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Study Analysis on Knowledge, Attitude, and Behavior of Colorectal Cancer Patients: A Single-Center Observational Study at Dr. Hasan Sadikin General Hospital, Bandung, Indonesia

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A B S T R A C T

Introduction: Colorectal cancer (CRC) is the second deadliest cancer with the second highest mortality rate (9.2%) after lung cancer (11.4%) and breast cancer (6.9%). CRC is more prevalent in developed countries and more prevalent among men, with incidence rates per 100,000 in both sexes at 19.7, 23.6, and 16.3 respectively. Majority of the patients came to the hospital with diagnosis of loco regional and metastatic colorectal cancer. Therefore, information and education regarding CRC are important to the patient and their family to assure optimal screening and management. This study aimed to determine the effect of education on knowledge, attitudes, behavior of colorectal cancer patients. **Methods:** A descriptive-analytic research study design was conducted, including all patients diagnosed with colorectal cancer coming to Dr. Hasan Sadikin Hospital Bandung, a tertiary referral hospital, in the period August 2021 to August 2022. The pre and post-education questionnaire were used to evaluate the knowledge, attitude, and behaviour of the respondent regarding the colorectal cancer. An informational leaflet with verbal explanation was utilized as educational material. Data was analyzed using SPSS version 24. **Results:** Fifty-two respondents were recruited and more than half of the respondents (73.1%) showed a high mark in the post-test knowledge of CRC. Furthermore, behavior aspect also showed a dramatic increase and almost all the subjects (98.1%) scored high on behavior aspect. **Conclusion:** The education provided to CRC patients significantly enhances their knowledge, attitude, and behavior.

1. Introduction

Colorectal cancer (CRC) is the third most common malignancy worldwide and has been ranked as the second leading cause of cancer deaths in 2020. The incidence. The prevention of CRC includes changes in modifiable risk factors, including obesity, inactivity, high consumption of red meat, smoking, and moderate-frequent alcohol consumption. Things such as physical activity, dietary fiber, and vitamin D intake are included as protective factors. Besides the modifiable risk factors, some factors that are not modifiable such as a history of CRC or polyp adenoma either individually or in the family a history of chronic inflammation of the intestines family history and genetic predisposition, a history of diabetes and cholesistectomy.[1–4] Epidemiologically, the incidence of cancer cases at young ages (< 40 years) has increased significantly and this trend occurs globally. The incidence of young-onset CRC in Dr. Hasan Sadikin General Hospital (RSHS) in 1995-2004 was around 15-54.5%. Young-onset cancer is associated with hereditary mutations with strong mutational penetration. However, the proportion of hereditary cases in young cancers is estimated to be only 20%, so the majority are sporadic cases.[5–7]

Early detection of CRC can be started from primary health care facilities through education programs by avoiding modifiable CRC risk factors and by screening

or early detection in the population, especially in high-risk groups. The purpose of CRC screening is early detection, removing pre-cancerous lesions, and detecting disease at an early stage so that curative therapy can be carried out. Indications for early examination or TRC screening are individuals with moderate and high risk. Included in the moderate risk are individuals aged 50 years or older, individuals with no history of CRC or inflammatory bowel disease, individuals without a family history of CRC, and individuals diagnosed with adenoma or CRC after age 60.[2,8,9] Increased knowledge of CRC patients can be a good derive for patients to determine a positive attitude towards CRC. This positive attitude can be the basis for implementing positive conduct towards CRC. From this, it can be seen that knowledge can influence the attitudes and conduct of a patient. Thus, it can be estimated that sufficient knowledge about CRC in CRC patients can promote good conduct and behaviour as well. This study aimed to describe the knowledge, attitudes, and behavior of colorectal cancer patients before and after education on colorectal cancer.

