.2)</td>
<td>.32</td>
</tr>
<tr>
<td>Medium</td>
<td>247 (26.3)</td>
<td>215 (23.3)</td>
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<tr>
<td>Severe</td>
<td>77 (8.2)</td>
<td>78 (8.5)</td>
<td></td>
</tr>
<tr>
<td>No. of years of smoking, mean (SD)</td>
<td>38.9 (15.5)</td>
<td>39.8 (15.4)</td>
<td>.25</td>
</tr>
<tr>
<td>Length of heart disease, No. (%)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Less than 1 year</td>
<td>238 (26.3)</td>
<td>227 (25.5)</td>
<td>.71</td>
</tr>
<tr>
<td>At least 1 year</td>
<td>667 (73.7)</td>
<td>663 (74.5)</td>
<td></td>
</tr>
</tbody>
</table>

Result: Quit rate

- 6-month Quit rate: Intervention 28%, Control 22%, P=0.002
- 12-month Quit rate: Intervention 27%, Control 20%, P=0.603
Costs at 12-month

<table>
<thead>
<tr>
<th>Items</th>
<th>Intervention group (HKD$)</th>
<th>Control group (HKD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of nurse counseling time</td>
<td></td>
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</tr>
<tr>
<td>Baseline</td>
<td>21.07 x 367 x 112 = 34,100</td>
<td>17.58 x 367 x 112 = 29,722</td>
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<tr>
<td>1-week follow-up</td>
<td>12.7 x 369 x 112 = 15,149</td>
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<tr>
<td>1-month follow-up</td>
<td>13.31 x 506 x 112 = 7,603</td>
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<tr>
<td>Salary of nurses (cost of completing questionnaire)</td>
<td>252,258</td>
<td>190,188</td>
</tr>
<tr>
<td>Salary of research staffs</td>
<td>335,697 x 938 / 1860 = 169,292</td>
<td>335,697 x 922 / 1860 = 166,405</td>
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<tr>
<td>Biochemical validation</td>
<td>7,260</td>
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<tr>
<td>Printing of questionnaires</td>
<td>3,045 x 938 / 1860 = 1,536</td>
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<tr>
<td>Developing self-help manuals and health education materials</td>
<td>5,200 x 938 / 1860 = 2,622</td>
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<tr>
<td>Total</td>
<td>489,840</td>
<td>396,044</td>
</tr>
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</table>

Result: Cost

Cost per quitter at 12-month:
- Intervention group: HKD$1,967 (USD 252) (HKD$489,840/249)
- Control group: HKD$1685 (USD 216) (HKD$396,004/235)

Cost per 100 individuals treated at 12-month:
- Intervention group: HKD$52,222 (USD 6,695)
- Control group: HKD$42,951 (USD 5,507)

Incremental cost per quitter for the intervention versus the control:
- 6-month: HKD$1,545 [HKD$(52,222-42,951)/6] (USD 198)
- 12-month: HKD$4,636 [HKD$(52,222-42,951)/2] (USD 594)

Result: Other cost-effectiveness studies comparison

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<tbody>
<tr>
<td>Intervention:</td>
<td>a smoking cessation class</td>
<td>an incentive-based quit smoking contest</td>
<td>a self-help quit smoking kit</td>
<td>a low-intensity nurse-led stage-matched smoking cessation intervention</td>
</tr>
<tr>
<td>Cost per quitter:</td>
<td>USD399 (HKD3,112)</td>
<td>USD226 (HKD1,849)</td>
<td>USD144 (HKD1,123)</td>
<td>USD339 (HKD2,644)</td>
</tr>
<tr>
<td>Marginal cost per quitter:</td>
<td>(450,63 (HKD6,985)</td>
<td>USD339 (HKD2,644)</td>
<td>USD452 (HKD3,967)</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

- The cost per quitter and marginal cost per quitter of our study are similar to other smoking cessation studies
- This low-intensity smoking cessation intervention delivered by trained nurses, using a stage matched approach in counseling was cost-effective in a short term (6-month) but the benefit in cost disappeared at 12-month
- More booster interventions may be needed to sustain the intervention effect
References


