

RESEARCH COMMUNICATION

Promoting Oral Cancer Awareness and Early Detection using a Mass Media Approach

Amyza Saleh¹, Yi-Hsin Yang², Wan Maria Nabillah Wan Abd Ghani³, Norlida Abdullah⁴, Jennifer Geraldine Doss^{3,5}, Roy Navonil⁶, Zainal Ariff Abdul Rahman^{3,7}, Siti Mazlipah Ismail^{3,7}, Norain Abu Talib⁴, Rosnah Binti Zain^{3,8}, Sok Ching Cheong^{1,7*}

Abstract

Background and Aim: Less than 50% of oral cancer cases are diagnosed at early stages of the disease and this is in part due to poor awareness and lack of knowledge on the signs and symptoms of oral cancer. This study sought to measure the baseline awareness of oral cancer in Malaysia and aimed to increase public awareness and knowledge of oral cancer using a mass media campaign. **Methods:** Baseline awareness and impact of the campaign was measured using self-administered questionnaires sent via email to individuals. The campaign was aired on two national television channels and the reach was monitored through an independent programme monitoring system. **Results:** 78.2% of respondents had heard of oral cancer, and this increased significantly after the campaign. However, the ability to recognize signs and symptoms remains unchanged. We found that the level of awareness differed between the distinct ethnic subgroups and the reach of the campaign was not uniform across all ethnicities. **Conclusion:** This substantial study to measure the oral cancer awareness in Malaysia provides important baseline data for the planning of public health policies. Despite encouraging evidence that a mass media campaign could increase the awareness of oral cancer, further research is required to address the acceptability, comprehensiveness and effectiveness. Furthermore, different campaign approaches may be required for specific ethnic groups in a multi-ethnic country such as Malaysia.

Keywords: Oral cancer - cancer awareness - cancer survey - campaign - mass media - Malaysia

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Introduction

Oral cancer is a significant disease worldwide with up to 400,000 new cases each year and almost 130,000 deaths annually (Ferlay et al., 2010). Notably, 80% of these cases occur in the South and South East Asian countries. The incidence of oral cancer is increasing in many countries mainly because of the prevalence of smoking and alcohol consumption, the primary factors. In many Asian countries including Malaysia, the situation is compounded by the practice of betel quid chewing (Lee et al., 2011). Regardless of the risk factors contributing to oral cancer development, the most important factor that alters patient survival is the stage by which the cancer is detected (Ries et al., 1999).

The mouth is easily accessible for clinical or even self-examination, and as demonstrated in some feasibility

studies, early detection of oral cancer is theoretically possible (Warnakulasuriya et al., 1984; Mathew et al., 1997; Sankaranarayanan, 1997). However, many benign mouth disorders may appear similar to oral cancer or precancer and knowledge of some specific features of cancer may likely raise awareness of the public to seek attention early. Raising awareness empowers people to present early. The proportion of oral cancer cases diagnosed at an early and localised stage is still less than fifty percent (Patton et al., 2006) resulting in an appalling 5-year survival rate of about 50% (Rogers et al., 2009). Current evidence suggests that this is in part due to poor public awareness of the disease itself and the associated signs and symptoms of oral cancer and premalignant lesions (Boyle et al., 1993). For example, in the United Kingdom, oral cancer is one of the least heard of cancers with only 56% of participants questioned being aware of

¹Oral Cancer Research Team, Cancer Research Initiatives Foundation (CARIF), Sime Darby Medical Centre, Subang, ⁶Media Prima Berhad, Sri Pentas, Bandar Utama, Petaling Jaya, Selangor, ³Oral Cancer Research and Coordinating Centre, ⁵Department of Community Dentistry, ⁷Department of Oral & Maxillofacial Surgery, ⁸Department of Oral Pathology, Oral Medicine and Periodontology, Faculty of Dentistry, University of Malaya, Kuala Lumpur, ⁴Oral Health Division, Ministry of Health, Putrajaya, Malaysia, ²Department of Oral Hygiene, Kaohsiung Medical University, Kaohsiung, Taiwan *For correspondence: sokching.cheong@carif.com.my

its existence (Warnakulasuriya et al., 1999). This lack of awareness and information could result in the incapacity of patients with oral cancer to seek appropriate treatment.