2. Methods

This study used an observational analytical research design using a cross-sectional approach. The technique used for sampling in this study was random sampling. Random sampling refers to a random sampling technique in which the individuals in the population or sample do not have different strata. In this study, the sample used was 52 patients diagnosed with colorectal cancer who came to Dr. Hasan Sadikin General Hospital Bandung in the period August 2021 to August 2022. The data used in this study were primary and secondary data. Primary data was obtained through a questionnaire instrument given to the respondents. The questionnaire was adopted from Al-Thafar AK (2017) and Alshammari SA (2020) and translated into an Indonesian version then given to 30 colorectal cancer patients for testing and the results will be entered into SPSS 24 to assess Cronbach's alpha, if the results are below 0.75 then Revision will be carried out until Cronbach's alpha is above 0.75. After that, the sample will be taken using a non-randomized purposive sampling method. Samples will be given informed consent and will be matched with inclusion/exclusion criteria. Data analysis was carried out using SPSS (version 24). The chi-square test was run for analyzing categoric data and T-Test for numeric data. P-values were considered statistically significant if $P<0.05$. The ethical approval was obtained from the Research Ethics Committee of Dr. Hasan Sadikin General Hospital, Bandung, Indonesia with number approval of LB.02.01/X.6.5/173/2022.

Meanwhile, secondary data was obtained from hospital medical records to determine the number of patients diagnosed with colorectal cancer. Data was taken with the instrument in the form of a questionnaire. Questionnaires were used to determine the extent of knowledge, attitudes, and behavior. The questionnaire contains several types of statements that must be filled out such as True-False-Do not Know questions, Yes and No questions, and choose one most likely answer out of several choices. The questionnaire was divided into several sections. The first part of the respondents was asked to fill in sociodemographic data including domicile, age, education level, marital status, and occupation. The second part contains questions about risk factors for colorectal cancer and the third part contains questions regarding digital rectal examination as one of CRC early detection methods. Knowledge 20 questions, attitude 10 questions, and behavior 2 questions were categorized as high, moderate, and low. The knowledge level is evaluated using a scoring system, with scores ranging from 29-42 for good knowledge, 15-28 for moderate knowledge, and 0-14 for poor knowledge. The attitude assessment is evaluated using a scoring system, with scores ranging from 29-42 for good attitude, 15-28 for medium attitude, and 0-14 for bad attitude. The assessment of behavior is based on a scoring system, with scores ranging from 29-42 for good attitude, 15-28 for moderate attitude, and 0-14 for bad attitude.

3. Results

This research involved 52 respondents spread across various regions, with the majority (61.5%) coming from outside Bandung City and Bandung Regency. In terms of occupation, the majority of respondents were housewives (40.4%), followed by entrepreneurs (32.7%). Other jobs represented include traders, retirees, the Indonesian National Army/National Police of the Republic of Indonesia, and other jobs. More than half of the respondents (55.8%) have a partner who works as an entrepreneur, while the other 25% have a partner who works as a housewife. Civil servants and the unemployed are the least represented paired occupations.

Regarding family health history, 28.8% of respondents had a family history of similar diseases, while 71.2% did not have this history. Overall, table 1 provides an overview of the characteristics of study respondents, including regional origin, occupation, partner's occupation, and family health history.

Table 1. Characteristics of the study participants.

Characteristics	Frequency (%)
Respondent area	
Bandung City	11 (21.2)
Bandung District	9 (17.3)
Other than Bandung	32 (61.5)
Occupation	
Housewife	21 (40.4)
Entrepreneur	17 (32.7)
Seller	1 (1.9)
Retired	2 (3.8)
Army	2 (3.8)
Non-civil guard	1 (1.9)
Others	5 (9.6)
Partner's occupation	
Farmer	1 (1.9)
Housewife	6 (11.5)
Entrepreneur	13 (25.0)
Non-civil guard	1 (1.9)
Civil servant	4 (7.7)
Jobless	3 (5.8)
Family history	
Yes	15 (28.8)
No	37 (71.2)

