

Personalized Multilevel Intervention for Improving Appropriate Use of Colorectal Cancer Screening

Intervention for Improving Appropriate Use of Colorectal Cancer Screening

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ABSTRACT

Objective: To evaluate the efficacy of multi-level interventions aimed at enhancing colorectal cancer (CRC) screening uptake among individuals aged over 50 years, while also identifying the health and socio-demographic factors associated with increased participation.

Study Design: Randomized experimental study.

Place and Duration of Study: This study was conducted at the Department of Medicine, Nishtar Medical University, Multan from January 2017 to December 2019.

Methods: The data was collected from total of 20 basic health units involving men and women aged 50 to 74 years. Subjects were selected through simple random sampling and were subsequently randomly assigned to one of four groups. The first group received written information about colorectal cancer (CRC) screening through a letter, the second group received the information via a telephone call from health personnel, the third group attended a group meeting at their health center for the information, while the fourth group, serving as the control group, received no information.

Results: There were 29.1% participants, who provided written information, 27.3% had telephonic information, 21.7% had face-to-face information and 21.9% had control group. All the groups were almost equal with respect to demographic and clinical history, and differences were statistically insignificant, except education status and cancer history.

Conclusion: Simple interventions within the purview of primary health-care professionals, such as providing written and telephone information, have the potential to enhance participation in colorectal cancer (CRC) screening, thereby optimizing this preventive activity.

Key Words: Colorectal cancer, Multilevel intervention, Personalized, Prevention, Screening.

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INTRODUCTION

Colorectal cancer (CRC) is an ideal candidate for screening due to its significant health impact, and with available tests capable of detecting it in its early stages, when treatment is most effective¹. The scientific community strongly advocates for screening, citing a favorable benefit-risk balance, and there is widespread consensus on the importance of raising awareness among the general population, health professionals, and health authorities to prevent this disease^{2,3}.

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For an extended period, the European Union, the US Preventive Services Task Force, and the Canadian Task Force on Preventive Health Care have consistently advocated for the implementation of population-based colorectal cancer screening⁴.

The fecal occult blood test (FOBT) has demonstrated a detection rate of 60-85% for tumors, while colonoscopy with polypectomy has shown the potential to reduce mortality by 60-90%, contributing to a decline in the incidence of this disease over the last two decades through early diagnosis and treatment^{5,6}.

Several countries have successfully initiated population-based colorectal cancer (CRC) screening programs, and more are poised to follow suit; however, the selection of screening modalities is influenced by factors such as cost, resource availability, and acceptance within the population⁷. Currently, no test has equaled the widespread availability and effectiveness of fecal occult blood tests (FOBT), a choice supported by clinical trials⁸.

Primary health-care professionals play a crucial role in colorectal cancer (CRC) prevention by disseminating information about primary prevention measures, encouraging screening among the average-risk

population⁹, identifying high-risk individuals through appropriate personal and family histories, and collaborating with specialized care in managing and following up individuals with specific colorectal lesions¹⁰.

The study may lead to the development of individualized screening plans based on personal risk factors, family history, and other relevant factors.

METHODS

A randomized experimental study was conducted at department of Medicine, Nishtar Medical University, Multan, from January 2017 to December 2019. The data was collected from 20 basic health units involving men and women aged 50 to 74 years. Subjects were selected through simple random sampling and were subsequently randomly assigned to one of four groups. The first group received written information about colorectal cancer (CRC) screening through a letter, the second group received the information via a telephone call from health personnel, the third group attended a group meeting at their health center for the information, while the fourth group, serving as the control group, received no information.

To achieve a statistical power of 80% with an alpha error of 5%, and considering an expected frequency of CRC screening participation at 8% in the control group and 15% in the group subjected to the least effective intervention over a 2-year period, a total sample size of 700 participants was determined, with 325 participants required in each group.