Malaysia is a multi-ethnic country situated in South East Asia with a population size of 22.2 million (Statistics Department, 2001). The population consist of 3 main ethnic groups: Malay (51.0%), Chinese (24.2%) and Indian (7.1%). In addition, the states of Sarawak and Sabah in the island of Borneo are also populated with indigenous people of the Malay Archipelago who make up about 11.0% of the population. Oral cancer is the 11th most common form of cancer in Malaysia, with two new oral cancer cases being diagnosed everyday (Lim et al., 2008). Notably, oral cancer is the 2nd most common cause of cancer deaths in males, in Malaysian public hospitals (Ministry of Health, 1998) and this is in part because 67.1% of the cases present at Stage III and IV (Doss et al., 2011). In Malaysia, published data on the awareness on oral cancer is scarce, where to date, there are only two published surveys conducted in selected communities in dental schools or hospitals (Khoo et al., 1996, Saini et al., 2006). In this study, we conducted a nation-wide survey to determine the baseline level of awareness on oral cancer and carried out a mass media campaign to raise the awareness on oral cancer. The impact of this campaign was also assessed using a post-campaign survey.

Materials and Methods

Study design

In our study, “awareness” had a dual context; 1) having heard of mouth cancer and 2) recognizing the signs and symptoms of the disease. To assess public awareness on oral cancer, in particular its early signs, we carried out a public survey using a self-administered questionnaire that was sent via email. This was conducted in collaboration with a local integrated media company (Media Prima) using two of their databases consisting of two million individuals (MyTV3 and Alt Media). The database consists of individuals from various socio-economic strata. Names of the respondents were drawn randomly from these databases and the email survey was conducted for a period of 2 weeks, where three batches of emails were sent to different individuals from all the states in Malaysia. All emails were sent by Media Prima thus maintaining the confidentiality of the respondents’ email addresses. The email surveys were carried out in two phases; before (pre-campaign survey) and after (post-campaign survey) conducting a mass media campaign. The mass media campaign is described in further detail in the following sections. This study was approved by the University of Malaya Ethics Committee (Ethical Approval Code: DF OP 03/06/0018/(L)).

Pre-campaign survey

The sample size for this study was calculated using a single proportion formula based on the proportion of awareness among the adults in Malaysia of 67% (Suppiah et al., 2002) at the precision of 5% giving a total of 340 subjects. In the pre-campaign survey, a questionnaire consisting of two close ended questions in two languages

(Bahasa Malaysia and English) were sent via email to 75,559 individuals. These two languages were utilised in the survey as they are universally used and understood within the Malaysian population. The questionnaire was prepared in the English language and then translated into the national language (Bahasa Malaysia), and face validated by a committee consisting of clinicians, public health personnel and scientists. The first question was intended to determine the awareness of oral cancer amongst the public (Question 1: Have you heard of mouth cancer? [The answer was recorded as “Yes or No”]) and the second was intended to assess if the respondents could identify the early signs of oral cancer (Question 2: What are the signs of mouth cancer? i) ‘White/red patches in your mouth’; ii) ‘Ulcers that don’t heal’; iii) ‘Bleeding gums’; iv) ‘White/red patches in your mouth’ and ‘Ulcers that don’t heal’; v) All the above [The answer was recorded as either (i), (ii), (iii), (iv) or (v)]). Options (i), (ii) or (iv) were considered to be correct.

Mass Media Campaign

Media Prima was engaged in designing and running a media campaign over two national television channels (TV3 and NTV7). In combination, these two channels would reach at least a third of the television viewers in Malaysia (AC Nielsen rating 30th April 2011). The campaign was carried out in two parts; the first part was a 20-second advertisement that was aired for 32 consecutive days (23rd May – 23rd June 2010). The advertisement, aired 2-3 times a day, showed visuals of early signs of oral cancer including ulcers, white and red patches in the mouth. It also informed the public that if early signs were ignored, these lesions could develop into oral cancer, and urged the public to see their own dentist to seek advice if they observed these signs in their mouth. Overall, the advertisement was meant to educate the public on the early signs of oral cancer and to empower them by informing them where to seek help. The advertisement ended by asking the public to tune in to the talk shows that were scheduled for the 22nd June 2010 on TV3 (in Bahasa Malaysia) and 29th June 2010 on NTV7 (in English) to learn more about oral cancer.