Table 2 presents changes in respondents' knowledge, attitudes, and behavior related to the research topic before (pre) and after (post) the intervention carried out. Before the intervention, 23.1% of respondents had high knowledge, 38% had medium knowledge, and 3.8% had low knowledge. After the intervention, there was a significant increase in respondents' knowledge. As many as 73.1% of respondents now have high knowledge, and only 1.9% still have low knowledge. Before the intervention, 23.1% of respondents had a high positive attitude towards the research topic, while 40% had a moderate attitude and 36.9% had a low attitude. After the intervention, there was an increase in positive attitudes. Although the number of respondents with a high positive attitude increased to 42.3%, the majority of respondents (57.7%) are now in the moderate attitude category. Before the intervention, only 17.3% of respondents showed good behavior regarding the research topic. In contrast, the majority of respondents (55.8%) showed low behavior. The intervention carried out proved effective in improving

respondent behavior. As many as 98.1% of respondents now show good behavior, and only 1.9% still have low behavior. Table 2 shows that the intervention carried out succeeded in increasing respondents' knowledge, attitudes, and behavior significantly. The greatest improvement was seen in the behavioral aspect, followed by knowledge and attitude. This indicates that the intervention was effective in changing respondents' thinking patterns and habits related to the research topic.

Table 2. Answers to knowledge, attitudes, and behavior questionnaire.

	Pre (%)	**Post (%)**
Knowledge		
High	12 (23.1)	38 (73.1)
Moderate	38 (73.1)	13 (25.0)
Low	2 (3.8)	1 (1.9)
Attitude		
High	12 (23.1)	22 (42.3)
Moderate	40 (76.9)	30 (57.7)
Behavior		
High	9 (17.3)	51 (98.1)
Moderate	14 (26.9)	-
Low	29 (55.8)	1 (1.9)

Table 3 presents the average value and p-value for the knowledge, attitudes, and behavior of respondents before (pre) and after (post) the intervention. The average value of respondents' knowledge before the intervention was 33.46 with a standard deviation of 9.617. After the intervention, the average knowledge score increased to 49.25 with a standard deviation of 10.812. The statistical test shows a p-value of 0.000, which means there is a statistically significant difference between the knowledge scores before and after the intervention. The average value of respondents' attitudes before the intervention was 25.04 with a standard deviation of 4.316. After the intervention, the average attitude value increased to 27.90 with a standard deviation of 5.214. The statistical test shows a p-value of 0.000, which means there is a statistically significant difference between the attitude values before and after the intervention. The average value of respondents' behavior before the intervention was 1.85 with a standard deviation of 2.313. After the intervention, the average behavior score increased rapidly to 5.88 with a standard deviation of 0.832. The statistical test shows a p-value of 0.000, which means there is a statistically significant difference between the behavioral values before and after the intervention. Table 3 shows that the intervention carried out succeeded in increasing respondents' knowledge, attitudes, and behavior significantly. The greatest improvement was seen in the behavioral aspect, followed by knowledge and attitude. This is in line with the results of the previous table narrative which shows that the intervention was effective in changing respondents' thinking patterns and habits related to the research topic.

Table 3. Comparison between knowledge, attitude, and behavior pre and post-test.

	Pre (%)	**Post (%)**	**p-value**
Knowledge	33.46 ± 9.617	49.25 ± 10.812	0.000
Attitude	25.04 ± 4.316	27.90 ± 5.214	0.000
Behavior	1.85 ± 2.313	5.88 ± 0.832	0.000

Table 4 presents the results of the pre-test and post-test to assess respondents' knowledge about risk factors for colorectal cancer. Each number indicates the question asked to the respondent, and the answer "Correct" indicates the correct answer. In general, table 4 shows a significant increase in respondents' knowledge regarding colorectal cancer risk factors after taking the test (post-test) compared to before the test (pre-test). The greatest increase in knowledge was seen in risk factors such as diet, alcohol, smoking, and changes in stool consistency. Increased knowledge is occurring on risk factors such as age, previous history of cancer, family history, excess body weight, diabetes, prolonged diarrhea, constipation, feeling full in the stomach, and abdominal pain. There has been little improvement in knowledge of risk factors such as unexplained weight loss and persistent fatigue. Knowledge about screening age and early detection did not show significant changes. These results indicate that the intervention provided was effective in increasing respondents' understanding of risk factors for colorectal cancer. The greatest increases in controllable risk factors (such as diet, alcohol, and smoking) indicate the potential for independent risk reduction.

