

# An investigation of efficient nursing interventions in early diagnosis of cancer: A systematic review and meta-analysis

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## ABSTRACT

**Background and Aims:** Due to the contradictory results of previous research and the lack of a specific study to address the effective nursing interventions in the early diagnosis of cancer, the purpose of this study was to determine the effect of nursing interventions on early diagnosis of cancer. **Methods:** This systematic review and meta-analysis were conducted during the last 5 years from 2015 to September 30, 2020. The articles related to the nursing interventions to early diagnosis of cancer were achieved from PubMed, Cochrane Library, Embase, ISI, Scopus databases, and Google and Google Scholar search engines. Risk-ratio with a 95% confidence interval (CI) between the intervention and control groups was determined using the fixed-effect model, and the Mantel-Haenszel method and I<sup>2</sup> showed the heterogeneity of studies. Stata V16 software was used for meta-analysis. **Results:** The effect of an intervention on early diagnosis of breast cancer was evaluated using mammography, clinical breast examination, and breast self-exam. A total of 300 individuals participated in the study. RR results in the intervention group showed the effectiveness of nursing interventions on breast cancer detected early in both the mammography and colonoscopy (RR, 1.18 95% CI 0.57, 1.79.  $P=0.00$  and RR, 0.58, 95% CI 0.42, 0.75,  $P=0.00$ , respectively). **Conclusion:** A variety of nursing interventions including education, consultation, patient guidance, and reminders can have a positive impact on the early detection of cancers.

**Keywords:** Breast cancer, colon cancer, nursing interventions

## Introduction

In recent years, cancer incidence and mortality are rapidly growing worldwide. According to the World Health

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Organization (WHO), cancer is the second leading cause of death in the world. Early detection is essential to control cancer. Current guidelines for screening methods include results from human papillomavirus (HPV) test, Pap smear, mastography for breast cancer diagnosis, colonoscopy, and fecal occult blood test (FOBT) to diagnose colon cancer, and LDCT to diagnose lung cancer. Early detection of cancer can reduce mortality by 20–60%. However, the early detection of cancer

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is still unsatisfactory.<sup>[1,2]</sup> According to the 2019 report of the American Cancer Society, only half of women 40 years and over have performed mammogram screening, and 32% of women between 34 and 40 years have received a Pap smear and HPV test in recent 5 years, while approximately 54% of people 45 years and over have screened for colon cancer. According to the reported statistics, overall participation in cancer screening is a major challenge, and this is especially of great importance in Iran. Countries have to incur high costs for cancer diagnosis, so they postpone cancer diagnosis to the final stages, which in turn negatively affects survival outcomes and imposes a heavy burden on health care systems.<sup>[3]</sup>

In health care systems, early diagnosis of cancer may be hindered by various factors such as poor knowledge, lack of knowledge almost screening strategies, fear of breast cancer screening, services, and tests unavailability. Nurses are responsible to deal with these hinders.<sup>[4,5]</sup> In Iran, nurses are among the most important members in the health care system who are trained to serve patients and maintain and develop public health. Another main task of nurses is health education to promote health and develop healthy behaviors. Hence, nurses are among the best staff to train patients and staff about cancer and its screening methods and early diagnosis.<sup>[6]</sup> WHO also emphasizes the important role of promoting nurses' performance in preventing and controlling noncommunicable diseases, which include cancer. The multifaceted role of nurses and nurse-led interventions ensure early detection of cancer.<sup>[1]</sup> Nurses play a leading role in nursing interventions and have independent decision making and authority in personalizing patient care. Nursing interventions can potentially help in the early detection of cancer through various procedures.<sup>[7,8]</sup> Primarily, nurses promote cancer awareness and understanding, its threat perceptions, and early diagnosis through counseling, educating, and providing information on cancer symptoms, risks, and screening methods. Second, nursing interventions can increase the opportunity for early detection of cancer through improving service accessibility.<sup>[5]</sup> As recommended by WHO on 2017, the awareness of symptoms and access to care are the primary steps in the breast cancer detected early. Various studies have shown the positive impacts of nursing interventions on early detection of cancer.<sup>[1]</sup> However, studies have shown contradictory results.<sup>[9,10]</sup> Various approaches (e.g., a phone call, face-to-face meeting, and text message), content, and sample size can affect the obtained results in different interventions.<sup>[11-14]</sup> Thus, consistent results are difficult to obtain. Some studies failed to find a direct association between nursing interventions and early detection of cancer.<sup>[15,16]</sup> Due to the contradictory results of previous research and the lack of a specific study to address the effective nursing interventions in the early diagnosis of cancer, the purpose of this study was to determine the effect of nursing interventions on early diagnosis of cancer.