The second part of the campaign which consisted of two talk shows that were aired on the two aforementioned television channels, aimed to address emotional barriers faced by patients in seeking treatment. These shows featured oral maxillofacial surgeons together with an oral cancer survivor who was diagnosed with Stage IV oral squamous cell carcinoma of the gum 6 years ago. During the show, the patient related his experience in discovering that he had oral cancer, emphasizing on the signs of his cancer, and that despite the advance stage of his disease, he was treated successfully and survived the disease. The surgeons reiterated the early signs of oral cancer, elaborated on the risk habits associated with the disease, and also highlighted that oral cancer does not only occur in those with these habits.

The reach of this campaign was monitored through AC Nielsen, a global marketing research system subscribed by Media Prima. The percentage of viewers who would have seen the advertisement at least once (Reach 1+),

and the average frequency that an individual would have seen the advertisement was measured and expressed as a percentage of the television viewing base in the individual categories.

Post-campaign survey

In the post-campaign survey, emails were sent to 40,351 individuals. The questions were identical with the pre-campaign survey with an additional question asked in the post-campaign survey (Question 3). This additional question was intended to determine if respondents obtained information from the mass media campaign (Question 3: Where did you learn about mouth cancer? Choose the most relevant answer: a) Internet; b) TV; c) Radio; d) Family/Friends; e) Dentist/Clinic; f) Brochure [The answer was recorded as either (a), (b), (c), (d), (e) or (f)]).

Statistical analysis

Data was analysed using SAS V9 (SAS Institute Inc., Cary, NC, USA). All the demographic characteristics and the status of cancer awareness were first shown by frequency distribution tables. The relationship between demographic characteristics versus cancer awareness or the ability to identify the early signs of oral cancer was analysed by Chi-square tests. The significance level was set at $p < 0.05$.

Results

Pre- and post-campaign surveys

In the pre-campaign survey, 777 responses were received, resulting in a response rate of 1.0%. The respondents were from the 3 major ethnic groups in Malaysia where the Chinese and Indians were well represented in accordance with the ethnic distribution in Malaysia, with 42.1% (327/777) and 18.4% (143/777) respectively, whilst the Malays made up 39.5% (307/777) of the respondents. In the post-campaign, a higher response rate of 1.9% was achieved where 793 responses were received. From these, 60.8% (482/793) were Malays, 35% (278/793) were Chinese and 4.2% (33/793) were Indians. There were significant differences between the response rate when comparing ethnicity, age and gender in the pre- and post-campaign surveys (Table 1a). In terms of the survey coverage, all except two states of Malaysia were represented with some variability in the number of respondents from each state (data not shown). Comparing the pre- and post-campaign responses, a consistent increase across the response rates in all ethnic groups, gender and age groups were noted (Table 1b).

Further analyses were conducted only on the respondents with complete data on age, gender, ethnicity, marital status, education level and income. The number of respondents from the pre- and post-campaign with these data was 669 and 757 respectively (Table 2). The pre-campaign data demonstrated that 78.2% had heard of oral cancer and this percentage increased significantly to 84.4% in the post-campaign survey ($p < 0.01$; Table 2). Analyzing the pre- and post-campaign surveys individually, there were no significant differences between those who answered "Yes" to Question 1 in terms of gender, age and

Table 1a. Email Survey Response Rates

Pre-campaign:	Total		Response rate (%)	p-value
	Blast	Response		
Ethnicity				
Chinese	32300	327	1.00	< 0.01
Indian	10679	143	1.30	
Malay	32580	307	0.90	
Age				
≥ 35	34358	444	1.30	< 0.01
< 35	41201	333	0.80	
Gender;				
Female	37623	443	1.20	< 0.01
Male	37936	334	0.90	
Ethnicity				
Chinese	9001	278	3.10	< 0.01
Indian	1658	33	2.00	
Malay	29692	482	1.60	
Age				
≥ 35	8801	359	4.10	< 0.01
< 35	31550	434	1.40	
Gender;				
Female	20777	487	2.30	< 0.01
Male	19574	306	1.60	

