

## RESEARCH ARTICLE

# Cost Effective Analysis of Recall Methods for Cervical Cancer Screening in Selangor - Results from a Prospective Randomized Controlled Trial

Rima Marhayu Abdul Rashid<sup>1,2\*</sup>, Sophia Ramli<sup>1,2</sup>, Jennifer John<sup>1,2</sup>, Maznah Dahlui<sup>1</sup>

### Abstract

Cervical cancer screening in Malaysia is by opportunistic Pap smear which contributes to the low uptake rate. To overcome this, a pilot project called the SIPPS program (translated as information system of Pap smear program) had been introduced whereby women aged 20-65 years old are invited for Pap smear and receive recall to repeat the test. This study aimed at determining which recall method is most cost-effective in getting women to repeat Pap smear. A randomised control trial was conducted where one thousand women were recalled for repeat smear either by registered letter, phone messages, phone call or the usual postal letter. The total cost applied for cost-effectiveness analysis includes the cost of sending letter for first invitation, cost of the recall method and cost of two Pap smears. Cost-effective analysis (CEA) of Pap smear uptake by each recall method was then performed. The uptake of Pap smear by postal letter, registered letters, SMS and phone calls were 18.8%, 20.0%, 21.6% and 34.4%, respectively ( $p < 0.05$ ). The CER for the recall method was lowest by phone call compared to other interventions; RM 69.18 (SD RM 0.14) compared to RM 106.53 (SD RM 0.13), RM 134.02 (SD RM 0.15) and RM 136.38 (SD RM 0.11) for SMS, registered letter and letter, respectively. ICER showed that it is most cost saving if the usual method of recall by postal letter be changed to recall by phone call. The possibility of letter as a recall for repeat Pap smear to reach the women is higher compared to sending SMS or making phone call. However, getting women to do repeat Pap smear is better with phone call which allows direct communication. Despite the high cost of the phone call as a recall method for repeat Pap smear, it is the most cost-effective method compared to others.

**Keywords:** Cervical cancer – screening – recall method - cost effective analysis - Malaysia

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### Introduction

Cervical cancer is the second most common cancer among women and the fourth most common cause of death for women in Malaysia. The Age Standardized Rate (ASR) was 15.7 per 100,000 in 2002 which was similar to Indonesia (Ferlay et al., 2004). In the South East Asian (SEA) region, Penang, Malaysia has 17.9 per 100,000 population compared to Thailand at 28.9, 22.4 and 17.8 per 100,000 population for Chiang Mai, Lampang and Songkla respectively, and Manila, Philippines at 19.8 per 100,000 population (Curado et al., 2007). The National Cancer Registry Report in 2007, showed that the Indian ethnic group had the highest incidence at 10.3 per 100,000, followed by the Chinese and Malays at 9.5 and 5.3 per 100,000, respectively (Omar ZA and Tamin NSI, 2011). It was estimated that the prevalence of cervical cancer was 4,696 annually, out of which 1,372 of the cases were precancerous lesions. The disease burden was associated with a direct cost of RM 39.2 million and a further RM

12.4 million through loss of productivity (Aljunid et al., 2010).

Cervical cancer is highly preventable through cytology screening programs that facilitate the detection and treatment of precancerous lesions. However, there is lack of effective screening programmes in the developing countries, including Malaysia which cause the low reduction of cervical cancer for the past three decades (Lim, Halimah, 2004; WHO, 2005; Sankaranarayanan et al., 2001; Baskaran, 2013). In contrast, in the developed countries, it has been a huge reduction in the cervical cancer mortality rate following a large scale cytology testing (Cancerresearchuk, 2012; Canfell et al., 2006) that can generally be attributed to faster diagnosis via national cervical cancer screening program as well as improvements in the treatment.

The opportunistic cervical cancer screening in Malaysia has been carried out throughout Malaysia since 1969 by Ministry of Health Malaysia but has had been overused by those in the reproductive years of age. Data

<sup>1</sup>Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya <sup>2</sup>Family Health Development Division, Ministry of Health Malaysia, Kuala Lumpur \*For correspondence: rimamarhayu77@gmail.com

from MOH (2006) showed that 58.9% estimated coverage of Pap smear screening was done among those aged 30-49 years old. Only a small percentage of 14% and 13.8% coverage were among those in the 50-59 and 60-65 years of age group respectively and the highest incidence (71.6%) were among those in the 60-69 years age group. A study conducted among Malaysian women reported that lack of knowledge about cervical cancer screening using Pap smear, and the need for early detection for cervical cancer are among the main reasons for not doing the screening as well as lack of awareness of Pap smear indications and benefits, perceived low susceptibility to cervical cancer, and embarrassment (Wong et al., 2008; Baskaran et al., 2013).