The intervention aimed to disseminate detailed information on current preventive recommendations and screening methods through various communication channels, including written materials, telephone calls, and face-to-face interactions. The emphasis was on encouraging individuals, particularly those aged 50 to 74 years, to undergo fecal occult blood testing (FOBT) every two years as a colorectal cancer (CRC) screening method. A motivational strategy was consistently applied across all communication forms, emphasizing individual responsibility for personal health. Specifically, written information tailored for the study was created, telephone information was delivered by

trained nurses, and face-to-face sessions, conducted by nurses in groups.

After the interventions were completed, subjects underwent a two-year follow-up evaluation. They were summoned to their respective health centers to participate in a questionnaire survey encompassing socio-demographic, health-related, and participation variables in colorectal cancer (CRC) screening, either within the past two years or at some point in their lives. Health professionals conducted the interviews, excluding individuals with a history of colorectal cancer or severe sensory impairment, as well as those with insufficient intellectual performance to contribute effectively to the study. Participants were required to provide written informed consent during the interview process. Approval for the study was obtained from the Clinical Research Ethics Committee of the authorities. The responses were input into a database SPSS version 23, where they underwent thorough processing and analysis. A comparison of the variables of interest and potential confounding variables was conducted across all groups to determine if, despite the utilization of a random allocation system, homogeneity existed among the groups concerning the baseline values of the study variables.

RESULTS

Seven hundred participants both male and female were included in this study. There were 204 (29.1%) participants had written information, 191 (27.3%) had telephonic information, 152 (21.7%) had face-to-face information and 153 (21.9%) had control group. All the groups were almost equal with respect to demographic and clinical history, and differences were statistically insignificant, except education status and cancer history. (Table. 1).

In this study, 133 (19.0%) cases were participated in screening whereas 567 (81.0%) cases were not participated in screening. (Figure. 1). The participated and not participated cases in screening were equally distributed with respect to demographic and clinical history, and differences were statistically insignificant, (p>0.050). (Table. 2).

Table No.1: Demographic and clinical history of both the study groups

Variable	Written information 204 (29.1%)	Telephonic information 191 (27.3%)	Face to face information 152 (21.7%)	Control Group 153 (21.9%)	p-value
Age (years)	63.69±14.03	62.54±12.57	64.09±13.46	62.07±13.58	
Gender					
Male	99 (48.5)	82 (42.9)	69 (45.4)	65 (42.5)	0.624
Female	105 (51.5)	109 (57.1)	83 (54.6)	88 (57.5)	
Education status					
Uneducated	37(18.1)	44(23.0)	40(26.3)	35(22.9)	<0.001
Primary	151(74.0)	147(77.0)	112(73.7)	105(68.6)	
Secondary or higher	16(7.8)	0 (0.0)	0 (0.0)	13(8.5)	

Marital status					
Married	203(99.5)	188(98.4)	151(99.3)	152(99.3)	0.656
Un-married	1(0.5)	3(1.6)	1(0.7)	1(0.7)	
Area of living					
Urban	74(36.3)	60(31.4)	60(39.5)	54(35.3)	0.476
Rural	130(63.7)	131(68.6)	92(60.5)	99(64.7)	
Cancer history	20(9.8)	19(9.9)	28(18.4)	14(9.2)	0.030
Cancer history among first-degree relatives	106(52.0)	84(44.0)	64(42.1)	66(43.1)	0.200
Multimorbidity	56(27.5)	56(29.3)	38(25.0)	35(22.9)	0.555
Comorbidity	142(69.6)	143(74.9)	118(77.6)	116(75.8)	0.330
Self-perceived health	59(28.9)	54(28.3)	37(24.3)	44(28.8)	0.771
N (%), Mean ± S.D					



Figure No.1: Distribution of cases according to participation in screening

Table No.2: Association of participation in screening with demographic and clinical history of both the study groups