Table 1b. Comparison of Response Rates between Pre-Campaign and Post-Campaign

	Pre-campaign Response rate (%)	Post-campaign Response rate (%)	p-value
Total	1.00%	1.90%	
Ethnicity			
Chinese	1.00%	3.10%	< 0.01
Indian	1.30%	2.00%	0.04
Malay	0.90%	1.60%	< 0.01
Gender			
Female	1.20%	2.30%	< 0.01
Male	0.90%	1.60%	< 0.01
Age			
> 35	0.80%	1.40%	< 0.01
< 35	1.30%	4.10%	< 0.01

marital status. Consistently in both surveys, more Indians (86.7%) and Malays (85.0%) reported to have heard of oral cancer in comparison to the Chinese (70.2%). In addition, when comparing education level and awareness, the highest numbers of individuals who had heard of oral cancer were amongst the university graduates (Table 2). Comparing the pre- and post-campaign data, there was a significant increase in the awareness among females (79.0% vs. 86.3%; $p < 0.01$), those who were 35 years or older (78.5% vs. 87.3%; $p < 0.01$), the Chinese ethnic group (70.2% vs. 78.9%; $p = 0.01$) and those who were single (71.6% vs. 81.4%; $p = 0.02$; Table 2). Interestingly, individuals from the annual income bracket of RM25,000 - 48,000 showed the most significant increase in the awareness following the media campaign ($p < 0.01$). It is noteworthy that after the campaign, the distribution of respondents who answered "Yes" to Question 1 were more evenly distributed in all the states compared to that in the pre-campaign (data not shown).

Using Question 2, we determined the percentage of individuals who could identify the early signs of oral cancer. Following those who answered "Yes" to Question 1 in the pre- and post-campaign surveys, there was no

significant difference in the distribution of answers between the pre- and post-campaign surveys, where 36.7% and 36.5% respectively, could identify the correct signs of oral cancer (Table 3a and 3b) indicating that overall, there was no significant improvement after the mass media campaign. However a significant improvement in the ability to identify the correct signs of mouth cancer were noted among those who were married (p = 0.03), and amongst university graduates (p = 0.05). Interestingly, consistent with Question 1, there was also an improvement amongst those earning between RM 25,000 – 48,000 although this did not achieve statistical significance (p = 0.08; Table 3b).

To determine the source of information, the respondents were asked to indicate from where they received information on oral cancer (Question 3). Again, only data from respondents who answered “Yes” to question 1 were analysed here. ‘Brochure’ and ‘TV’ were rated the highest as the mode of obtaining information (Table 4). From those who identified the correct signs of oral cancer, the majority reported that they obtained the information from “TV” (26.1%) followed by “Brochure” (22.0%) and

Table 2. Distribution of Respondents Who Answer “Yes” to Question 1 “Have You Heard of Mouth Cancer?”

	Pre-campaign		Post-campaign		p-value
	N	“Yes” (%)	N	“Yes” (%)	
Answering “Yes” to question 1:					
Total	669	523 (78%)	757	639 (84%)	< 0.01
Gender:					
Male	298	230 (77%)	298	243 (82%)	0.19
Female	371	293 (79%)	459	396 (86%)	< 0.01
Age:					
> 35	298	234 (79%)	354	309 (87%)	< 0.01
< 35	371	289 (78%)	403	330 (82%)	0.17
Ethnicity:					
Chinese	325	228 (70%)	275	217 (79%)	0.01
Indian	143	124 (87%)	32	26 (81%)	0.42
Malay	200	170 (85%)	450	396 (88%)	0.29
Marital Status:					
Single	190	136 (72%)	252	205 (81%)	0.02
Married	218	172 (79%)	198	170 (86%)	0.06
Education:					
≤ High School					
	151	110 (73%)	133	107 (81%)	0.13
College	118	92 (78%)	114	89 (78%)	0.99
University	119	97 (82%)	176	153 (87%)	0.2
Data not available					
	281	224(80%)	334	290 (87%)	0.02
Annual Income:					
< RM 12,000	111	84 (76%)	148	118 (80%)	0.44
RM 12,000-24,000					
	57	46 (81%)	68	62 (91%)	0.09
RM 25,000-48,000					
	108	77 (71%)	97	84 (87%)	< 0.01
RM 49,000-60,000					
	35	27 (77%)	18	16 (89%)	0.46
RM 61,000-84,000					
	12	9 (75%)	12	10 (83%)	>.99
RM 85,000-100,000					
	9	7 (78%)	5	4 (80%)	>.99
> RM 100,000	13	10 (77%)	18	10 (56%)	0.28

