Developing Nurses' Performance Guidelines for Patients with Rectal Cancer Undergoing Radiotherapy

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Abstract

Background: Rectal cancer is one of the most common forms of cancer and one of the top cancer killers. One of the modalities treatment is radiotherapy that causes fewer side effects as fatigue, skin reactions, gastrointestinal disturbance, rectal bleeding and bladder irritation. Nurses play important role in providing care for rectal cancer patients treated by radiotherapy (pre, during and post) exposure to radiation. **Aim;** This study aimed to develop nurses` performance guidelines for patient with rectal cancer undergoing radiotherapy. This aim was achieved through the following: Assessing knowledge and practices of nurses caring for patients with rectal cancer undergoing radiotherapy & developing nurses` performance guidelines for patients with rectal cancer undergoing radiotherapy. **Design;** A descriptive explorative design was utilized for conduction of this study. **Setting;** The study was conducted at the Radiotherapy Department and Outpatients' Clinics for oncology at Qena University Hospital. **Study Subject;** A convenient sample of all available nurses (N=30). **Tools; I,** self-administered questionnaire**, II,** an observational checklists **Result**; 63.33% of the studied nurses had satisfactory total knowledge regarding rectal cancer and 60% of them had unsatisfactory of total practices regarding care of patients with rectal cancer undergoing radiotherapy. **Conclusion;** Nearly more than half of the studied nurses had satisfactory total knowledge and also more than half of them had unsatisfactory total practices regarding rectal cancer**.** There was no a statistical significant correlation between studied nurses of total score of knowledge and total score of practices. **Recommendations;** on-going and regular in-service educational programs regarding evidence-based guidelines should include care of rectal cancer patients before, during and after radiotherapy.

Keywords: Nurses' performance, Guidelines, Rectal Cancer, Radiotherapy.

Introduction

Rectal cancer is defined as tumors arising within 15 cm of the anal verge. While histologically similar to cancers occurring at other sites in the colon ***(Bray etal., 2018).*** Several risk factors have been implicated in rectal tumor genesis including genetic factor (familial adenomatous polyposis), family history of cancer, age over 50 years, environmental factors as diet, obesity, bad habits as (smoking and alcohol consume) ***(Nunez et al., 2017).***

Rectal cancer is one of one-third of all colorectal cancers and representing the cancer with the second highest incidence and the second cause of cancer death in the western society. Rectal cancer is treatable and curable if caught early. However, untreated rectal cancer can grow through the intestinal wall and spread to other parts of the body through the blood vessel or lymphatic system, such as to the liver and lungs, and become terminal ***(Glynne-Jones et al., 2017).***

Treatment for rectal cancer depends on the stage of the tumor specifically the size and location of the tumor in the rectum as well as the degree of metastasis. Stage 0: this very early cancer is found only in the innermost lining of the rectum wall, Stage I: the tumor has spread beyond the inner lining but remains within the rectum wall and has not spread to the lymph ***(Ivanova et al., 2017&Chiorean et al., 2020).***

Stage II: the cancer extends through the thick outer muscle layer of the rectum but has not spread to the lymph nodes, Stage III: the cancer has spread outside the rectum to one or more lymph nodes, Stage IV: the cancer has spread to

other parts of the body, such as the liver or lungs. The cancer may or may not be present in the lymph nodes ***(Ivanova et al., 2017 & Chiorean et al., 2020).***

Rectal cancer treatment often involves a combination of therapies. The treatment of choice for rectal cancer is surgery, in addition to other modalities such as chemo and radiotherapy (neo adjuvant therapy) that aims to prevent recurrence and palliate symptoms. If surgery does not remove all of the primary cancer and metastasis occurs, then other forms of treatment are necessary mainly drug therapy and radiotherapy (adjuvant therapy) that aims to preventing the growth of the cancer, or at least slowing the growth down (***Cheng et al,. 2018).***