Following the poor uptake in the current cervical cancer screening program in Malaysia, the call-recall system for Pap smear screening was piloted in a suburban Klang, Selangor and a rural Mersing, Johor from 2007 till 2011. The aimed was to improve regular participation of women for screening, designed to follow the current system in Australia with some modification to suit the local setting (Mohamed, 2008; Rashid et al., 2013). The pilot project was initiated as an experiment to move from the opportunistic screening for cervical cancer to a population based approach where there will be regular participation of women for screening to enable regular monitoring via regular screening of all women aged 20-65 years old.

This study was conducted to evaluate the cost-effectiveness of the SIPPS program which invite women for Pap smear and recall women for repeat Pap smear by postal letter. In addition, several recall methods were introduced to look for the most cost-effective method of recall in getting women to repeat smear. The findings could assist the provider in the planning of the nationwide cervical cancer screening program.

## Materials and Methods

This is a cost effectiveness analysis (CEA) of the various recall methods for inviting women to come for repeat Pap smear of the SIPPS program. The outcome selected for CEA were the number of women responded to the recall methods and the number of women who came for repeat Pap smear. The costing for CEA was the total cost of screening from the perspective of the healthcare provider.

### Outcome measurement

A Randomized Control Trial (RCT) was conducted in eight community clinics resided in a suburban area, Klang, in 2011, whereby, a total of 1000 women, were randomly selected from the list of women who had attended Pap smear in the last one year and had normal cytological findings. These women were equally divided into 4 groups, each with different types of recall methods; the usual recall by letter and new recall methods either by registered letter, SMS and phone call. Eight weeks after given the recall, the number of women who responded to the recall either by calling or coming to the health clinic, and the number of women who came for repeat Pap smear were recorded. Figure 1 shows flow chart on the measurement

of the outcome.

### Costing data

All cost from the women's first invitation, first Pap smear, intervention cost and the repeat Pap smear were included in the costing analysis. The cost for pap smear was adopted from a study done locally which cost the procedure of pap smear conducted in the public healthcare facilities in 2005 (Ibrahim NSN, 2005). Inflation rate had been applied to get the cost of Pap smear in 2010 and 2011. The cost for the first invitation and the cost for each recall methods were collected based on the time consumed for the procedure done at the district health office (DHO). The cost effective analysis (CEA) was then calculated using this formula:

$$CEA = \frac{\text{The total cost of screening}}{\text{The number of women who repeated pap smear}}$$

Incremental Cost Effective Ratio (ICER) was done to look for the most cost effective method compared to the current recall method which was by letter, in getting women to come for repeat Pap smear. This calculation yields the cost per additional women attending Pap smear ICER was calculated using this formula:

$$ICER = \frac{\text{Cost per outcome (intervention2)} - \text{Cost per outcome (recall by letter)}}{\text{Outcome (intervention2)} - \text{Outcome (recall by letter)}}$$

Sensitivity analysis was performed on the recall method which is most cost-effective, using the highest and the lowest rates of Pap smear uptake from other studies.

## Results

The total number of patients that responded to all the interventions was 24.9% which was equivalent to 249 patients. The highest respond rate were observed in the group that received phone call (37%), followed by SMS (24%), registered letter (20%) and the least was by postal letter (19%), p<0.05. The rate of uptake for Pap smear was highest among the group that received phone call (34%) while other recall methods had similar Pap smear uptake; 19% to 22%. The number of women who responded to the recall is as shown in Table 1. Reasons for non-response for letters include did not reach the women either because

