

Giant Inflatable Colon Model Enhances Lebanese Community Knowledge and Intention for Colorectal Cancer Screening

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PURPOSE To assess the knowledge and intention for colorectal cancer (CRC) screening within the Lebanese community before and after a guided tour through an inflatable colon model.

METHODS The Cancer Prevention and Control Program, Naef K. Basile Cancer Institute at the American University of Beirut Medical Center in collaboration with AMALOUNA educational nongovernmental organization launched awareness campaigns during which a walk-through inflatable colon was displayed. Pre- and post-surveys related to the age of screening, risk factors, symptoms, and CRC prevention were collected anonymously before and after touring the inflatable colon to assess the effectiveness of this educational tool.

RESULTS Compiled data collected from 782 participants revealed that older age and higher education were predictors of favorable CRC screening knowledge and behaviors before entering the inflatable colon. Interestingly, touring the inflatable colon model significantly improved participants' awareness and knowledge about CRC. Most importantly, it increased their willingness for screening and social engagement and comfort discussing and promoting CRC screening.

CONCLUSION Overall, these results indicate that the interactive colon is an effective educational tool that can make a positive impact by improving the community CRC awareness and interest in CRC screening. They also highlight the importance of such educational efforts conducted in the community to create more awareness about CRC and emphasize the importance of its prevention.

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INTRODUCTION

Cancer is a global health threat charting among the top worldwide causes of mortality and morbidity worldwide. Statistics in Lebanon show that the cancer incidence rate has dramatically increased over the past decades. Specifically, colorectal cancer (CRC) currently ranks fourth in males and second in females as the most commonly reported cancer in Lebanon¹ and is among the three main causes of mortality and morbidity.² It is estimated that the age-standardized incidence and mortality of CRC in Lebanon is 20 and 10.5 per 100,000, respectively, and these numbers are expected to increase.³ Moreover, it is expected that the shift to Western diet, sedentary lifestyle, smoking habits, as well as the increase in life expectancies will further expand CRC incidence rate and burden.⁴ This necessitates the development and implementation of effective strategies to combat cancer generally and CRC specifically not only by therapeutics but also through primary and secondary prevention.

From a clinical point of view, early detection by screening significantly increases chances of survival and reduces

the medical and financial burdens of treatment.⁵ This has been shown by several published studies correlating significant reduction of CRC incidences, mortality, and economic burden to early detection by screening. The recommended CRC screening tests in Lebanon and similarly to the West for people > 50 years of age with no family history are the fecal occult blood test (FOBT) and fecal immunochemical test (FIT) screening at yearly intervals and colonoscopy at 10-year intervals.⁶ Importantly, although CRC screening with any of these recommended tests is reported to reduce CRC mortality^{6,7} and incidence, none of these tests is generally available at the public primary health care centers in Lebanon,⁸ and there is currently no implementation of a national CRC screening plan in Lebanon. Moreover, although CRC is common in Lebanon, public awareness of it was estimated to be marginal.⁹ In addition, there are only scarce data about CRC screening knowledge and attitudes of CRC screening. A recent survey performed on 371 participants in Lebanon revealed that 44% were unaware of routine screening and 57% were unwilling to get screened. These results were related to participants'

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CONTEXT

Key Objective

Is the giant inflatable colon model an effective educational tool that increases knowledge as well as willingness to undergo and discuss colorectal cancer (CRC) screening?

Knowledge Generated

Two major gaps in knowledge among the participants were identified regarding the absence of symptoms in CRC (48.9%) and importance of polyp excision in terminating it (59.2%). After colon intervention, the target population for CRC screening (age \geq 50 years) was significantly more comfortable discussing CRC screening.

Relevance

The giant inflatable colon model increased awareness about CRC screening and changed attitudes by encouraging more people to comply with CRC screening testing.

own/personal evaluation of the screening technique and misconceptions about CRC.¹⁰

To address these issues, the Cancer Prevention and Control Program at Naef K. Basile Cancer Institute (NKBCI), American University of Beirut Medical Center (AUBMC) in collaboration with AMALOUNA, an AUB-affiliated educational non-governmental organization (NGO) that aims to raise awareness about cancer, cancer prevention, and cancer research, launched a series of outreach events using a giant inflatable colon model. The overall objective was to evaluate the use of this interactive educational tool in improving knowledge and behaviors of the community toward CRC prevention.