Table 4. Distribution of respondents' answers on level of knowledge of colorectal cancer.

No	Questionnaire items	Pre-test	Post-test
		Correct	Correct
1	Colorectal cancer has risk factors	21	43
2	Age	16	34
3	Previous history of cancer	14	42
4	Diet	17	47
5	Age > 50 years	14	43
6	Family history	31	39
7	Excess weight	15	35
8	Alcohol consumption	14	47
9	Smoke	28	44
10	Diabetes	15	41
11	Inactivity	18	29
12	Prolonged diarrhea	27	38
13	Constipation	21	37
14	Stomach feels full/full	15	40
15	Change in stool consistency	13	41
16	Frequent stomach pain, stomach cramps, or a feeling of fullness or bloating	16	40
17	Losing weight for no reason	27	37
18	Feeling very tired all the time	32	31
19	Screening age range	18	43
20	Early detection	13	42

Table 5 presents respondents' attitudes about colorectal cancer after taking the test (post-test). Respondents have a good attitude about the importance of early detection to prevent colorectal cancer (question 1). The majority of respondents (42 of 52) agreed or strongly agreed that screening is necessary if they have a family history of colorectal cancer (question 5). Most respondents (42 of 52) agreed or strongly agreed that a diet rich in fruit and vegetables and low in red meat can reduce the risk of colorectal cancer (question 7). Respondents understand that maintaining an ideal body weight can reduce the risk of colorectal cancer (question 8). The majority of respondents (43 of 52) agreed or strongly agreed that early detection of colorectal cancer does not affect the prognosis of the disease (question 9).

Most respondents (33 of 52) agreed or strongly agreed that individuals with a history of inflammatory bowel disease should be screened for colorectal cancer (question 10). Most respondents (35 of 52) did not know or did not agree that digital colorectal examinations were performed routinely (question 2). Respondents' understanding regarding the stages of colorectal cancer as a disease that can be cured still varies (question 3). Some respondents (16 of 52) misunderstood that screening is only done if there are symptoms of colorectal cancer (question 4). Understanding of colonoscopy as a method of early detection of colorectal cancer needs to be improved (question 6). Although respondents' understanding of early detection, risk factors, and the importance of screening for individuals with a family history is good, knowledge of examination methods and disease stages needs to be improved through further education.

Table 5. Distribution of respondents' answers on attitudes toward colorectal cancer.

No	Questionnaire items	Post-test (n=52)				
		Don't know	Totally disagree	Disagree	Agree	Totally agree
1	Early detection can prevent colorectal cancer	0	25	0	27	0
2	Digital rectal examinations are performed regularly	1	30	0	21	0
3	Colorectal cancer is a curable disease	2	22	5	16	7
4	Screening is only done if there are symptoms of colorectal cancer such as abdominal pain	6	6	4	26	10
5	I need to do an examination if I have a family history of colorectal cancer	0	10	0	18	24
6	Colonoscopy as early detection of colorectal cancer	0	8	2	22	20
7	A diet rich in fruit and vegetables and low in red meat reduces the risk of colorectal cancer	2	14	2	12	22
8	Maintaining an ideal body weight to reduce the risk of colorectal cancer	2	4	12	16	18
9	Colorectal cancer that is diagnosed earlier does not affect the prognosis of the disease	2	5	2	13	30
10	Individuals with a history of inflammatory bowel disease should be screened for colorectal cancer	4	9	6	12	21

Table 6 presents changes in respondents' awareness regarding colon cancer screening before (pre-test) and after (post-test) intervention. Table 6 shows a significant increase in respondents' awareness of the importance of colon cancer screening after the intervention. The proportion of respondents who had undergone early colon cancer screening increased drastically from 32.69% before the intervention to 98.07% after the intervention. The proportion of respondents who had ever thought about undergoing early colon cancer screening also increased significantly, from 28.85% to 98.07%. These results indicate that the intervention carried out was very effective in increasing respondents' awareness about the importance of colon cancer screening. The drastic increase, both in those who have been screened and those who are thinking about doing so, indicates a positive change in behavior.