Radiation treatment for rectal cancer is given by different methods as regards fractionation and total dose. Each dose that is delivered is termed a fraction. Radiotherapy causes fewer side effects as fatigue skin problems which can range from redness to blistering, rectal irritation which can cause diarrhea painful bowel movement, rectal bleeding bladder irritation***(Nam et al,. 2017).***

Nurses play important role in providing care for rectal cancer patients treated by radiotherapy (pre, during and post) exposure to radiation. This role consists of assessment, patient education, support and counseling and physical care. In recent years there has been increasing interest in the development of advanced practice nursing roles in this specialized area of oncology. Radiation oncology nurses need to be proactive in developing the knowledge and skills needed to meet the challenges of the future. Enhancing nurses' knowledge and practices help to prepare planned care plan that for improving patients' condition (***Shaukat et al., 2021).***

Nursing performance guidelines can effectively reduce postoperative complications in patients with rectal cancer, within which evidence based nursing (EBN) is a type of nursing model that has emerged in recent years with the main purpose of using the latest, best, and well founded scientific theories to provide care for patients ***(Guo et al., 2020).***

Significance of the study:

Rectal cancer continues to be one of the most common human malignancies, afflicting nearly one million individuals' worldwide every year.The incidence of rectal cancer in the European Union is 125 000 per year, .i.e. 35% of the total colorectal cancer incidence, reflecting 15–25 cases/100 000 population per year and is predicted to increase further in both genders ***(Glynne-Jones et al., 2018)***.

Colorectal cancer is the7th commonest cancer in Egypt, representing 3.47% of male cancers and 3% of female cancers. The estimated number of colorectal cancer patients in 2015 was more than three thousand ***(Metwally et al., 2018)*** According to the statistical records at at Qena University hospital , the total admission number of patients with cancer admitted to radiological department during 2020-2021 were 300 , 50 of them diagnosed with rectal cancer which representing16.66%.Therefore, developing nurses' performance guidelines for patients with rectal cancer undergoing radiotherapy are more important for improving quality of patients` care and decrease cost of treatment.

Aim of the Study

This study aimed to develop nurses` performance guidelines for patient with rectal cancer undergoing radiotherapy. This aim was achieved through the following:

- Assess knowledge and practices of nurses caring for patients with rectal cancer undergoing radiotherapy.
- Develop nurses` performance guidelines for patients with rectal cancer undergoing radiotherapy.

Research question:

The current study answered the following questions:

- What are the knowledge and practices of nurses caring for patients with rectal cancer undergoing radiotherapy?

Subjects and Methods

I. Technical design

Research design:

A descriptive exploratory research was utilized. It helps the investigator to describe and document aspects of a situation as it naturally occurs. As well, this design helps to establish a database for future research.

Research Setting:

The study was conducted at the radiotherapy department and outpatients' clinics for oncology at Qena University Hospital in Qena Governorate in Egypt.

Subjects:

A convenience sample that was composed of all available nurses (n= 30) nurses from previous mentioned setting. All nurses accepted to participate in this study are from both genders, with different ages, experiences, qualifications.

Tools for data collection:

Two tools were used for collecting data :

Tool I: Self-administered questionnaire:

It was developed by the researcher in simple Arabic language based on the extensive review of relevant and recent literatures ***(Bae et al., 2017; Dossa et al., 2017; Akinyemiju et al., 2018 & D'Souza et al., 2019).*** This tool was divided into 6 parts: -

The 1st Part: Include the nurses 'personnel (demographic characteristics data.

The 2nd Part: It was used to assess nurses' knowledge about anatomy and physiology of rectum (4 yes/ no questions)

The 3rd Part: It was used to assess nurses' knowledge about rectal cancer disease (32 yes / no questions): it included definition of rectal cancer disease (2 questions), stages of rectal cancer (1 question), risk factors for rectal cancer (9 questions), clinical manifestations of rectal cancer (9 questions), investigations and diagnostic studies (11 questions).