## Methods

### Searching strategy

Present systematic review and meta-analysis were conducted amid the last 5 years from 2015 to September 30, 2020. The

articles regarding nursing interventions to early diagnosis of cancer were achieved from PubMed, Cochrane Library, Embase, ISI, Scopus databases, and Google and Google Scholar search engines. A systematic search of databases was performed using Persian keywords and their English equivalents with all possible combinations. The keywords used to search the databases included Education, Anatomy, Neoplasms, Cancer, Symptom Assessment, Incidence, Epidemiology, Mortality, risk factor, Directive Counseling, Methods, knowledge about early detection, Risk perception, Benefits transfer of willingness. The Persian keywords equivalent to these search terms were also used for a national search. In the present study, the PRISMA statement and the PICO strategy [Table 1] were used.<sup>[17]</sup> The inclusion criteria in this study were: randomized controlled trials (RCT) have been used, the effect of nursing intervention on nursing diagnosis has been investigated, and the complete results are reported. Studies without definite results and other study methods were excluded from the study.

### Data extraction and data analysis

The author's name, publication year, study type, cancer type, sample size, intervention type, intervention theory, intervention method, follow-up period, and outcomes were extracted from selected studies. The quality of randomized clinical trials was assessed using the Cochrane Collaboration tool.<sup>[18]</sup> A scaled score of 1 was allocated for high-quality studies, while a 0 score was dedicated to studies with low or unclear quality. The scale score was between 0 and 6. A higher score shows a higher quality of the study. Risk-ratio with a 95% confidence interval (CI) between the intervention and control groups was determined using the fixed-effect model, and the Mantel-Haenszel method and I<sup>2</sup> showed the heterogeneity of studies. Stata V16 software was used for meta-analysis.

## Results

A total of 83 articles were found in the initial search, of which 17 articles were excluded due to repetition and lack of full text. Next, 25 unrelated articles were excluded from the study after studying the title and abstract of the articles. After a thorough study of the remaining articles, 35 other articles were excluded from the study due to a lack of complete data and no RCT studies. Finally, six articles were used in this study [Figure 1]. Of these six studies, two studies examined the breast and cervical cancer early detection and four studies examined the early diagnosis of colon cancer. Table 2 shows the detailed characteristics of the studies.

**Table 1: PICO strategy**

PICO OR PECO strategy	Description
P=Participants	Participants: General risk or high-risk populations
I=Interventions	Intervention: Nursing interventions for early detection of cancer
C: Control	Control: Standard care without intervention
O: Outcome	Outcomes: effect of nursing interventions on breast and colon cancers

The effect of nursing interventions on early detection of breast cancer is shown in Figures 1-3. The effect of interventions on breast cancer early detection was evaluated using mammography (mastography), clinical breast examination (CBE), and breast self-examination (BSE). A total of 300 individuals participated in the study. RR results in the intervention group showed the effectiveness of nursing interventions on breast cancer early detection in both mammography (RR, 1.18 95% CI 0.57, 1.79.  $P = 0.00$ ; Figure 1) and CBE (RR, 1.32 95% CI 0.72, 1.92.  $P = 0.00$ ; Figure 2). The results of breast self-exam also showed the effectiveness of interventions in the early detection of breast cancer (RR, 0.54 95% CI 0.25, 0.84.  $P = 0.00$ ) [Figures 3 and 4].

The effect of nursing interventions on early detection of colorectal cancer is shown in Figures 5 and 6. The effect of the intervention on colorectal cancer early detection was evaluated using colonoscopy and FOBT. A total of 901 individuals participated in the study. RR results of colonoscopy in the intervention group showed the effectiveness of the nursing intervention in early diagnosis of breast cancer (RR, 0.58 95%

CI 0.42, 0.75.  $P = 0.00$ ; Figure 4). RR results further showed that various nursing interventions were effective in the early detection of breast cancer (RR, 0.58 95% CI 0.42, 0.75.  $P = 0.00$ ; Figure 5).