Table 6. Distribution of respondents' answers on attitudes toward colorectal cancer.

Questionnaire items	Pre-test	Post-test
	Yes (%)	Yes (%)
Have you done early screening for colon cancer?	17 (32.69)	51 (98.07)
Have you ever thought about getting screened for colon cancer early detection?	15 (28.85)	51 (98.07)

4. Discussion

This study found a relationship between knowledge and attitudes towards colorectal cancer before and after education. Moderate knowledge was found to be more well-prepared, with 32 respondents (84.2%) having moderate attitudes, while 5 respondents (50% had moderate attitudes). The Kendall Tau-b test showed no significant relationship between knowledge and attitudes before education, and the correlation test was weak. After education, moderate knowledge led to bad behavior, with 18 respondents (60%), and 11 respondents (50%), both with moderate and high knowledge attitudes. The Kendall Tau-b test showed no significant relationship between knowledge and attitudes after education, but a strong correlation was found. The study suggests that attitudes can be influenced by factors beyond knowledge, such as personal experience, culture, mass media, educational institutions, religious institutions, and emotional factors. The attitude toward preventing colorectal cancer is primarily a change in habits and lifestyle, and good preventive attitudes can arise even without good knowledge.

The behavior score increased more than threefold, from 1.85% to 5.88%. This study reveals a relationship between knowledge levels and colorectal cancer behavior before and after education. Before education, moderate knowledge led to 78.9% of respondents, while high knowledge led to 66.7%. High knowledge resulted in 33.3% of respondents showing good behavior. The Kendall Tau-b test showed no statistically significant relationship. However, a sufficient correlation was found in the correlation test before and after education. After education, moderate knowledge led to 96.7% of respondents having good knowledge, while high knowledge led to 100% of respondents having good behavior. The correlation test showed a sufficient relationship between moderate-good knowledge and moderate-good behavior. Attitude increases from 25.04% to 27.90%. This study reveals a strong relationship between attitude levels and behavior before and after education. Before education, 12 respondents with moderate attitudes had moderate behavior, while 27 respondents with moderate attitudes had moderate behavior. However, there was no statistically significant relationship between attitude level and colorectal cancer behavior before education. The correlation test between knowledge and behavior before education showed a very weak correlation. After education, 14 respondents had moderate attitudes, while 28 respondents with bad attitudes had good behavior. Despite no statistically significant relationship between attitude and colorectal cancer behavior after education, the correlation test showed a strong relationship between attitudes and behavior after education.

If subjects did not receive adequate and early training in colorectal cancer screening, they may not be able to contribute to increased colorectal cancer prevention. The study describes how education and attitude toward colorectal cancer significantly increased awareness of risk factors and colorectal cancer screening with a 95% confidence interval.[21] Around 70% of TRC cases are sporadic cases that are influenced by environmental factors such as diet, physical activity, smoking, and alcohol consumption. Meanwhile, about 25% of CRC cases are caused by genetic predisposition, and 5% of CRC patients have hereditary factors associated with its development. A family history of CRC and the presence of common chronic conditions, such as metabolic syndrome and fatty liver, are key risk factors for CRC.[1,3] Meanwhile,

high-risk individuals are those with a history of adenomatous polyps, individuals with a history of curative resection of CRC, individuals with a family history of first-degree CRC or colorectal adenoma (recommendations differ based on family age at diagnosis), individuals with a long history of inflammatory bowel disease, individuals with a diagnosis or suspicion of hereditary nonpolyposis colorectal cancer (HNPCC) syndrome or Lynch syndrome or familial adenomatous polyposis (FAP).[2,8,9]