Table 3a. Distribution of Answers for Question 2 “What are the Signs of Mouth Cancer?” from Respondents Who Answered ‘Yes’ to Question 1

	Pre-campaign		Post-campaign	
	n	(%)	n	(%)
Total			523	639
(i) White/Red patches	32	6.10	36	5.60
(ii) Ulcers that don’t heal	46	8.80	70	11.0
(iii) Bleeding gums	16	3.10	16	2.50
(iv) Combination of (i) and (ii)	114	21.8	127	19.9
(v) Combination of (i), (ii), and (iii)	315	60.2	390	61.0

Table 3b. Distribution of Respondents Who Answered Question 2 Correctly

	Pre-campaign			Post-campaign			P-value
	N	No*	(%)	N	No*	(%)	
Correct answer in question 2							
Tota:	523	192	37%	639	233	37%	0.93
Gender:							
Males	230	88	38%	243	91	38%	0.86
Female	293	104	36%	396	142	36%	0.92
Age:							
> 35	234	95	41%	309	102	33%	0.07
< 35	289	97	34%	330	131	40%	0.11
Ethnicity:							
Chinese	325	98	30%	275	85	31%	0.84
Indian	143	53	37%	32	15	47%	0.3
Malay	200	87	44%	450	177	39%	0.32
Marital Status:							
Single	190	74	39%	252	95	38%	0.79
Married	218	62	28%	198	76	38%	0.03
Education:							
≤ High School	110	41	37%	107	40	37%	0.99
College	92	28	30%	89	28	32%	0.88
University	97	34	35%	153	71	48%	0.05
Data not available							
	224	89	40%	290	92	32%	0.06
Annual Income:							
< RM 12,000	84	33	39%	118	45	38%	0.87
RM 12,000-24,000	46	13	28%	62	20	32%	0.66
RM 25,000-48,000	77	21	27%	84	34	41%	0.08
RM 49,000-60,000	27	9	33%	16	5	31%	0.89
RM 61,000-84,000	9	3	33%	10	4	40%	>.99
RM 85,000-100,000	7	4	57%	4	1	25%	0.55
> RM 100,000	10	5	50%	10	5	50%	>.99

*Number of correct answer

“Internet” (20.9%) (Table 4).

Mass Media Campaign Reach

Based on the campaign reach data from AC Nielsen, it was estimated that 54% of TV3 and NTV7 viewers had seen the campaign at least once and the average frequency that they would have seen the campaign was estimated to be 3.3 times (Table 5). The reach between males and females were almost the same. However, in terms of the ethnic groups, it appeared that the highest reach were amongst the Malays (68%) followed by the Chinese (35%), whilst the Indians had the lowest reach

Table 4. Sources of Oral Cancer Information According to those Who Answered 'Yes' in Question 1 and Those Who Answered Question 2 Correctly

	N	Answered "Yes" in Question 1 (%)	Correct answer for Question 2 (%)
	739	639	268
Internet	159(21.5%)	113 (17.7%)	56 (20.9%)
TV	165(22.3%)	146 (22.9%)	70 (26.1%)
Radio	9(1.20%)	5 (0.80%)	4 (1.50%)
Family/Friends	126(17.1%)	113 (17.7%)	49 (18.3%)
Dentist/Clinic	93(12.6%)	86 (13.5%)	30 (11.2%)
Brochure	187(25.3%)	176 (27.5%)	59 (22.0%)