The 4th Part: It was used to assess nurses' knowledge of surgical management of rectal cancer (7 questions MCQ).

The 5th part: It was used to assess nurses' knowledge of radiotherapy for rectal cancer patients (17 yes/ no questions): it included (1question) about definition of radiotherapy, (4 questions) about uses of radiotherapy, (12 questions a) bout side effects of radiotherapy & (4 MCQ questions): it includes (1 question) about types of radiation and (3questions) about session of radiotherapy).

The 6th part: It was used to assess nurses' knowledge of nursing care of rectal cancer patients undergoing radiotherapy: (49 yes/no questions): it included nurses' knowledge regarding nursing care rectal cancer patients pre session of radiotherapy (9 questions), during session of radiotherapy (3 questions) and after radiotherapy treatment (37 questions).

❖ **Scoring system:**

Each question was given 1 for correct answer and 0 for incorrect answer, and total mark was113 degree. The total level of nurses' knowledge was categorized into satisfactory or unsatisfactory knowledge level according to statistically analysis as following:

- ≥ 70% was considered satisfactory (≥79 grades).
- < 70 % was considered unsatisfactory (< 79 grades).

Tool II: An observational checklist:

It was developed by the investigator from recent and relevant literatures from ***(O'Caoimh et al., 2017; Cercek et al., 2018; Cheng, et al., 2018; Smith et al., 2019; Pellino & Spinelli., 2020 &Van der valk, 2020).***

It was used to evaluate nurses' practices toward care of rectal cancer patients undergoing radiotherapy. (pre, during and post). It included 4 parts as following:

The 1th Part: Nursing care before radiotherapy treatment consist of 42 steps.

The 2nd Part: Nursing care during radiotherapy treatment consist of implementation (8 steps).

The 3rd Part: Nursing care after radiotherapy treatment consist of 43 steps:(general observation 2 steps, Discharge instructions for patients to manage side effects of radiotherapy44 steps that divided into (fatigue 3 steps, 8 steps about skin reaction or skin care, anorexia/nausea and vomiting 7 steps, diarrhea 4 steps, rectal bleeding 4 steps, sexual dysfunction 4 steps, anemia 2 steps, Infection control measures 5 steps) and Follow up(4 steps).

The 4th Part: Safety measures from radiation hazards consist of 7 steps.

❖ **Scoring system:**

This tool was consisted of 100 steps, each step was scored by one grade if done and was scored by zero grade if not done or incorrectly done, total mark 100 grades. A subtotal for nurses' practice was categorized into satisfactory or unsatisfactory practices according to statistically analysis as following:

- ≥ 70% was considered satisfactory (≥ 70grades).
- < 70 % was considered unsatisfactory (< 70grades).

II. Operational design:

It includes the preparatory phase, content validity, pilot study and field work.

Preparatory phase:

It included reviewing of related literatures and theoretical knowledge of various aspects of the study using books, articles, internet periodicals and magazines to develop tools for data collection.

- Pilot study

It was carried out on 20% of nurses (6) in hospital to test applicability, clarity and efficiency of the tools, and the time required for fill in, then the necessary modifications were done according to the results of pilot study, the study nurses who shared in the pilot study were included in the study sample.

- Validity and reliability:

Testing validity of the proposed tools by using face and content validity, Validity aimed to inspecting the items to determine whether the tools measure what supposed to measure and conducted to determine If the tool covers the aim .Validity was tested through a jury of (7)experts , (6) of them from critical- surgical nursing and medical - Surgical nursing department at Ain Shams University (2 professors, 3 assistant professors and one lecturer) and one assistant professor from General surgical and laparoscopic department from faculty of medicine at South Valley University. The expertise reviewed the tools for clarity, relevance, comprehensiveness, understanding and applicability, minor modifications were done.

