

Nursing Care for Esophageal Cancer Patients Receiving Radiation Therapy in China: A Review of The Published Literature

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Introduction

The role of nursing care is especially significant for patients receiving radiation therapy for esophageal cancer. Esophageal cancer, including cancer arising from the gastro-esophageal junction, is a challenging disease worldwide. Recently statistics indicated that the crude incidence of esophageal cancer ranked fifth in all cancer sites with rate of 22.14/100,000 in Chinese population [1]. Radiotherapy has been widely used for treating esophageal cancer in hospitals for the past several decades in China. Complications in patients of esophageal cancer are major problems that occur during or after radiotherapy [2,3]. In spite of the variation in technologies and protocols in radiation therapy, the majority of patients will develop complications and the disease is terminal. Therefore, treatment is eventually palliative and the nurse plays a crucial role in the care of these individual. Nursing care for these patients is a very challenge task and requires a great amount of knowledge and skills patient care. Nursing research are necessary in many aspects including coordinating various support services, patient and family education, clinical assessment, nutritional management, management of side effects, and palliative care [4-17]. However, due to economic and cultural differences, nursing care and practice vary greatly in different regions and countries. Exchange and communication of the nursing research among different countries and cultures could enhance the improvement and standardization of nursing care protocols and systems, to improve the quality of patient life. These information from Chinese nursing research have not reached to abroad much because of the lacking of publications from Chinese nursing researchers.

There are differences in nursing care for cancer patients among hospitals in China [18,11-13,19]. Because of the difference in availability of equipment and knowledge of technology, there have been huge variations in the numbers of patients with radiation treatments, protocols for the treatments and nursing care among these hospitals. It has been reported that in China cancer patients' supportive care needs were not always fully provided by nurses, even when these needs were identified by healthcare professionals [20]. Nursing protocols and management vary greatly among hospitals. It is expected that these variations have been reduced in recent years due to economic development and improvement of conditions in the hospitals in China. However, reports in well respected nursing journals on the patient care for cancer patients from China is few.

There are few reports on the nursing care of Chinese patients with esophageal cancer in English journals. Searching PubMed with the key words "nursing, esophageal, radiotherapy, China" on July 15, 2014, we did not obtain any article. Using the key words "esophageal, nursing, China" we found 10 publications, while there were 636 publications with key words "esophagea, nursing" only. Thus, there are many reports on esophageal nursing but very few are from China. Then, we find that most articles on the nursing care of radiotherapy patients with esophageal cancer from Chinese hospitals have been published in Chinese journals, searching Wanfang data resource (Med.wanfangdat), CNKI (Chinese National Knowledge Infrastructure; www.cnki.net) and Sinomed (<http://sinomed.imicams.ac.cn/index.jsp>), with the key words "nursing, esophageal cancer, radiotherapy. We identified 107 publications in Chinese journals, and to share this information with the worldwide nursing care community, we have summarized and

translated into English the major objectives, methods, and results of these publications as well as names of the institutes where the research was done.

Aim of this Literature Review

In order to introduce the information of scientific reports on nursing care published in Chinese journal in the past several decades into the outside world. The follow objectives are designed for this review:

To collect Chinese literatures reporting the nursing care of radiotherapy patients with esophageal cancer from Chinese journals.

To provide the English summary of each of Chinese publications.

To summarize all the collected literature and provide the information.

Method

We first collected the copies of full papers of 107 publications on nursing care of radiotherapy patients with esophageal cancer from Chinese journals.

We then translated the title, author information, journal names, abstracts, methods, results, and conclusions into English. Finally, we divided them into different categories and described and summarized these literatures according to their contents.