Variable	Participation in screening 133 (19.0%)	Not participation in screening 567 (81.0%)	p-value
Age (years)	63.35±14.79	62.84±13.07	0.697
Gender			
Male	59 (44.4)	256 (45.1)	0.869
Female	74 (55.6)	311 (54.9)	
Education status			
Uneducated	26 (19.5)	130 (22.9)	0.295
Primary	104 (78.2)	411 (72.5)	
Secondary or higher	3 (3.3)	26 (4.6)	
Marital status			
Married	133 (100.0)	561 (98.9)	0.233
Un-married	0 (0.0)	6 (1.1)	
Area of living			
Urban	47 (35.3)	201 (35.4)	0.981
Rural	86 (64.7)	366 (64.6)	
Cancer history	18 (13.5)	63 (11.1)	0.432
Cancer history among first-degree relatives	55 (41.4)	265 (46.7)	0.262
Multi-morbidity	35 (26.3)	150 (26.5)	0.974
Comor-bidity	99 (74.4)	420 (74.1)	0.932
Self-perceived health	36 (27.1)	158 (27.9)	0.853
N (%), Mean ± S.D			

DISCUSSION

The primary obstacle to the success of cancer screening programs, notably in the case of colorectal cancer (CRC), is widely recognized to be low population participation, a critical factor that directly influences the effectiveness of screening and can impede positive cost-effectiveness outcomes despite ample evidence supporting the screening's efficacy. In a study by Gale et al¹¹ observed that since 2006, in England, where Fixed Odds Betting Terminals (FOBT) have been accessible to individuals aged 50 and above, a reported coverage of 54% has been observed, yet the reasons for this relatively low participation remain unclear.

The study conducted by López-Torres-Hidalgo J et al¹² revealed that both written and telephone information can effectively enhance participation in colorectal cancer (CRC) screening, with the potential for optimization through straightforward interventions manageable by primary health-care professionals. In this study self-perceived health is another factor that influence non participation in screening. In their study, Molina-Barceló et al¹³ reported that other circumstances, such as the absence of symptoms of the disease or not receiving a letter of invitation, were noted.

In their study, Javadzade et al¹⁴ reported that "Lack of recommendation by doctors" emerged as one of the barriers to screening participation described in the literature. Numerous studies have consistently demonstrated that the recommendation of a health professional stands as the most influential factor in motivating individuals to participate in screening programs¹⁵.

In this study there was not a significant difference regarding residential area as rural and urban residents have equal ratio of participation in screening. Decker et al¹⁶ study observed wide overall variation among countries in colorectal cancer (CRC) screening participation, highlighting the need to discern regional differences and thereby enhance adherence to screening programs.

In Larkey et al¹⁷ study, it was found that individuals residing in rural settings and those with a higher

number of health issues were the most active participants in screening procedures.

Various interventions have been investigated to assess their impact on adherence to colorectal cancer (CRC) screening. Both written and electronic communications, tailored to the specific characteristics of the population, have shown promising results, particularly among immigrant populations and even within workplace settings¹⁸. Interventions combining written information with new technologies, such as text messages, have yielded promising results and are cost-effective¹⁹.

The review of studies by Powe et al²⁰ focusing on enhancing participation in CRC screening, concludes that the most effective interventions target individuals or communities, address screening barriers, tailor messages to the population, utilize diverse communication methods, and are sustained over time.

CONCLUSION

Simple interventions within the purview of primary health-care professionals, such as providing written and telephone information, have the potential to enhance participation in colorectal cancer (CRC) screening, thereby optimizing this preventive activity.

Author's Contribution:

Concept & Design of Study:	Feras Almarshad, Ghulam Mustafa
Drafting:	Feras Almarshad, Ghulam Mustafa
Data Analysis:	Feras Almarshad, Ghulam Mustafa
Revisiting Critically:	Feras Almarshad, Ghulam Mustafa
Final Approval of version:	Feras Almarshad, Ghulam Mustafa

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