Testing reliability of proposed tools was done statistically by alpha Cronbach test for the following:

As a general = 0.849
Questionnaire = 0.878
Observational checklist = 0.858

Field work:

Field work included: Data collection was started and completed within 4 months from (October 2020 up to the end January 2021). Data collected by investigator through four days per week at morning and afternoon shifts, it takes 12 hours (from 8 a.m to 8 p.m at rate 2 nurses at week) at radiological department and outpatient clinics for oncology at Qena university hospital.

Interviewing (30) nurses who providing care for patients with rectal cancer undergoing radiotherapy and explain the aim of the study then get their approval for participation in the study before any data collection.

Assessing nurses 'performance (knowledge and practices) regarding the care of rectal cancer patients undergoing radiotherapy by using self-administered questionnaire and observational checklist as following: Firstly, the researcher filled the observational checklist at the morning and afternoon shifts during clinical work. Nurses were observed while working, it took about 45-50 minutes, then self-administrated questionnaire was filled by the nurses at the morning and afternoon shifts, it took about 20-30 minutes.

Nurses' guidelines: Based on the previous nurses performance assessment, the

nurses 'guidelines were developed by investigator ***(Morris et al., 2017 & Fan et al., 2019).*** It consisted of 2 parts :**part1** knowledge related rectal cancer (definition, risk factors and manifestation of rectal cancer disease and uses , types and side effects of radiotherapy).**Part2** nursing care before , during and after radiotherapy . The researcher also considered safety measures for nursing staff from radiation hazards **(Garla et al., 2018)**.

III. Administrative Design:

An official letter was issued from faculty of nursing, Ain Shams University to the director of Qena University Hospital prior staring collection data to obtain their approval and assistance in conducting the study .Purpose of the study was explained to the head nurse manager of the hospital and head nurse of the department of the hospital under the study.

Ethical considerations:

Ethical approval was obtained from the scientific ethical committee of faculty of nursing, Ain Shams University. The purpose of the study was explained by simply manner for nurses and obtained written informed consent from each participant before data collection. They were given the right to withdraw from the study at any time without given any reason and they were assured that anonymity and confidentiality of information were protected. Ethics, values, culture and beliefs were respected.

IV. Statistical Design:

The collected data were organized, statistically analyzed and presented in tables and graph using the Statistical Program for Social Science (SPSS). Chi-square (x2) test of significance was used in order to compare proportions between qualitative parameters. Pearson's correlation coefficient (r) test was used to assess the degree of association between two sets of variables. The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following: Probability (P-value), P-value <0.05 was considered **significant**, P-value <0.001 was considered as **highly significant**, P-value >0.05 was considered **insignificant.**

Results:

Table (1): shows that the mean age of the studied nurses was 26.78±5.62, regarding gender 73.3% of them were female, regarding level of educational 70% of them had technical institute of nursing, regarding clinical experience 70% of them had experience <5 years, as well as training courses 86.7% of them didn't attend any training course.

Table (2): reveals that, 90 %, 56.67% of the studied nurses had satisfactory knowledge regarding nursing care for patients with rectal cancer and rectal cancer disease respectively. While 90 % of studied nurses had unsatisfactory knowledge regarding treatments of rectal cancer patients. In addition to 63.33% of studied nurses had satisfactory level of total knowledge regarding rectal cancer disease with mean number (41.07±11.09).

Figure (1): illustrates that, 63.33% of the studied nurses had satisfactory total level of knowledge regarding rectal cancer. While 36.67% of them had unsatisfactory total level of knowledge regarding rectal cancer.

Table (3): shows that, (80 % of the studied nurses had satisfactory practices regarding during radiotherapy treatment. While 80% of the studied nurses had unsatisfactory practices regarding safety measures for nursing staff from radiation hazards. In addition to 60% of studied nurses had unsatisfactory total level of practices regarding care of rectal cancer patients undergoing radiotherapy with mean number (13.66±3.69).

Figure (2): shows that, 40% of the studied nursing had satisfactory total level of practices regarding care of rectal cancer patients undergoing radiotherapy and 60% of them had unsatisfactory total level of practices regarding care of rectal cancer patients undergoing radiotherapy.