Results

Publications of nursing care in China

For the purpose of comparison, we first searched the number of publications from China, India, UK, and USA. With the four sets of keywords "esophageal nursing China", "esophageal nursing India", "esophageal nursing UK", and "esophageal nursing USA", we found the numbers of publications in PubMed in China, India, UK, and USA are 10, 6, 13, and 131, respectively. Based on the data from WHO's annual World Health Statistics reports in 2012, The nursing staff in these four countries are 15.1, 10.0, 94.7 and 98.2 per 10,000 people. The population in 2012 in these countries are 1,390,000,000 1,240,000,000 62,783,000 and 318,000,000. The total numbers of nurses in these countries are approximately 2098900, 124000, 594555 and 3122760. Thus, the publication rate in international journals of English language of UK and US is at least four times more than that in India and China. The rate of publications in China and India is similar.

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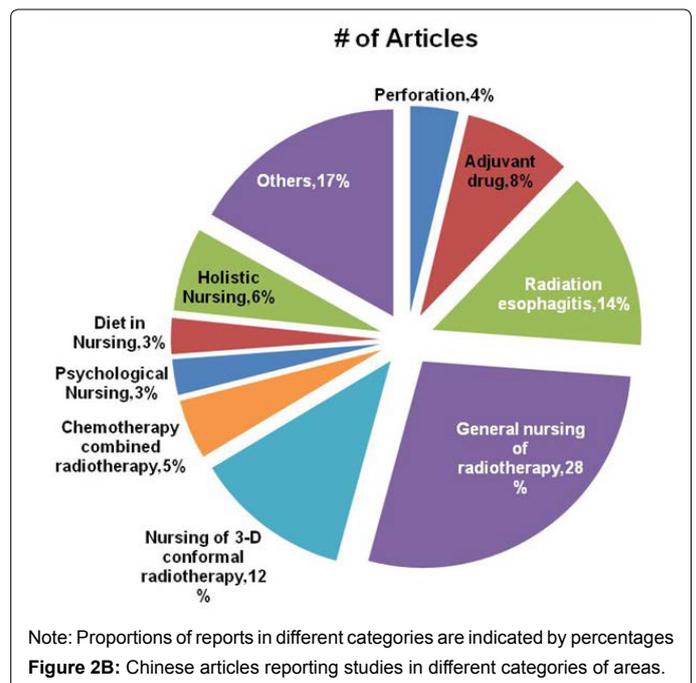
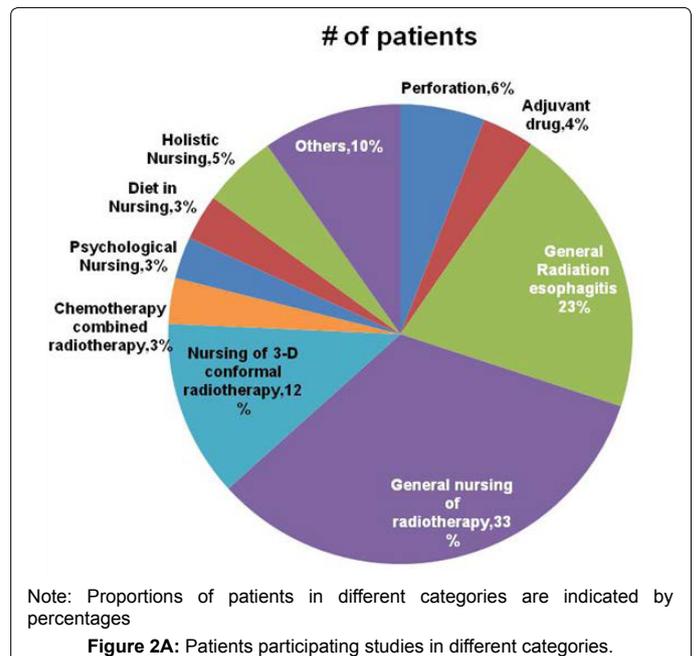
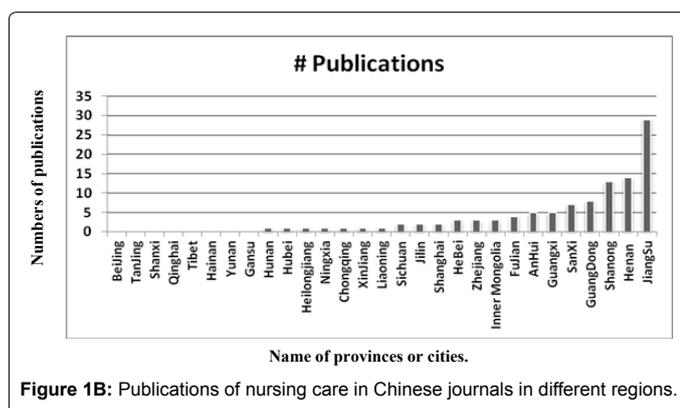
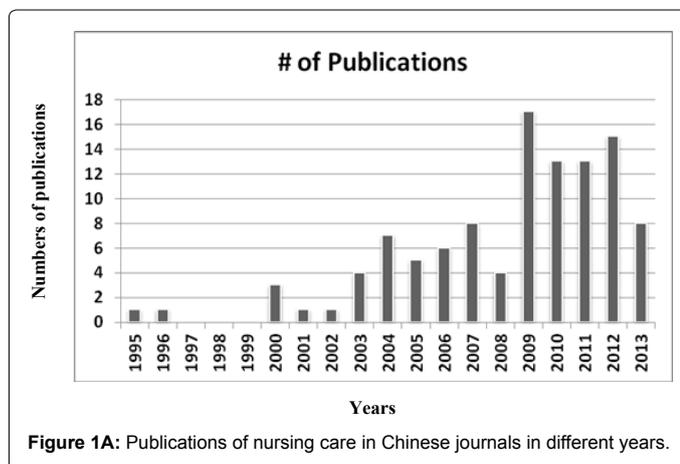
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Unlike India, whose journal language is mainly in English, China has journals in Chinese. Our searching indicated that there are 107 articles on esophageal nursing in Chinese journals. If we count these publications, the publication rate in China is even better than that in UK and in US. However, more than half of these publications in Chinese are descriptive, without careful experimental plans or controls or proper controls. We there conducted further analysis of these publications, for the references of none Chinese colleagues as information for their own research and collaboration.