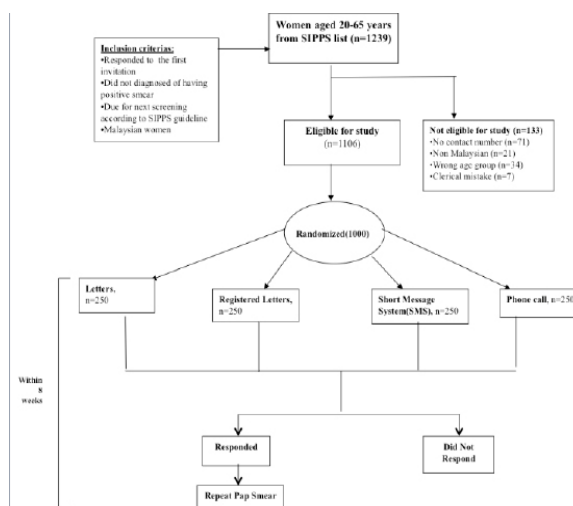


Figure 1. Flow Chart of the Study

**Table 1. Outcome of the Intervention and the Cost Effective Analysis (CEA)**

| Outcome   | Intervention   |                   |                |                 |
|---|----------------|-------------------|----------------|-----------------|
|   | Letter         | Registered letter | SMS            | Phone call      |
| Number of Respondents to Recall N (%)*              | 47 (18.8)      | 51 (20.4)         | 59 (23.6)      | 92 (36.8)       |
| Total Cost for the Recall per patient RM (SD RM)    | 24.92 (0.02)   | 25.91 (0.03)      | 23.71 (0.03)   | 24.74 (0.06)    |
| Total Cost for 250 patients up to Recall RM (SD RM) | 6230.00 (5.00) | 6477.50 (7.50)    | 5927.50 (7.50) | 6185.00 (12.50) |
| Cost per response/CEA RM (SD RM)                    | 132.55 (0.11)  | 127.01 (0.15)     | 100.47 (0.13)  | 67.23 (0.14)    |
| Number of Pap smear done N (%)*                     | 47 (18.8)      | 50 (20.0)         | 54 (21.6)      | 86 (34.4)       |
| Total Cost up to repeat Pap smear RM (SD RM)        | 7342.96 (5.00) | 7661.50 (7.50)    | 7206.22 (7.50) | 8221.48 (12.50) |
| Cost per repeat Pap smear/CEA RM (SD RM)            | 156.23 (0.11)  | 153.23 (0.15)     | 133.45 (0.14)  | 95.60 (0.15)    |

\* Denominator were all the intervention sent in each arm=250 each; SD=Standard Deviation

**Table 2. Incremental Cost Effective Ratio (ICER)**

| For                | Intervention | Cost, RM (SD RM) | Number of Patients Who Responded (N) | Incremental Cost | Incremental Effect | ICER  |
|--------------------|--------------|------------------|--------------------------------------|------------------|--------------------|-------|
| Patients' Response | Letter       | 6320.00 (5.00)   | 47                                   |                  |                    |       |
|                    | Phone Call   | 6185.00 (12.50)  | 92                                   | -45              | 45                 | -1    |
| Repeat Pap Smear   | Letter       | 7342.96 (5.00)   | 47                                   |                  |                    |       |
|                    | Phone Call   | 8221.48 (12.50)  | 86                                   | 878.52           | 39                 | 22.53 |

**Table 3. Sensitivity Analysis (SA)**

|                      | Base Case Scenario (250) | Worst Case Scenario (250) | Best Case Scenario (250) |
|----------------------|--------------------------|---------------------------|--------------------------|
| Uptake Rate (%)      | 34.4                     | 6.3                       | 50                       |
| Pap Smear Uptake (N) | 86                       | 16                        | 125                      |
| Total Cost (RM)      | 8221.48                  | 8233.98                   | 8208.98                  |
| CER                  | 95.6                     | 514.62                    | 65.67                    |

the addresses could not be located or they had moved out, while for messages or phone calls were because both could not be made due to wrong phone numbers.

The total cost of the various recall methods are as in Table 1. The cheapest cost for a recall was by SMS (RM 23.71 [SD RM 0.03]). The total cost of screening which includes the cost for the first invitation letter, the first Pap smear, cost of each recall method and cost of repeat Pap smear for each group, was also cheapest by sending a SMS. However, CEA showed that using phone call for a recall method was most cost effective compared to other methods either for getting a response (RM 67.23 [SD RM 0.14]) or for a repeat smear (RM 95.60 [SD RM 0.15]). Sensitivity analysis for the best scenario used the rate of Pap smear uptake by phone (50%) from a study done in Taiwan (Hou et al., 2002), while the worst scenario used the rate of Pap smear from the study in France at 6.3% (Heranney et al., 2011). Table 3 shows the data used and the CEA analysis for sensitivity analysis. ICER was calculated comparing the most cost effective method (using phone call) with the current method used which was the letter. Based on ICER, if we were to change the current SIPPS recall method by sending letter to using phone call, there will be a cost saving of RM 1.00 to get a woman to respond and an addition of RM 22.53 to get a woman do a repeat pap smear.

## Discussion

SIPPS program was developed as a pilot project to increase the Pap smear uptake among the women in the population of a suburban district. The study showed that

compared to sending letter to call women for repeat Pap smear, other recall methods such as by sending registered letter, sending short messages (SMS) and telephone call were more cost effective; with phone call being the most cost-effective method of recall for repeat Pap smear. The ICER showed that the cost saving per additional patients response and cost addition per additional Pap smear uptake of RM 1.00 and RM 22.53, respectively which was equivalent to USD 0.34 and USD 7.56, respectively (7 May 2013, 1 USD= RM 2.981). Similarly, the CER for using phone calls to recall patients was lowest at USD 22.55 (SD RM 0.05) per response and USD 32.07 (SD RM 0.05) per Pap smear uptake.