Table (4): shows that, there was a statistical significant relation between total level of knowledge of the studied nurses and their level of education and clinical of experiences at (p-value are 0.007^{*} and 0.024^{*}) respectively.

While, there was no significant relation with their age, gender and attending training courses about care of rectal cancer patients undergoing radiotherapy (P-value =0.613, 0.627 and 0.281) respectively.

Table (5): reveals that, there was a statistical significant relation between total level of practices of the studied nurses and their level of education, clinical of experience and training courses about care of rectal cancer patients undergoing radiotherapy (p-value = 0.007*,0.002* and 0.037*) respectively. While there was no significant relation with age and gender at (P-value = 0.613 and 0.627) respectively.

Table (6): reveals that there was no a statistical significant correlation between studied nurses of total score of knowledge and total score of practices with (r = -0.085 and P-value = 0.656).

Table (1): Distribution of studied nurses according to their demographic data (N=30).

Demographic data	No.	%
Age (years)		
20-<30 years	27	90.0
30-<40 years	3	10.0
Mean ±SD	26.78±5.62	
Gender		
Male	8	26.7
Female	22	73.3
Level of education		
Nursing Diploma	7	23.3
Technical health Institute	21	70.0
Bachelor of Nursing	2	6.7
Clinical experience		
<5 years	21	70.0
5-10 years	7	23.3
>10 years	2	6.7
Training Courses		
Yes	4	13.3
No	26	86.7

Table (2): Distribution of nurses' knowledge according to their total knowledge about rectal cancer (N=30).

Total Knowledge about Rectal cancer	Satisfactory		Unsatisfactory	
	No.	%	No.	%
Rectal cancer	17	56.67	13	43.33
Treatment of rectal cancer	3	10	27	90
Nursing care for patients with rectal cancer	27	90	3	10
Total Level of nurses' knowledge about rectal cancer (Scoring ≥70%)	19	63.33	11	36.67
Mean±SD	**41.07±11.09**		**15.47±4.18**	

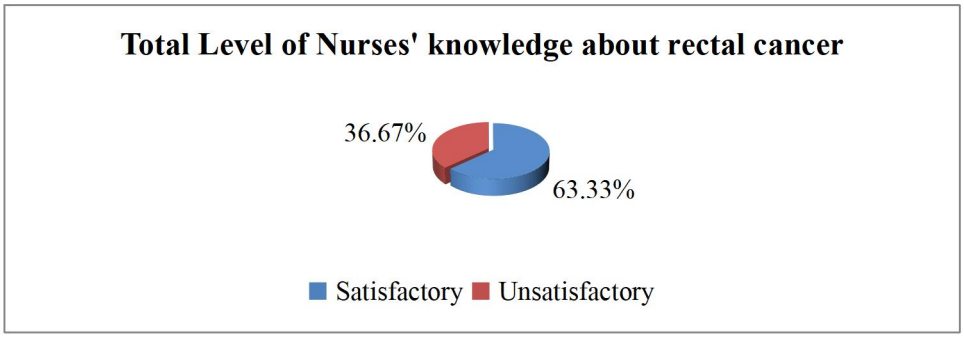

Figure (1): Percentage and distribution of nurses' knowledge according to their total level of knowledge about rectal cancer (N=30).

Table (3): Number and percentage distribution of studied nurses' practices level according to their care of rectal cancer patients undergoing radiotherapy (N=30).