Features of publications of nursing care in China

There is an unequal distribution of the numbers of publications among years and geographical regions. The 107 articles were published over a period of 19 years, from 1995 to 2013 (Figure 1A). Before 1995, there was no publication in China concerning the nursing care of patients with esophageal cancer (Figure 1A). Between 1995 and 2000, there were only two publications. In contrast, the number of publications has greatly increased in recent years. Interestingly, the number of publications in 2013 is less than that in previous years. One possible explanation is that studies are much stringently designed, therefore reports from these studies may have been submitted for publication in international journals. The other feature of these publications is that the publications are mainly from several provinces of a total of 29 provinces and cities of provincial levels in China. Majority publications are from Jiangsu, Henan, Shandong and Guangdong provinces (Figure 1B), where the economy has been growing rapidly.

And the amount of funding for hospitals and for research has been increasing rapidly in the past two decades. However, no matter how exceptions. One is that the number of publications from Zhejiang



province is surprisingly low, considering its top 6 economic status in China and its top 10 high-ranked medical schools and other academic institutions in the province. Another puzzling feature is the shortage of publications from Beijing, Tianjin and Shanghai, cities with the most highly respected medical universities and hospitals in China.

Categories of publications of nursing care of patients receiving radiation therapy for esophageal cancer in Chinese journals

Based on the nature of the reports, we divided these publications into 10 categories of patient care (Supplementary Tables S1-S10). Among the 107 reports, 55% are focused on three study areas (Figure 2A): the general nursing care of esophageal cancer patients undergoing standard radiotherapy; the nursing care of patients with esophagitis; and the

nursing care of patients undergoing treatment with three-dimensional conformal radiotherapy. About 45% of publications concerned patients with other specific treatments, such as psychological and nutritional counseling. Among 8880 patients who participated in these studies, about 70% were involved in studies in the three largest areas (Figure 2B).