## Discussion

This was a systematic study and meta-analysis that examined the effect of nursing interventions on early diagnosis of cancer. A review of the six clinical trial studies showed that nursing interventions had a positive effect on early detection of cancer, knowledge and awareness about cancer, beliefs and breast cancer early detection, and precancerous lesions. Four types of nursing interventions classification with different components and characteristics were identified including education, patient appointment reminder, counseling, and patient surveying. Information on cancer, early detection, and the availability of services and education have been widely used in nursing interventions. WHO (2017) suggested that instruction can progress cancer awareness and barrier identification.<sup>[19]</sup> Numerous approaches have been used to remind the early detection behavior of cancer in clinical trial studies, and patient reminders have been widely reported in previous early cancer screening programs.<sup>[20,21]</sup> In nursing counseling, various methods are applied to remove barriers to early detection of cancer, such as evaluation, proper data, problem-solving, and inspiration. WHO also emphasizes the significance of counseling in directing patients on how and where to get to early conclusion services. Counseling is additionally utilized to progress cancer early detection.<sup>[22]</sup> Patient surveys

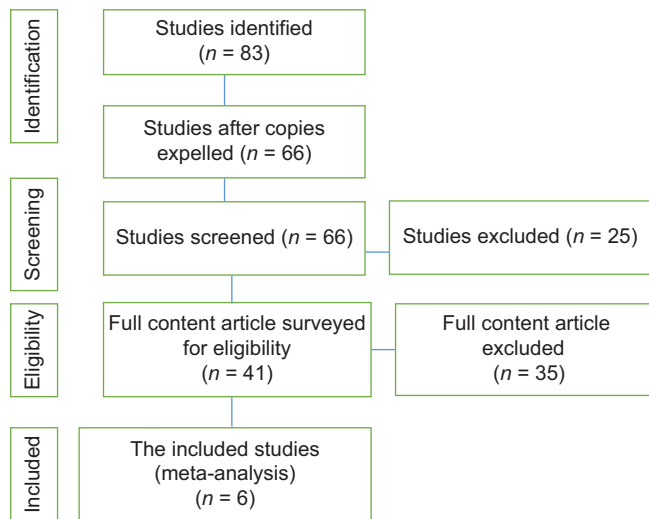


Figure 1: Steps for inclusion and selection of articles for meta-analysis

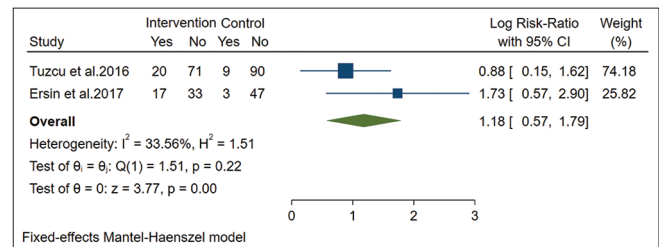
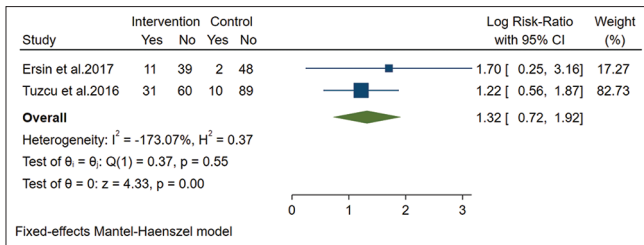


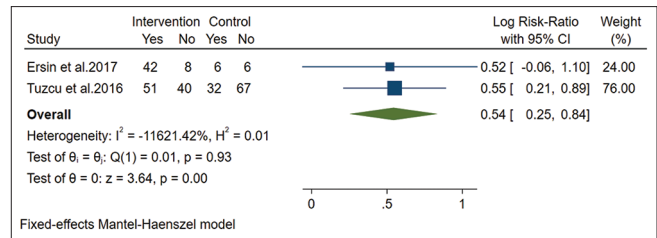
Figure 2: The effects of nursing interventions on the use of mammography to diagnose breast cancer