METHODS

Setting

The Cancer Prevention and Control Program NKBCI, AUBMC, in collaboration with AMALOUNA, an AUB-affiliated educational NGO that aims to raise awareness about cancer, cancer prevention, and cancer research, designed an awareness campaign with educational activities tailored for CRC. This campaign was launched in the international CRC month of March 2017 and ran for more than 12 months. Target demographics were people of diverse age groups, educational backgrounds, and geographic areas. We toured around Lebanon with the inflatable colon to several areas, including Beirut, Mount Lebanon, and the North and South governorates. These events were publicized via social media, including television. Moreover, in rural areas where they had certain authority figures, we relied on word of mouth in addition to social media. Furthermore, Sanchez et al¹¹ showed that after inflatable colon intervention young adults reported an increased intention to promote CRC education among their relatives and community members. This mode of knowledge dissemination is effective, because social influence has been reported to cause health behavior changes in individuals.¹² As such, we aimed to include all age groups, including the young so they propagate the message to their parents.

Inflatable Colon Educational Tool

During the awareness campaign, an inflatable colon model was constructed for participants to tour. The model is 2.5 m in height, 3 m in width, and 6 m in length completed, with a built-in electrical air blower. When inflated, it has an arch shape, which creates a double-layer walk-through tunnel laid out with digital printings and pictures explaining and detailing the different stages of CRC in the following progressive order: normal colon tissue, inflamed colon tissue (Crohn's disease and ulcerative colitis), benign polyps, malignant polyps, invasive CRC, and advanced cancer with metastasis. In addition, recommendations for the routine screening tests (FOBT, FIT, and colonoscopy), CRC risk factors, and preventative information were attached on the inner wall of the model. Languages used were English and Arabic in full text.

Groups of up to 10 participants were ushered through by a trained member of AMALOUNA. Tours were prerehearsed to ensure uniformity of data dissemination and were approximately 15 minutes long. In addition to the inflatable colon and distribution of educational material, free CRC screening tests were distributed to eligible participants in some venues to promote additional screening.

Data Collection

A survey questionnaire was developed based on the results published by Redwood et al,¹³ who was the first to publish a study that showed the inflatable colon as an effective teaching model to increase CRC awareness. It included four knowledge questions about CRC: (1) at what age should one be screened for CRC (correct answer = 50 years), (2) whether polyp excision influences CRC progression (correct answer = yes), (3) whether CRC always presents with symptoms (correct answer = no), and (4) whether CRC can be hereditary (correct answer = yes). They were also asked two attitude questions on how likely they are to get screened for CRC and how comfortable they feel talking about early detection screening tests for CRC using a 5-point Likert scale (very unlikely, somewhat

unlikely, neutral, somewhat likely, and very likely). Participants ≥ 50 years of age were asked if they previously underwent screening for CRC.

The survey was administered in Arabic only. The surveys were filled out individually, although AMALOUNA members were available to help read the questionnaire if the participant needed assistance. To test for the benefit of the inflatable colon educational tool, participants were asked to answer the survey questions before they entered (pre-survey) and right after they exited (postsurvey) the inflatable colon model. Anonymized forms were then placed into a drop box after being completed by the participants. There were no identifiers, but demographic information including sex, age, and education level was collected.

Data Analysis

Data generated from the survey questions were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 24.0 for Windows (Chicago, IL). Data are presented as No. (%). For the two attitude questions, “somewhat likely” and “very likely” were lumped into a high-likelihood category.

Descriptive analysis was performed followed by an association analysis between demographics (age and education level) and knowledge and attitudes before and after the entry to the inflatable colon using χ^2 test. A paired analysis was then performed to compare knowledge and attitude before (pre) and after (post) visiting the inflatable colon using McNemar’s test. A *P* value $< .05$ is considered statistically significant.