Total Practices toward care of rectal cancer patients undergoing radiotherapy	Satisfactory		Unsatisfactory	
	No.	%	No.	%
A-Before radiotherapy treatment	11	36.67	19	63.33
B-During radiotherapy treatment	24	80	6	20
C-After radiotherapy treatment	11	36.67	19	63.33
D-Safety measures for nursing staff from radiation hazards	6	20	24	80
Total Level of Practices about rectal cancer (Scoring ≥70%)	**12(40%)**		**18(60%)**	
Mean ±SD	**40.66±10.98**		**13.66±3.69**	

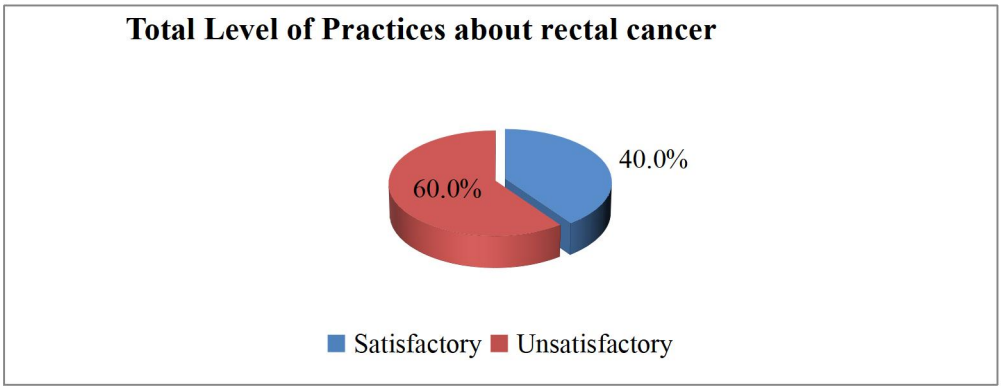

Figure (2): Percentage distribution of nurses according to their total level of practices regarding care of rectal cancer patients undergoing radiotherapy.

Table (4): Relation between nurses percentage score regarding knowledge about rectal cancer and their demographic data (n=30).

Demographic data	Total Percentage score of Nurses' knowledge				Test	p-value
	Satisfactory (n=19)		Unsatisfactory (n=11)			
	No.	%	No.	%		
Age (years)						
20-<30 years	18	94.7	9	81.8	0.255	0.613
30-<40 years	1	5.3	2	18.2		
Gender						
Male	4	21.1	4	36.4	0.236	0.627
Female	15	78.9	7	63.6		
Level of education						
Nursing Diploma	1	5.3	6	54.5		
Technical health institute	16	84.2	5	45.5	9.904	0.007*
Bachelor of Nursing	2	10.5	0	0.0		
Clinical experience						
<5 years	10	52.6	11	100.0		
5-10 years	7	36.8	0	0.0	7.444	0.024*
>10 years	2	10.5	0	0.0		
Training Courses						
Yes	4	21.1	0	0.0	1.161	0.281
No	15	78.9	11	100.0		

Using: Chi-square test
p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table (5): Relation between nurses percentage score regarding practices toward care of rectal cancer patients undergoing radiotherapy and their demographic data (n=30).

Demographic data	Total Percentage score of Nurses' Practices				Test	p-value
	Satisfactory (n=12)		Unsatisfactory (n=18)			
	No.	%	No.	%		
Age (years)						
20-<30 years	10	83.3	17	94.4	0.255	0.613
30-<40 years	2	16.7	1	5.6		
Gender						
Male	4	33.3	4	22.2	0.236	0.627
Female	8	66.7	14	77.8		
Level of education						
Nursing Diploma	1	8.3	6	33.3	9.904	0.007*
Technical health institute	9	75.0	12	66.7		
Bachelor of Nursing	2	16.7	0	0.0		
Clinical experience						
<5 years	4	33.3	17	94.4	12.937	0.002*
5-10 years	6	50.0	1	5.6		
>10 years	2	16.7	0	0.0		
Training Courses						
Yes	4	33.3	0	0.0	4.339	0.037*
No	8	66.7	18	100.0		

Using: Chi-square test **p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS**

Table (6): Correlation between nurses' total score of knowledge and total score of practices care of rectal cancer patients undergoing radiotherapy (n=30).