Table 5. Estimated Reach of the Mass Media Campaign

Target	TV3&NTV7		TV3		NTV7	
	Reach	I+Fre	Reach	I+Fre	Reach	I+Fre
Total Individuals	54%	3.3	44%	2.9	23%	2.2
Gender:						
Male	50%	3.0	41%	2.6	21%	1.9
Female	58%	3.6	48%	3.2	25%	2.4
Race: Malay	68%	3.4	65%	3.0	21%	1.7
Chinese	35%	2.9	7%	1.4	33%	2.8
Indian	17%	2.6	13%	1.9	8%	2.6
Age: 4-9	55%	3.1	49%	2.7	21%	1.9
10-19	56%	3.1	49%	2.7	22%	1.8
20-29	48%	3.2	40%	2.9	19%	1.8
30-39	49%	3.7	40%	3.3	21%	2.3
40-49	58%	3.2	46%	2.9	27%	2.0
50-59	59%	3.7	45%	3.2	26%	2.9
60+	56%	3.7	39%	3.1	30%	2.9
Location:						
Market Centre	43%	2.7	30%	2.3	21%	2.2
Other Urban	54%	3.5	44%	3.0	23%	2.5
Rural	65%	3.6	58%	3.2	25%	1.9

(17%). The reach of the campaign was somewhat uniform across the different age groups, and was most viewed in the rural areas (Table 5). Looking at each television channel individually, TV3 had almost double the reach of NTV7 (44% vs. 23%). Comparing both channels, TV3 had a wider reach amongst the Malays (65% of Malay viewers) whereas NTV7 had a greater reach amongst the Chinese (33% of Chinese viewers). The difference in reach of the two different channels was also apparent in terms of geographical areas whereby 58% of rural viewers watched the campaign on TV3 as compared to only 25% on NTV7. The viewing of the campaign on NTV7 was more uniformed across the geographical areas but the overall reach was less than that of TV3 (23% vs. 54%; Table 5). The reach to the Indian ethnic group was low for both television channels (13% & 8%), however, TV3 still had better reach in this population.

Discussion

A commonly cited reason for late disease presentation is the inability to recognize the early signs of cancer (Macleod et al., 2009). Thus, raising awareness and educating the public on the early signs of cancer should enable patients to present at an early stage resulting in improved survival. Data on the level of oral cancer

awareness in Malaysia is scarce, making the planning of public health policies to improve survival of patients with the disease very challenging. Hence, we conducted a baseline study to determine the level of oral cancer awareness in Malaysia and assessed the use of mass media television campaign in increasing awareness. This is the largest study to have evaluated the level of oral cancer awareness in Malaysia, and the only study that has conducted a mass media campaign to improve the knowledge on the early signs of oral cancer.

We used e-mail surveys to collect pre- and post-campaign data on the knowledge on oral cancer as 65% of the Malaysian population are users of the internet (Abu Bakar, 2010). Furthermore, the use of the internet has its advantages including the relative ease of survey implementation, the ability to generate a quick response, and the ability to reach large numbers without prohibitive costs (Van Gelder et al., 2010). The response rates documented in this study were 1.0% and 1.9% in the pre and post campaign respectively. It is well documented that response rates for internet-based surveys are lower compared to postal surveys (Kittleson, 1995). The lower response rate in internet-based surveys could be due to several factors including a variation in the ability of users in using emails, undelivered emails when users change their email addresses or service provider, ease of deleting an email and the lack of immediate compensation after completing the survey. Whichever the reason, the lower response rate of internet-based surveys compared to conventional methods of surveying give rise to concerns of selection bias and the ability to generalize the findings of these surveys. In particular, internet-based surveys have been shown to be associated with a reduced representation from the lower socio-economic strata and over-representation of males (Eysenbach, 2005). In this study, significant differences in the response rates between the different ethnic and age groups were seen, which could be reflective of the internet demography in Malaysia. Surprisingly, we found that the response rates were higher amongst females, and this could be due to the fact that women are more interested in health issues (Eysenbach, 2005) and therefore more likely to complete online surveys. It is also worth noting that the largest representation for both the pre- and post-campaign surveys was from the group with the lowest annual income (Table 2 and 3b). Taken together, the data indicate that both females and the lower socio-economic groups were represented adequately in this survey. Nevertheless, efforts to increase response rates and the use of other survey methods should be explored in the future to improve the accuracy of the data.