Table 2: Selected studies for systematic and meta-analytical review

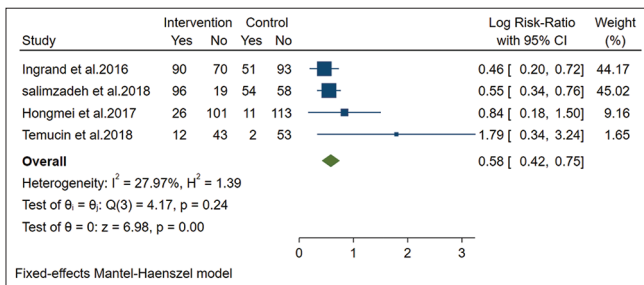
Author	Year of publication	Cancer type	Sample size	Follow-up period	Results and measurements		
					Early detection (method)	Early detection (knowledge)	Precancerous lesions and early-stage cancers
Salimzadeh et al. <sup>[19]</sup>	2018	Colon	115/112	6 months	Colonoscopy (medical history)	Knowledge about colorectal cancer risk and screening (SAQ)	Not specified
Temucin et al. <sup>[20]</sup>	2018	Colon	55/55	3-6 months	Colonoscopy and fecal occult blood test (medical history)	Perceived benefits and barriers to screening (BBS)	Not specified
Hongmei et al. <sup>[21]</sup>	2017	Colon	130/130	12 months	Colonoscopy	Knowledge of Colon cancer and screening beliefs (SAQ)	Not specified
Ersin et al. <sup>[11]</sup>	2017	Breast	50/50	just after intervention	BSE, CBE, mammography, and Pap smear (self-report)	Belief in early diagnosis of breast and cervical cancer (HBMS)	Not specified
Ingrand et al. <sup>[22]</sup>	2016	Colon	144/160	12 months	Colonoscopy	Not specified	Colonoscopy results: normal, non-malignant or adenoma
Tuzcu et al. <sup>[23]</sup>	2016	Breast	100/100	6 months	BSE test, CBE, mammography (self-report)	Health beliefs about breast cancer screening behaviors (CHBMS)	Not specified



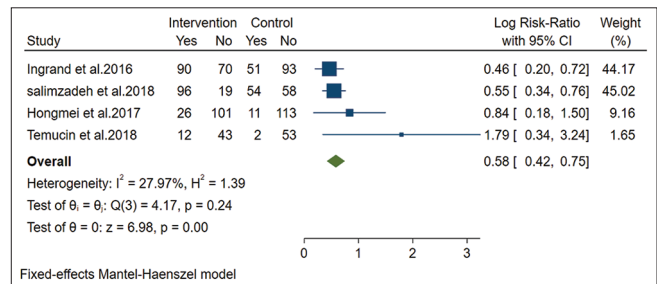
**Figure 3:** The effects of nursing interventions on the use of clinical trials to diagnose breast cancer



**Figure 4:** The effects of nursing interventions on the use of patient's self-exam in breast cancer diagnosis



**Figure 5:** The effects of nursing interventions on the use of colonoscopy to diagnose breast cancer



**Figure 6:** The effects of nursing interventions on the diagnosis of colon cancer

are also included in studies with a focus on various barriers affecting access to cancer early diagnosis services, particularly commonsense problems (screening, screening scheduling). A review of the studies showed that just one study providing specific training for navigators.<sup>[23-25]</sup> This gap should be addressed in future studies. Moreover, only one study<sup>[26]</sup> used social media as a presentation mode of intervention. Although only face-to-face or telephone interviews were applied in the included studies and the results showed that the effectiveness of these interventions, the use of social media may also be useful. This is consistent with the results of previous systematic studies.<sup>[27]</sup>

Among the studied articles, only one study investigated the effect of nursing interventions on cervical cancer that was not included in the meta-analysis. However, Table 2 shows that education combined with reminder interventions had positive effects on Pap smear testing by women. Previous studies also confirm this result.<sup>[2,28]</sup> The results of the present study also showed that nursing interventions can improve the use of colonoscopy. Studies show higher effectiveness of patient navigation compared to counseling. Patient navigation has been advocated as an innovative, barrier-focused intervention and uses a variety of methods to guide participants. Counseling can also reduce stress and fear of anomalous screening results. Variables such as knowledge and self-efficacy about cancer were not examined in the present study and are recommended for future studies. BSE is also effective in the early detection of breast cancer. Identifying cancer risk factors and ensuring proper screening tests are emphasized inpatient care for patients and reducing complications and mortality from cancer. Nursing interventions contribute to early diagnosis of cancer. Various nursing interventions as mentioned earlier can also be used with basic components. The use of patient education is recommended

in nursing interventions. Follow-up via virtual media and phone calls is also recommended. Counseling can also be used to motivate patients to perform screening.

## Conclusion

Various nursing interventions, including education, counseling, patient navigation, and reminders, can be used with a positive effect on the early detection of cancers. Increasing community knowledge about breast cancer, lung cancer, and colon cancer is of great importance. Future studies should examine the effect of nursing interventions on early diagnosis of other types of cancers and the long-term effects of interventions. The use of social media (interactive computer-mediated technologies) may also be an option for transmitting intervention data in future studies. It is necessary to establish reliable scales to Cancer Awareness Measure and beliefs about the early diagnosis of various cancers. Subsequent high-quality RCTs and validated target methods are encouraged to be considered in future studies.

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## Conflicts of interest

There are no conflicts of interest.

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