These studies can be divided into 10 categories.

Category 1: Category # 1 includes publications for the care of patients with esophageal perforation. There are 4 such publications from 4 different institutes. At present, no report on the nursing care of patients with esophageal perforation has been published in an English journal. The earliest report in Chinese journal was in 1996 by the Cancer Prevention and Control Institute in Shandong Province [2]. It reported 21 patients to whom a nasogastric feeding tube was placed before radiation therapy. Authors concluded that the total effective (healing rate) rate was 71.9%. The First Hospital China Medical University in 2003 reported the nursing care of 443 patients with esophageal perforation, a large number of cases even in China [3]; however, the only information described in the report was the careful observation for changes in condition and the use of a reasonable diet to reduce the incidence of bleeding and perforation after radiotherapy. The other 2 more recent reports describe patient observation and care of esophageal-tracheal fistulas and concurrent perforation after radiotherapy (Supplementary Table S1).

Category 2: Category # 2 includes publications related to the nursing care for patients with esophageal cancer who received concurrent drug treatment along with radiation. There were 9 publications from 9 different institutes. The earliest report was in 2000 by The Hospital of Zhongshan Medical University [20]. It reported the use of zhenhuang capsules, a traditional Chinese medicine, combined with radiation, to treat esophageal cancer patients. Traditional Chinese medicine has become gradually accepted in the West countries, including its use for cancer patients [21]. In China, Chinese medicine plays an important role in minimizing disability, protecting cancer patients against suffering from complications, and helping patients to live well. Currently, this is the only report of combination of Chinese medicine with radiation for esophageal cancer. Patients in both experimental and control groups are treated with radiotherapy dose at 40 and 60 Gy. Results indicated that after treatment tumors size are reduced and quality of life are improved in both groups. However, efficacy from combination with traditional Chinese Medicine was much great; significantly differs from that of control group. The other 8 articles reported the use of Western intravenous and prescription of medications. Two reports described the care for patients treated with platinum chemotherapeutic drugs and the other 6 for nursing care of patients received various western drugs in combination with radiotherapy. At present, only one report on Chinese nursing care of patients who with adjuvant drugs combined with radiotherapy for esophageal cancer has been published in an English journal[22] (Supplementary Table S2).

Category: Category # 3 includes articles describing the clinical

care of patients with radioactive esophagitis. We found as many as 15 publications in Chinese journals from 14 different institutes; while no report has been found from an English journal. Esophagitis is the most common side effect during radiotherapy treatment of esophageal cancer. The Hospital of Quanzhou City in Fujian Province in 2007 reported nursing care for 387 patients with radioactive esophagitis [4]. The article reported one important aspect of the nursing care, the continuous improvement of the nursing work to help patients to fight their disease with positive and optimistic attitudes, which in some degree reduce the incidence of radiation esophagitis. The other noticeable report is from the Cancer Prevention and Control Institute in Shandong province in 2006 [5], which reported the comprehensive nursing intervention by applying a combination of an esophagitis mixture with Kangfuxin to patients. Both drugs are traditional Chinese medicines. Authors reported that the comprehensive nursing intervention with combination of these two drugs can effectively reduce the incidence of radiation esophagitis and relieve symptoms. The incidence of esophagitis in observation group was 27.7%, while the control group was 78.3%. The latest report was in 2013 by The People's Hospital of Jintan City in Jiangsu Province [6]. It reported a study with a total of 120 patients who were divided into two groups; one with nursing intervention and the other without as the control. All patients received 20, 40 and 60 Gy radiations during the treatment. The results indicated that at grade III-IV radioactive the rate of esophagitis was less frequent in intervention group than that in the control group. Other articles reported similar data on patient observation and care of esophagitis after radiotherapy (Supplementary Table S3).