RESULTS

A total of 782 visitors of various age groups and educational backgrounds completed the survey (Table 1). The majority of participants were females (67.1% females and 32.9% males); more than half of the sample had obtained a university

degree, and a few participants (8.1%) had less than a high school education.

Before visiting the inflatable colon, only a few participants (20.3%) knew the recommended age for CRC screening (Table 2). However, 40.8% and 51.1% recognized that polyp excision may prevent CRC and that CRC does not always present with symptoms, respectively. CRC being potentially hereditary was common knowledge among the majority of the participants (70.1%). There was no significant difference between most of the general questions between sexes. The only two statistically significant findings were that women were more knowledgeable than men that CRC does not always present with symptoms and that risk to develop CRC increases when a family member has it. As expected, those who had higher education levels had significantly more knowledge before the inflatable colon visit regarding the screening age for CRC and its asymptomatic and genetic characteristic but not with respect to the importance of polyp excision for CRC termination. Interestingly, a significantly higher frequency of the older participants > 50 years of age (50%) knew that polyp excision may prevent CRC, whereas more of the younger participants < 50 years of age (53.1%) recognized that CRC is not always symptomatic. More importantly, knowledge significantly improved for all four knowledge questions after visiting the inflatable colon in both groups of different educational backgrounds (Table 3).

As for the attitude questions, most participants felt likely to get screened for CRC and to talk about CRC screening, and significantly more so for the latter question among those who were > 50 years of age (83.3%; Table 2). Similarly to the knowledge questions, after visiting the inflatable colon, participants showed a significant increase in the likelihood of getting screened and in discussing CRC screening (Table 3). Importantly, after touring the colon, the likeliness to get screened was more significant in the highly educated group (Table 3).

DISCUSSION

Community cancer awareness is an important factor in driving cancer prevention and early detection. Prior studies have evaluated outreach educational activities and reported that, although they provided insufficient evidence about their effectiveness in increasing screening rates, they led to improvement in CRC knowledge, attitudes, and intentions to secure CRC screening.¹⁴ The results of this CRC educational campaign, which incorporated the use of a giant inflatable colon and focused on raising awareness about CRC and its screening and prevention, would certainly add to the extensive research examining the importance of community educational campaigns as a potential strategy for CRC prevention.

The inflatable colon, with its huge size when it was installed in the cancer awareness events, attracted the participants and increased their interest in learning more about CRC.

TABLE 1. Demographic Characteristics of Participants

Characteristic	No. (%)
Sex	
Male	251 (32.9)
Female	512 (67.1)
Age, years	
< 50	607 (78.1)
≥ 50	170 (21.9)
Education level	
Below high school	61 (8.1)
High school	196 (25.9)
Undergraduate	234 (31.0)
Graduate	265 (35.1)

NOTE. N = 782. Total numbers may not add up to 782 because of missing answers.

TABLE 2. Sex, Age, and Education Level as Potential Predictors for Correct Knowledge and High-Likelihood Attitude Concerning Colorectal Cancer Before Inflatable Colon Visit

Question	Answer	Sex		Age Category, years		Education Level Category			P		
		All Correct	Male	Female	P	< 50	≥ 50	P		School Level	University Level
Knowledge											
In your opinion, what is the age at which we have to do CRC screening test?	50 years	153 (20.3)	47 (18.7)	105 (20.5)	.546	116 (19.6)	37 (29.8)	.344	77 (16)	47 (25.3)	.006
Do you think polyp excision from the colon terminates CRC?	Yes	302 (40.8)	94 (38.7)	200 (41.2)	.508	224 (38.4)	78 (50)	.009	197 (41.9)	72 (37.5)	.294
Does CRC always present with symptoms?	No	390 (51.1)	106 (42.6)	258 (51.6)	.020	316 (53.1)	72 (43.4)	.027	212 (43.3)	128 (66.3)	< .001
If a family member suffers from CRC, do you think the risk for developing CRC increases?	Yes	531 (70.1)	151 (60.9)	371 (74.9)	< .001	422 (71.3)	108 (66.3)	.214	313 (64.5)	149 (78)	.001
Attitude											
How likely are you to get screened for CRC?	High	524 (69.5)	164 (69)	350 (70.7)	.295	399 (68)	121 (74.2)	.125	338 (70.3)	130 (67.7)	.514
How likely are you to talk about CRC screening?	High	570 (76.7)	178 (72.7)	382 (78.9)	.058	439 (75)	130 (83.3)	.029	361 (76.6)	146 (76)	.868