At baseline, 78.2% of respondents reported to have heard of oral cancer. This is lower than a recently published study conducted in a Malaysian public university, where it was found that 89.9% had heard of oral cancer (Saini et al., 2006), but higher than an unpublished study conducted in government hospitals, where only 67% were aware of the disease (Suppiah et al., 2002). Compared with these two studies, the current study is perhaps the most representative of the Malaysian population, as there is adequate geographical representation (all but two states),

where different levels of socio-economic and ethnic groups were sampled. Interestingly, the percentage of Malays and Indians who knew about oral cancer appeared to be higher compared to the Chinese, and this perhaps reflects findings of previous studies where oral cancer was more frequently seen amongst the Indians and the Malays (Hashim, 1991). University graduates had the highest level of awareness, which is in concordance with earlier studies (Cruz et al., 2002, Saini et al., 2006). Following the mass media campaign, the percentage of respondents who had heard of oral cancer increased significantly. Moreover, the distribution of post-campaign respondents was more uniform across all the states strongly suggesting that the source of information was most likely from the mass media campaign.

Evidently, after the campaign, there was a significant increase in the level of awareness amongst the females, those 35 years of age and above, the Chinese and those who are single. The increase in awareness among women could be due to a larger number of viewers being female (women: men = 60:40), or that more women who are housewives watch television, thus making women more exposed to the campaign. Perhaps being the least aware before the campaign, the Chinese benefited most from this campaign which was demonstrated by a significant increase in awareness as compared to other ethnic groups. Interestingly, individuals with an income of RM25,000 to 48,000 had a significant increase in the level of awareness and although the reason for this is currently not obvious, this suggests that concern for health care matters may differ between individuals from the different income groups.

In spite of this, the overall ability of the respondents in recognizing the signs of oral cancer did not differ between the pre and post-campaign. This could be due to the fact that the advertisement was short and we used still visuals only. Although we incorporated strong graphic imagery (images of overt cancer) and personal testimonial which are methods that have been shown to be effective strategies for public health campaigns (Sutton et al., 1995; Amarasinghe et al., 2010; Grant et al., 2010), it is apparent that more research into the design of the campaign is necessary to improve the outcome of the campaign. The inability of individuals to recognize early signs of oral cancer appears to be consistently disappointing in many studies despite the fact that many know about the disease or had been exposed to awareness campaigns (Warnakulasuriya et al., 1999; Cruz et al., 2002; Prayman et al., 2009; Amarasinghe et al., 2010; Grant et al., 2010). Notably, this is not limited to oral cancer, as a recent systematic review reported that there is currently limited evidence that public campaigns are able to increase awareness and promote early presentation of cancer (Austoker et al., 2009). These findings indicate that more needs to be done to ensure that public campaigns are comprehensible and remembered, which will ultimately result in individuals having the capacity to respond appropriately to the symptoms.

In this study, we found that most of the respondents obtained information on oral cancer from brochures and television. This may be reflective of the use of brochures

by the Ministry of Health Malaysia to educate the public on self-mouth examination which were in circulation in the government hospitals and clinics in the last few years. However, it is also encouraging that television was cited as a source of information which indicates that the increase in oral cancer awareness is due to this campaign, as no other campaigns were conducted during the same period. Furthermore, the uniformity in the response rates amongst the different geographical areas in the post-campaign strongly suggests that television could have been the most likely source of information. Most notably, the majority of the respondents who recognised at least one sign of oral cancer obtained the information from television, further confirming that television is a good media in disseminating information on oral cancer to the public.