Calling women for Pap smear or reminding them for repeat smear by telephone either by direct calling or by sending messages is easy and could provide feedback immediately, provided the contact number given is correct. This study experienced the difficulty to contact some women because of incorrect telephone numbers in the record, either intentionally or otherwise. When the phone numbers seem correct, most women could only be reached at certain time such as after office hours, while some of them were reachable only after the second calls were made. However, the ownership of mobile phone had made it easier to reach the women and get feedback especially when they can call or send text messages at their own convenient.

The results of our study is in line with a few other studies done earlier including a study done in the US which showed that the cost per incremental Pap smear was \$1,117 for the letter/letter intervention, \$185 for the letter/phone intervention and \$305 for the phone/phone intervention. The study also concluded that a letter reminder, followed by a telephone appointment call, was the most cost-effective approach to screening women who were rarely screened (Vogt et al., 2003). Another study by McDowell et al (McDowell I et al., 1989) found that the estimated costs (USD) per additional Pap smear performed as compared with usual care for telephone intervention was lower at \$11.75 (assuming a salary of \$60) compared to the

GP invitation letter at \$14.23. A randomized control trial in Sweden that studied the different method of reminder to increase patient's compliance for cervical screening program found that a phone reminder increased the proportion of women attending up to 31.4% (95%CI 26.9-35.9) and the combinations of modified invitation, written reminder, and phone reminder almost doubled attendance within 12 months (Eaker et al., 2004). However, another study done in the United Kingdom, (Stein et al., 2005) showed that telephone intervention usage to increase the attendance of highly resistant women in cervical screening was more expensive and less effective than invitation letters. The women in our study, however, were among those who had their first Pap smear done and were recall for a repeat smear, unlike those in that studies who never had any Pap smear done before. Thus, more response was achieved following the recall given. Still many women did not want to participate and declined contact especially those who received the letters maybe because they were similar method to the first invitation sent. Most probably they did not feel the urgency of doing another Pap smear after receiving the recall knowing that the previous smears were normal.

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Our analysis may have underestimated some of the costs, as it was difficult to estimate the costs for the attempts to reach those who did not respond to the recall (administration, phone calls and text messages). Costs for sending text messages via phone would be lower if such interventions were implemented nationwide as the services will be much cheaper for a bigger number of SMS sent in bulk. If telephone calls are implemented nationwide to promote attendance, women's integrity must be respected and they must be given the possibility to decline having such phone calls. Therefore, consent should be given by them for the permission to be called by phone.

Most of the time, new intervention will increase costs, and the question for the decision makers is whether or not it is worth these extra costs. As we know, expanded efforts in cervical screening will in the long run result in decreased resources in other health service areas. The question is whether an extra cost for each additional cervical smear is reasonable. The answer depends very much on how many extra early stages of cancer this will detect. In this study, the relevant effectiveness measure would have been abnormal cervical smears. However, the current database used was relatively new (less than 5 years old). Therefore, it was not relevant in this small material to

use the detection of abnormal cervical smears as a measure of effectiveness. More time is needed to follow the patients up to disease progression to effectively estimate the true cost that we can save by implementing the intervention. Due to the small sample sizes of cytological abnormalities, no other comparisons were made.

The limitations of this study include the fact that the scope of study is limited, as it did not consider the women's experiences of having a cervical smear taken. This study was undertaken from a healthcare provider's cost perspective and indirect costs were not included. The cost-effectiveness analysis used, with a clinical measure for health effects, did not include effects on health-related quality of life. We would probably have obtained a more holistic description of the effects if these aspects of outcome had been considered. A broader perspective could have also been addressed which include the cost from the societal viewpoint (travel cost, any salary deficits and cost of leisure time used to attend the cervical screening) but these somehow may not change the conclusion.

The strengths of the study include the randomized study design, the population-based setting, the register-based cervical smears and the different possible interventions used in the setting.

In conclusion, women who had previous normal smear and due for the next cervical re-screening are more likely to return for a repeat smear if they are given a phone call as a method of reminder compared to other modes of recall. In a locality with no establish population based cervical cancer screening program, efforts to promote attendance at initial cervical screening were crucially needed to increase the uptake. Looking at the cost per Pap smear uptake in this study, using phone call as an invitation method should be considered as reasonable from a cost-effectiveness perspective provided the list of the correct phone numbers are available for all the patients in the target population. Taking the health gain in terms of early detection of curable abnormalities in consideration, we proposed that the SIPPS program to change the current recall of women for Pap smear by telephone call.

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