Category 4: Category # 4 is the largest category which includes publications related to the general care of esophageal cancer patients who are receiving radiotherapy. This group contained 30 publications from 28 different institutes. The publication types were further divided into radiotherapy care (18 articles), observation care (3 articles), complication care (2 articles), nursing experience (6 articles), and nursing strategy (1 article). The earliest report was in 2000 by The Hospital Liuzhou City in Guangxi Province [7]. It reported nursing experience on patients who had complications of acute radiation esophagitis, esophageal perforation, ulcer bleeding, and radioactive pneumonia. Their data indicated that initially 22 cases out of 52 patients had radiotherapy complications. Through integrative nursing care and treatment, 1 case of perforation healed after a timely surgery; 1 case of bleeding was under control after active nursing care and treatment; of 18 cases of radioactive esophagitis, symptoms of 15 cases were improved under intensive nursing care, while efficacy in 3 cases were not obvious. The rest 2 cases of pneumonia were also improved under nursing care. The First Hospital Xinxiang Medical University in 2009 reported 420 cases in a controlled clinical study [8]. The observed group was under effective communication and psychological counseling. The observed group include 220 patients while the control group had 200 patients. The study indicated that the incidence rate of observed group of radioactive dermatitis was 26%, the control group was 48%; Radioactive esophagitis of observation group was 32%,

Countries	Nurses ¹	Population ²	Nurses ³	Publications (English)	Numbers ⁴	Publications (Chinese)	Numbers ⁵
China	15.1	1390000000	2098900	10	209890	117	17939.32
India	10	1240000000	1240000	6	206666.7	6	206666.7
UK	94.7	62783000	594555	13	45735	13	45735
US	98.2	318000000	3122760	131	23837.86	131	23837.86

Note: ¹ = Numbers for nurses per 10000; ² = Total numbers for different countries; ³ = Total numbers nurses for different countries; ⁴ = Numbers of nurses per publication in English; ⁵ = Numbers of nurses per publication in Chinese.

Table 1: Comparison of publication rates in four different countries.

control group was 60%. Another controlled clinical study from the Hospital of Lianshui County in Jiangsu Province reported nursing care for 79 cases [9]. We found no report on Chinese clinical nursing care of esophageal cancer patients undergoing radiotherapy published in an English journal (Supplementary Table S4).

Category 5: Category # 5 includes 13 publications, from 13 different institutions, related to the care of esophageal cancer patients who are receiving three-dimensional conformal radiotherapy. Most radiation centers in China are capable of performing basic three-dimensional conformal radiotherapy [18]. The earliest reports were in 2005 by the Tumor Hospital of Anyang City and the Peace Hospital of Changzhi Medical University [10]. This clinical study was a retrospective clinical report about the effect of nursing intervention on 62 patients receiving intensity-modulated radiation for esophageal cancer [11]. The authors in Tumor Prevention and Control Institution of Taian City divided 62 patients into two groups and found that the intervention group had a lower esophageal mucosa reaction rate than that in the control group. The latest report of late-course accelerated hyperfractionation radiotherapy was in 2013 by the Peace Hospital of Taixing City [12]. It reported nursing care of 84 patients with 73.8% of radioactive esophagitis, 21.4% of radioactive pneumonia, 16.7% of bone marrow inhibition, and 100% of radioactive dermatitis. At present, no report on Chinese clinical nursing care on esophageal cancer patients receiving three-dimensional conformal radiotherapy has been published in an English journal (Supplementary Table S5).