The decision to use television for our mass media campaign was based on preliminary data from a previous study in Malaysia which indicated that television was deemed the preferred method for receiving information about oral cancer (Suppiah et al., 2002). Furthermore, a recent study reported that television advertising offered the largest coverage in an oral cancer awareness campaign in comparison to other methods (Eadie et al., 2009). Both television channels used here are well-viewed by the local community and could reach at least a third of the TV viewership base of Malaysia (AC Nielsen rating 30th April 2011). Despite an overall good coverage which was achieved in this study, the Indian ethnic group received the least exposure to the campaign. This is unfortunate as among the Malaysians, the Indian ethnic group has been reported to have the highest incidence of oral cancer (Hashim, 1991). As the reach of the campaign will influence the outcome, our findings suggest that detailed media research and planning is required to elucidate the different ways to reach distinct pockets of societies, in particular for a multi-ethnic country such as Malaysia, as different communities may interface with different media platforms. In addition, different campaign methods may need to be combined to be able to cover the population at large, and to ensure that the public are able to retain the messages disseminated by the campaign.

Strengths and Limitations: There were several limitations in this study that should be considered in using our data. 1) This e-mail survey received low response rates and the findings could have been exposed to selection bias as this survey would have only reached individuals who had access to computers and the internet; 2) The literacy of individuals would affect the selected sample and the data do not represent all strata of the Malaysian population equally; 3) As this was a partly sponsored campaign, we may have had less control over the viewing times of the campaign; 4) Pre and post sample for assessing knowledge on oral cancer were not the same individuals 5) Lack of a control group to assess the true impact of the campaign.

Despite these limitations, in comparison to previous studies (Braithwaite et al., 2003), the low response here is likely an underestimation, as emails that were not delivered or opened were not taken into account as these information were not available. Despite the lower response rates of internet surveys in comparison to postal or telephone surveys, a growing body of evidence suggests

that the data obtained through the internet are comparable to classical methods (Buchanan & Smith, 1999, Graham et al., 2006, Kramish et al., 2001). Moreover, in this study, a representation of all but 2 states in the country and an adequate sample size was obtained. Furthermore, to assess the use of television for the campaign, generalization is possible as sampling of respondents were performed based on a loyalty programme whereby respondents were regular viewers of these television channels, thus would be able to evaluate the campaign. Ideally, the pre- and post-campaign should have been conducted using a longitudinal cohort by following up the same individuals. However, longitudinal studies are known to be prone to high attrition rates (Padwal et al., 2003, Stice et al., 2000), and the current method of survey is an acceptable way of getting baseline data. Considering that this was a partly sponsored campaign, we may have had less control over the timing of the campaign, therefore the results of this study should not under-value the use of television as a tool in increasing awareness and knowledge. The use of a control group was not possible in this study as the programme was aired on national television. Another television campaign conducted in the West of Scotland (UK) to improve public awareness on Head and Neck and other cancers has also recorded a low impact on public knowledge of risk factors and subsequent oral cancer signs and symptoms remained poor (Odgen & Graham, 2003).

Recommendations and conclusions: From this study, it is evident that different approaches may be required to ensure that the campaign messages reach the various ethnic groups of our society. As the campaign did not appear to improve the ability of respondents to recognize the signs of oral cancer or retain the information obtained from the media, the campaign strategies needs to be re-assessed for comprehension, acceptability and potential effectiveness. Furthermore, there is also a need to evaluate the recall of the campaign in order to determine whether the increase in awareness was a direct effect of the campaign. As early presentation of oral cancer involves more than just being aware of the disease, further research is needed in the areas of assessment of behavioural change and factors governing late presentation of this disease. Other factors including patient empowerment, increase in awareness amongst primary care workers and the availability of clinical care facilities to meet the demand of suspected cancer patients would also need to be addressed with equal importance. Considering that the cost of the campaign is often the biggest consideration and limitation when organizing a campaign, the involvement of different stakeholders in cost sharing would be beneficial. Most importantly, this study provided essential baseline information in terms of awareness of oral cancer and its signs and symptoms which would prove to be useful for future nation-wide studies. We demonstrated that the level of oral cancer awareness improved after a mass media campaign, however more needs to be done to increase the ability of respondents to recognize signs and symptoms of oral cancer. As the majority of the respondents who correctly identified at least one sign of oral cancer obtained the information from the television, this medium remains an effective way in educating the public on oral cancer.

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