NOTE. Data presented as No. (%). Total numbers may not add up because of missing answers. χ^2 test was used to calculate P value. Boldface indicates significant value. Abbreviation: CRC, colorectal cancer.

TABLE 3. Pre Versus Post Visit to the Inflatable Colon: Comparison of Correct Knowledge and High-Likelihood Attitude Concerning Colorectal Cancer

Question	Answer	Visit to the Inflatable Colon		
		Presurvey	Postsurvey	<i>P</i>
Knowledge				
In your opinion, what is the age at which we have to do CRC screening test?	50 years	133 (19.2)	561 (81.2)	< .001
Do you think polyp excision from the colon terminates CRC?	Yes	269 (40.8)	501 (76)	< .001
Does CRC always present with symptoms?	No	351 (50.7)	512 (74)	< .001
If a family member suffers from CRC, do you think the risk for developing CRC increases?	Yes	477 (68.9)	580 (83.8)	< .001
Attitude				
How likely are you to get screened for CRC?	High	477 (70)	536 (78.6)	< .001
How likely are you to talk about CRC screening?	High	508 (76.6)	574 (86.6)	< .001

NOTE. Data presented as No. (%) unless otherwise indicated. Total numbers may not add up because of missing answers. Numbers are also slightly different from shown in Table 2, because only those who filled both the presurvey and postsurvey are included. McNemar's test was used to find *P* value. Boldface indicates significant value.

Abbreviation: CRC, colorectal cancer.

Data collected from > 700 participants demonstrated that the inflatable colon increased participants' knowledge about CRC and its screening. It also improved their attitude toward discussing and undergoing CRC screening, indicating that the colon is an effective educational tool and could potentially make a positive impact. This is in accordance with previous studies using this educational colon model along with the pre/post-test design, which also reported increase in community knowledge and interest in CRC screening.^{13,15-17}

When assessing prior knowledge of participants about CRC, we surprisingly found that only 20% of participants knew the correct age to start CRC screening. An overall high percentage of participants responded correctly (70.1%) and knew that the risk for developing CRC increases if they have a family member with CRC. This prior increased awareness of the impact of family history may be due to the wrong belief among the community that most cases of cancer are hereditary. When the participants were asked about their willingness to undergo screening, a high percentage were willing even before the colon visit (69.5%). These results are consistent with what was previously reported in the region by Almadi et al¹⁸ in 2015 and Qumseya et al¹⁹ in 2014.

Differential effects on the prior CRC knowledge and intention to get screening were assessed among demographic groups, specifically age and education level. An important finding was that age and education level were potential predictors for familiarity with CRC. Similar results have been reproduced in other regions of the world. In some studies, both age and higher education were reported to be associated with knowledge and perception toward CRC.^{20,21} Moreover, Qumseya et al¹⁹ reported an association between

a higher educational level and increased acceptance of CRC screening. In our study, being older (≥ 50 years of age) was associated with increased knowledge and likelihood to talk about CRC screening. The reasons for this might be that older people either have undergone or are due to undergo a screening test, and they are at risk for comorbidities leading them to seek more medical advice and get more knowledge from their primary physician.²²⁻²⁴ Surprisingly, high education level was associated with increased knowledge but not with increased intention and social behavior about CRC screening. This is in agreement with findings reported in the region showing that educational level did not indeed impact willingness to undergo CRC screening,¹⁸ and this might be partially explained by the fact that likelihood to get screened and to discuss CRC screening with others was found to be high across both strata of education in our samples. Importantly, after the colon visit, the frequency of correct CRC knowledge improved significantly ($P < .001$), and participants were more motivated to seek and discuss CRC screening.