		Total score of Nurses' Practices regarding care of rectal cancer patients undergoing radiotherapy
Total score of nurses' knowledge regarding rectal cancer	***r***	**-0.085**
	p-value	**0.656**
	n	**30**

r-*Pearson Correlation Coefficient>0.05 NS*

Discussion

Regarding the study nurses' characteristics, the results of the present study revealed that about most of the study nurses' ages were between 20<30 years with mean age 26.78±5.62. This might explain that they are young age, this result might be due to establishment of faculty of nursing, technical institute of nursing and nursing diploma in Qena governorate are considered recent.

This result was similar with ***Tsuchihashi et al., (2018)*** who carried out a study entitled "Survey of Difficult Experiences of Nurses Caring for Patients Undergoing Radiation Therapy: An Analysis of Factors in Difficult Cases" and mentioned that there were majority of female nurses with mean age (25.4 ± 2.83).

This result was in disagreement with ***Anderson (2018)*** related to age but results agree with ***Anderson (2018)*** related to gender who carried out a study entitled "Educating Oncology Nurses on the Benefits of Patient Exercise in America" and mentioned that there were predominance of female with the mean age (36.71±12.02).

Related to gender, the present results showed that, less than three quarters of the studied nurses were females. This result might be due to the greater fraction of the nurse in Egypt was female and my also related to the studying of nursing in Egyptian university were exclusive for female only till few years ago.

This result was similar to ***Muliira et al.,*** (***2016)*** who carried out a study entitled "Barriers to Colorectal Cancer Screening in Primary Care Settings: Attitudes and Knowledge of Nurses and Physicians" and found that most of the nurses were female.

This result also was similar to ***Martin et al., (2020)*** who carried out a study on "A qualitative evaluation of the use of interventions to treat fatigue among cancer survivors: A healthcare provider's view" and found that three quarters of the nurses were female.

Concerning to educational level, the present study results indicated that, more than two thirds of the studied nurses graduated from technical Institute of nursing. This result might be due to the establishment faculty of nursing at Qena university was recently.

This result was in dissimilarity with ***Hu et al., (2021)*** who carried out a study on "Knowledge, attitudes, practices, and related factors of low anterior resection syndrome management among colorectal surgery nurses: a multicenter cross-sectional" and found that less than three quarters of the nurses had a Bachelor's degree.

Regarding years of experience, the current study showed that more than two thirds of the studied nurses had experience <5 years. This result might be due to more than two thirds of the studied nurses graduated from technical health institute recently. This finding was in disagreement with a study done by ***Toba et al., (2019)*** entitled "Nurses' knowledge, perceived barriers, and practices regarding cancer pain management in Palestine" and found that more than two thirds of studied nurses had experience<10 years.

The study results illustrated that; majority of the studied nurses didn't attend any training courses related to nursing care for rectal cancer patients undergoing radiotherapy. This

result might be due to increase workload in the clinical area. This result was similar with ***Tsuchihashi et al., (2018)*** who illustrated that majority of the studied nurses didn't attend any training courses.

Regarding nurses' knowledge according to their total level of knowledge about rectal cancer, the study results reported that more than half of the studied nurses had satisfactory total level of knowledge about rectal cancer with mean 41.07±11.09. This result might be due most of studied nurses were young age and more than two thirds of them graduated recently that reflect their good level of knowledge. Other reason was large number of patients that cared with by nurses that increase their information.

This result was in similar with ***Soliman et al., (2021)*** who mentioned that about majority of studied nurses had satisfactory total level of knowledge about colorectal cancer.

In relation to the studied nurses' total level of practices regarding care of patients with rectal cancer undergoing radiotherapy, the results showed that more than half of them had unsatisfactory level of practices. This result might be due to unavailability of educational program on nursing care of radiotherapy in colorectal cancer patients and lack of performance appraisal or key performance indicators (K.P.I). to detect training need assessment for every staff.