The choice of screening examination is determined based on individual risk, individual preference, and access. In adults at moderate risk, screening should be initiated in individuals aged 50 years with options including digital rectal, FOBT or FIT every 1 year, flexible sigmoidoscopy every 5 years, colonoscopy every 10 years, double-contrast barium enema every 5 years, and CT colonography every 5 years. Screening recommendations for individuals at increased risk are divided into 3: (1) Patients with a history of polyps at previous colonoscopy, (2) Patients with CRC, and (3) Patients with a family history.[14] The management of CRC depends on cancer stage, histopathology, possible side effects, patient conditions, and preferences, and is multidisciplinary involving various specializations. There are various therapeutic modalities that can be chosen and adapted to the needs of each CRC patient. Endoscopic therapy is one of the modalities for treating colorectal polyps with polypectomy. Surgical therapy is performed in the majority of CRC patients. It is the main modality for early-stage CRC, which aims to remove malignant segments of the colon or rectum to surround lymph nodes, and also remove metastatic tissue. Another modality is systemic therapy, such as chemotherapy and biological therapy (targeted therapy), which uses drugs to kill cancer cells throughout the body. Chemotherapy is the modality of the first choice in advanced cancer. Biological therapy (targeted therapy) is a therapy using monoclonal antibodies that is growing rapidly and TRC is one type of cancer that benefits from the introduction of this therapy. In addition, there is radiotherapy which uses high-energy rays to kill cancer cells and is one of the main modalities of rectal cancer therapy.[16-18]

Despite developing many therapeutic modalities, the 5-year survival for patients with metastatic colon cancer remains very low, at just under 15%. In patients with early-stage cancer, the therapy has a curative purpose, while in patients with advanced cancer, the therapy has a palliative goal. In designing a colorectal patient management program, providing information and education about the disease and treatment steps, as well as complications that can occur, is important so that patients can be involved in making early decisions about their treatment options and be disciplined to follow the program that has been designed, including follow-up.[19-21] When we talk about education and colorectal cancer, we can discuss how education affects dietary patterns and healthy lifestyles to prevent colorectal cancer. In a German study, they identified a combination of lifestyle factors that appears to reduce the risk of CRC, regardless of the patient's genetic profile. These results reinforce the importance of primary prevention of CRC. Educated people know how to prevent and what kind of specialty doctors they have to visit when they face colorectal cancer.[22]

It is important to consider the study's potential limitations when interpreting the findings. First, because this was a cross-sectional study, it is impossible to establish a causal relationship between the various variables and CRC. Second, as with all similar surveys, the use of self-administered questionnaires to measure behavior and perceptions may leave room for the possibility that responses may be inaccurate or incomplete with people who may have different respondents. Due to the fact that the questionnaires had no missing data and the responses were self-reported in a private, anonymous setting, we are confident that these issues are minimal because the questionnaires had no missing data and the responses were self-reported in a private, anonymous setting. Thirdly, the response rate may constrain the sample's ability to be representative, and it's equally possible that a non-response bias exists among those

who do respond because they may possess traits that set them apart from those who did not. The low response rate might make the findings less generalizable even though it has no impact on the internal validity of the findings. With regard to the key socio-demographic traits, the respondents did not significantly differ from the population in the same area, so the results may be applied to a larger population.

5. Conclusion

There is an overall increase in the knowledge of respondents. Education provided to CRC patients effectively increases their knowledge, attitude, and behavior.