Notably, although the majority of the participants > 50 years of age and eligible for CRC screening were willing to get screened (74.2%), we found that only 14.2% reported having undergone CRC screening test in the previous years. In this campaign, we sought to change the attitude of eligible individuals not willing to undergo CRC screening toward a more favorable one. This extremely low compliance could be due to several barriers, including lack of knowledge, lack of availability, and lack of health insurance covering the cost of the screening tests. Accordingly, these participants may certainly benefit from more awareness campaigns about CRC and the availability of different screening tests. To address some of these challenges and to promote and facilitate CRC

screening, during the colon tour we introduced the public to different recommended CRC screening tests during our campaign. Both the FOBT and FIT are inexpensive, noninvasive tests, a concept that was regarded as new information to the majority of the public. Furthermore, we secured and distributed as many of these tests as possible free of charge all over Lebanon. In total, more than 700 free CRC screening tests were secured and distributed to eligible people, especially those from socioeconomically disadvantaged backgrounds in different locations in Lebanon (Saida, Tripoli, Beirut, Akkar, El Shouf). Importantly, one center followed with the appropriate steps when the screening test was positive, and colonoscopy was provided for free to participants who had positive FOBT/FIT tests.

This study entails some limitations. There may have been selection bias; the sample may not be representative of the Lebanese population, because much of the data were collected in urban areas (83%). Nevertheless, it is worth noting that some rural areas were represented as well. Furthermore, the questionnaires were anonymous, and the study was not designed in a way to follow up with the participants, a fact that limited our ability to determine who obtained screening after the campaign. This is particularly important for the 170 participants > 50 years of age who were due for screening at the time they participated in the

campaign. This would be an outcome of interest in our future awareness campaigns. Furthermore, studies have demonstrated that print material (ie, brochures) as a single untailored intervention, such as the case in cancer awareness campaigns, is not effective in promoting colorectal cancer screening.²⁵ They are only effective in combination with other interventions, such as an educational video, brochures, calendars, or booklets.²⁶ Moreover, studies have shown that associating written or audio text with visual tools improves attention and recall of health education when compared with text-only material.²⁷ Nevertheless, a comparator would be helpful in future studies.

Despite the limitations of our study, our results provide strong evidence for a gap of CRC knowledge, highlight an unmet need in addressing CRC screening by the Lebanese health system, and show that such educational efforts using the inflatable colon conducted in the community could increase CRC knowledge, promote its screening, and accordingly result in important implications for CRC prevention and control. Because this initiative is educational at its core, it can be implemented in virtually any setting or community. Implementing a national screening strategy is a priority, and it should start first with development of effective campaigns directed to the general public to raise awareness about CRC and the importance of screening and early detection.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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REFERENCES