This result was in agreement with ***Shafiee et al., (2020)*** who mentioned that slightly about two thirds of the studied nurses had unsatisfactory level of practices regarding care of rectal cancer patients undergoing radiotherapy. This result was in agreement with ***Tsuchihashi et al., (2018)*** who illustrated that majority of the studied nurses had unsatisfactory level of practices regarding care of patients with rectal cancer undergoing radiotherapy.

The study results, illustrated that there was a statistical significant relation between total percentage score of knowledge of the studied nurses and the following variables (Clinical experience and level of education). While, there were no significant relation with their age, gender and attending training courses. From the investigator's point of view this result might be due to more than two thirds of the studied nurses had clinical experience <5 years and graduated recently from technical institute of nursing which led to good information gained as well as adequate of nurses' knowledge.

This result was in agreement with ***Slyne et al., (2017)*** who carried out a study entitled "Colorectal cancer screening: An educational intervention for nurse practitioners to increase screening awareness and participation in southern New Hampshire" and reported that there was a statistically significant relation between total score of nurses' knowledge and the following variables (Clinical experience and level of education). Also, mentioned that there was no significant relation between total percentage score of knowledge of the studied nurses' and age and gender.

As the same time this result was in disagreement with ***Slyne et al., (2017)*** who mentioned that there was relation between studied nurses' knowledge and their training courses.

The study results showed that there was a statistical significant relation between total percentage score of practices of the studied nurses and the following variables (Clinical experience, level of education and training courses).While, there was no significant relation between total percentage score of practices of the studied nurses' and age and gender. From the investigator's point of view this result might be due to lack of training courses regarding radiotherapy for rectal cancer and lack of work experience which affected on the practices level of the studied nurses.

This result was similar to a study done by ***Aboiralor (2019)*** who carried out a study entitled "Developing Staff Education Regarding Colorectal Cancer Screening Practice Guidelines in America" and mentioned that there was a statistically significant relation between total score of nurses' practice and the following variables (Clinical experience, level of education and training courses). Also, mentioned that there

was no significant relation between total percentage score of nurses' practices and age & gender.

The present study results, revealed that there was no a statistical significant correlation between studied nurses of total score of knowledge and total score of practices with (r = -0.085 and P-value >0.0656). this result might be due to most of them graduated recently and were young age that reflect their level of knowledge, understanding were good and also their ability to gain and remember information were quickly but at the same time lack of their clinical experiences, most of them didn't attend any training courses, work over load, shortage of staff nurses' number, nurses worked under big stress because of their care provided for all cancer patients who treated by chemo and radiotherapy at the same time and department all these reasons affected on their practices.

This result was in disagreement with a study done by ***Badawy et al., (2016)*** who mentioned that there was positive correlation between total score of knowledge of the studied nurses and their total score of practices. Also, this result was in the same line with ***Shafiee et al., (2020)*** who mentioned that there was no a statistical significant correlation between total score of knowledge of the studied nurses and their total score of practices.

Conclusion

Based on results of the current study it can be concluded that, more than half of the studied nurses had satisfactory total knowledge and more than half of them had unsatisfactory total practices regarding care of rectal cancer patients undergoing radiotherapy. There was no a statistical significant correlation between studied nurses of total scores of knowledge and total score of practices.

Nurses' performance guidelines for patients with rectal cancer undergoing radiotherapy were developed based on their educational needs assessment of their knowledge and practices through simplified comprehensive booklet.

Recommendations

Based upon the results of the current study the following recommendations suggested:

- On-going and regular in-service educational programs regarding evidence-based guidelines should include care of rectal cancer patients before, during and after radiotherapy
- Apply a comprehensive booklet that included nurses' performance guidelines for patients with rectal cancer undergoing radiotherapy that designed by investigator as **"Appendix IV & V".**
- Nurses should be updated on their knowledge continuously through attending seminars, workshops, lectures and reviewing researches.
- An orientation program for newly graduated nurses at radiotherapy and oncology department.
- Replication of the current study on large sample and different hospitals setting to be able to generalize the results.

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