6. References

1. Wong MCS, Huang J, Lok V, Wang J, Fung F, Ding H, et al. Differences in incidence and mortality trends of colorectal cancer worldwide based on sex, age, and anatomic location. Clin Gastroenterol Hepatol. 2021; 19(5): 955-966.e61.
2. Xi Y, Xu P. Global colorectal cancer burden in 2020 and projections to 2040. Transl Oncol. 2021; 14(10): 101174.
3. Sawicki T, Ruszkowska M, Danielewicz A, Niedźwiedzka E, Arłukowicz T, Przybyłowicz KE. A review of colorectal cancer in terms of epidemiology, risk factors, development, symptoms and diagnosis. Cancers (Basel). 2021; 13(9): 2025.
4. Lukman K, Yuniasari L, Hernowo BS. Relationship between risk factors, microsatellite instability status, and P53 expression with colorectal adenocarcinoma carcinogenesis in Indonesians. Bandung Med J. 2012; 44(4): 245-52.
5. Bleyer A, Barr R, Hayes-Lattin B, Thomas D, Ellis C, Anderson B, et al. The distinctive biology of cancer in adolescents and young adults. Nat Rev Cancer. 2008; 8(4): 288-98.
6. Benson AB, Venook AP, Al-Hawary MM, Arain MA, Chen YJ, Ciombor KK, et al. Colon cancer, version 2.2021, NCCN clinical practice guidelines in oncology. J Natl Compr Canc Netw. 2021; 19(3): 329-59.
7. Florescu-Tenea RM, Kamal AM, Mitruț P, Ilie DS, Nicolaescu AC, Mogoanta L, et al. Colorectal cancer: an update on treatment options and future perspectives. Curr Health Sci J. 2019; 45(2): 134–41.
8. Jain V. 3D model of attitude. IJARMSS. 2014; 3(3): 1-12.
9. Alaqel MA, Alshammari SA, Alahmari SM, Alkhayal NK, Bin Traiki TA, Alhassan NS, et al. Community knowledge and Awareness of colorectal cancer and screening tools: Community-based survey of 1,912 residents of Riyadh. Ann Med Surg (Lond). 2021; 72: 103046
10. Christy SM, Sutton SK, Abdulla R, Boxtha C, Gonzalez P, Cousin L, et al. A multilevel, low literacy dual language intervention to promote colorectal cancer screening in community clinics in Florida: a randomized controlled trial. Prev Med. 2022; 158: 107021.
11. Song QF, Liu CE, Lv X, Wang JJ, Yin GX. Course and predictors of psychological distress among colorectal cancer survivors with ostomies: a longitudinal study. Eur J Oncol Nurs. 2022; 59: 102170.
12. Xi Y, Xu P. Global colorectal cancer burden in 2020 and projections to 2040. Transl Oncol. 2021; 14(10): 101174.
13. Sheikh-Wu SF, Anglade D, Gattamorta K, Xiao C, Downs CA. Positive psychology mediates the relationship between symptom frequency and quality of life among colorectal cancer survivors during acute cancer survivorship. Eur J Oncol Nurs. 2022; 58: 102136
14. Coyne C, Nene R, Brennan J, Castillo E, Vilke G. 373 cancer screening education in the emergency department: an interventional

study. Annals Emerg Med. 2021; 78(4S): S149–S150.

15. Jin Y, Zheng MC, Yang X, Chen TL, Zhang JE. Patient delay to diagnosis and its predictors among colorectal cancer patients: a cross-sectional study based on the Theory of Planned Behavior. Eur J Oncol Nurs. 2022; 60: 102174.
16. Finke I, Seppä K, Malila N, Jansen L, Brenner H, Pitkäniemi J. Educational inequalities and regional variation in colorectal cancer survival in Finland. Cancer Epidemiol. 2021; 70: 101858
17. Rawla P, Sunkara T, Barsouk A. Epidemiology of colorectal cancer: Incidence, mortality, survival, and risk factors. Prz Gastroenterol. 2019; 14(2): 89–103.
18. Shah SK, Nakagawa M, Lieblong BJ. Examining aspects of successful community-based programs promoting cancer screening uptake to reduce cancer health disparity: a systematic review. Prev Med. 2020; 141: 106242
19. Spector D. Optimizing cancer survivors' health: the role of lifestyle behaviors. J Nurse Pract. 2018; 14(4): 323-329.e1.
20. Darley A, Coughlan B, Furlong E. People with cancer and their family caregivers' personal experience of using supportive eHealth technology: a narrative review. Eur J Oncol Nurs. 2021; 54: 102030.
21. Althobaiti A, Jradi H. Knowledge, attitude, and perceived barriers regarding colorectal cancer screening practices and risk factors among medical students in Saudi Arabia. BMC Med Educ. 2019; 19(1): 421
22. Carr PR, Weigl K, Jansen L, Walter V, Erben V, Chang-Claude J, et al. Healthy lifestyle factors associated with lower risk of colorectal cancer irrespective of genetic risk. Gastroenterology. 2018; 155(6): 1805-15.