1. Shamseddine A, Saleh A, Charafeddine M, et al: Cancer trends in Lebanon: A review of incidence rates for the period of 2003-2008 and projections until 2018. *Popul Health Metr* 12:4, 2014
2. Saber T, Bedran K, Ghandour F, et al: Results from a retrospective analysis of colonoscopies for inflammatory bowel disease and colorectal cancer in a Lebanese tertiary care centre. *BMJ Open Gastroenterol* 4:e000167, 2017
3. Bray F, Ferlay J, Soerjomataram I, et al: Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 68:394-424, 2018
4. Bishehsari F, Mahdavinia M, Vacca M, et al: Epidemiological transition of colorectal cancer in developing countries: Environmental factors, molecular pathways, and opportunities for prevention. *World J Gastroenterol* 20:6055-6072, 2014
5. Kakushadze Z, Raghubanshi R, Yu W: Estimating cost savings from early cancer diagnosis. *Data (Basel)* 2:30, 2017
6. Wolf AMD, Fontham ETH, Church TR, et al: Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. *CA Cancer J Clin* 68:250-281, 2018
7. Nishihara R, Wu K, Lochhead P, et al: Long-term colorectal-cancer incidence and mortality after lower endoscopy. *N Engl J Med* 369:1095-1105, 2013
8. WHO: Cancer Country Profiles: Lebanon. http://www.who.int/cancer/country-profiles/lbn_en.pdf
9. Nemer HA, Hejase AJ, Hejase HJ, et al: Colorectal cancer: Exploring awareness in Lebanon. *Journal of Middle East and North Africa Sciences* 2:10-21, 2016
10. Tfaily MA, Naamani D, Kassir A, et al: Awareness of colorectal cancer and attitudes towards its screening guidelines in Lebanon. *Ann Glob Health* 10.5334/aogh.2437
11. Sanchez JI, Palacios R, Cole A, et al: Evaluation of the walk-through inflatable colon as a colorectal cancer education tool: Results from a pre and post research design. *BMC Cancer* 14:626, 2014
12. Leahey TM, Gokee LaRose J, Fava JL, et al: Social influences are associated with BMI and weight loss intentions in young adults. *Obesity (Silver Spring)* 19:1157-1162, 2011
13. Redwood D, Provost E, Asay E, et al: Giant inflatable colon and community knowledge, intention, and social support for colorectal cancer screening. *Prev Chronic Dis* 10:E40, 2013
14. Woodruff RC, Hermstad A, Honeycutt S, et al: Results from an evaluation of the Georgia Colorectal Cancer Control Program's community education and outreach events, 2013. *J Cancer Educ* 32:392-400, 2017
15. Briant KJ, Espinoza N, Galvan A, et al: An innovative strategy to reach the underserved for colorectal cancer screening. *J Cancer Educ* 30:237-243, 2015
16. Briant KJ, Wang L, Holte S, et al: Understanding the impact of colorectal cancer education: A randomized trial of health fairs. *BMC Public Health* 15:1196, 2015
17. Molina Y, Briant KJ, Sanchez JI, et al: Knowledge and social engagement change in intention to be screened for colorectal cancer. *Ethn Health* 23:461-479, 2018
18. Almadi MA, Mosli MH, Bohlega MS, et al: Effect of public knowledge, attitudes, and behavior on willingness to undergo colorectal cancer screening using the health belief model. *Saudi J Gastroenterol* 21:71-77, 2015
19. Qumseya BJ, Tayem YI, Dasa OY, et al: Barriers to colorectal cancer screening in Palestine: A national study in a medically underserved population. *Clin Gastroenterol Hepatol* 12:463-469, 2014
20. Bidouei F, Abdolhosseini S, Jafarzadeh N, et al: Knowledge and perception toward colorectal cancer screening in east of Iran. *Int J Health Policy Manag* 3:11-15, 2014
21. Beydoun HA, Beydoun MA: Predictors of colorectal cancer screening behaviors among average-risk older adults in the United States. *Cancer Causes Control* 19:339-359, 2008
22. Berkowitz Z, Hawkins NA, Peipins LA, et al: Beliefs, risk perceptions, and gaps in knowledge as barriers to colorectal cancer screening in older adults. *J Am Geriatr Soc* 56:307-314, 2008
23. Guessous I, Dash C, Lapin P, et al: Colorectal cancer screening barriers and facilitators in older persons. *Prev Med* 50:3-10, 2010
24. Tessaro I, Mangone C, Parkar I, et al: Knowledge, barriers, and predictors of colorectal cancer screening in an Appalachian church population. *Prev Chronic Dis* 3:A123, 2006
25. Marcus AC, Mason M, Wolfe P, et al: The efficacy of tailored print materials in promoting colorectal cancer screening: Results from a randomized trial involving callers to the National Cancer Institute's Cancer Information Service. *J Health Commun* 10:83-104, 2005 (suppl 1)
26. Gimeno Garcia AZ, Hernandez Alvarez Buylla N, Nicolas-Perez D, et al: Public awareness of colorectal cancer screening: Knowledge, attitudes, and interventions for increasing screening uptake. *ISRN Oncology* 2014:425787, 2014
27. Houts PS, Doak CC, Doak LG, et al: The role of pictures in improving health communication: A review of research on attention, comprehension, recall, and adherence. *Patient Educ Couns* 61:173-190, 2006