Category 6: Category # 6 contains 5 publications for the nursing care of patients receiving synchronous chemoradiation for esophageal cancer. No report on Chinese nursing care of esophageal cancer patients on concurrent chemoradiotherapy has been published in an English journal. One report in 2009 from the Hospital of Heze City in Shandong Province described the clinical care of patients with advanced esophageal cancer [13]. Eighty-five patients were divided into an hourly-treatment group and a normal procedure group with radiotherapy only; the treatment group was given intravenous chemotherapy drugs in a fixed point time by Chinese traditional theory of five elements, rooted the spirit of Chinese traditional culture. The authors concluded that in the treated group toxic reactions and side effects were significantly lower than that in the normal group. Infusion of an intravenous chemotherapy drug also is believed to improve a patient's overall well-being by amending organ function. The timing of the infusion of the intravenous chemotherapy drug may also perk up a patient's emotional and psychological state of health, leading to a better tolerance of cancer therapy. The other 4 more recent reports are also describe the care of esophageal cancer patients undergoing chemoradiotherapy (Supplementary Table S6).

Category 7: Category # 7 includes 3 articles from 3 institutions in recently years, reporting the psychological nursing of patients in esophageal cancer radiotherapy. China is experiencing a rapid growth in the aging population and in the cancer incidence. In the past, the focus of government health agencies were much on techniques and procedures of cancer treatment [18], while recently, the Chinese government has started to pay more attention to cancer prevention and cancer therapy rehabilitation. Two articles were clinical trials. One article on the psychological care was in 2013 by the Second Hospital of Shifang City in Sichuan Province [14]. It reported 144 patients who divided into interventional group and control group. Patients in the interventional group were given psychological care during radiation therapy. The authors concluded that quality of life, emotional function, physical function, cognitive function, role function and social function score in intervention group were significantly higher than that in

conventional group. The earliest report on the psychological care was in 2009 by the People's Hospital of Ganyu County in Jiangsu Province [15]. It reported 77 patients who were given psychological care during radiation therapy. The authors concluded that psychological nursing for patients of esophageal cancer with radical radiotherapy is very important for life quality. At present, no report on the Chinese curative effect of psychological nursing care for esophageal cancer radiotherapy has been published in an English journal (Supplementary Table S7).

Category 8: Category # 8 publications relate to the influence of a healthy diet on the life quality of patients with esophageal cancer. These reports included 3 publications from 3 different institutes. Cancer care is a complicated process that requires an enormous effort and resources from the government, cancer researchers, cancer treatment institutes, and healthcare workers. It is essential to advocate a healthy lifestyle and diet. Mould-infected foods, toxins produced by fungi, deficiency in minerals, genetic susceptibility, and the use of tobacco and alcohol all increase the risk for esophageal cancer. Unfortunately, the treatment diet and dietary guidance are far from meeting the basic needs of esophageal cancer patients before, during, and after radiotherapy. Only three articles reported the use of a reasonable diet to shorten the period of treatment, improve curative effect, and improve the cure rate and survival rate after radiotherapy. Currently, no article on a Chinese healthy diet as part of the nursing care of patients with esophageal cancer in radiotherapy has been published in an English journal. The earliest report in Chinese journal was in 2002 by the People's Hospital of Changzhi City [16]. It reported that after radiotherapy patients often are malnourished, with body weakness and weight loss. They concluded that if patients are given a planned diet after radiation, with an increase in various nutritional components, it can effectively prevent weight loss, enhance disease-resistant ability, and accelerate the rehabilitation of patients. Since 2006, no articles about diet as part of the nursing care of esophageal cancer patients to improve quality of life have been published (Supplementary Table S8).

Category 9: Category # 9 publications relate to the effect of holistic nursing on patients with esophageal cancer under radiotherapy. There were 7 publications from 7 different institutes. Holistic nursing is a nursing specialty focusing on the study of the integration of a person's mind, body, and spirit with their environment. Increasing the awareness of nursing care of cancer patients through educating the public has been become paramount. It is absolutely necessary for both the government and health institutes to enhance such practice. As an example, the concept and practice of terminal care have also been introduced into many families, healthcare institutes, and social welfare organizations. The government has also allowed use of narcotics for pain control for many terminal cancer patients. Nevertheless, there are still some unsolved issues with regard to holistic nursing for patients. No papers on Chinese holistic nursing care of patients with esophageal cancer in radiotherapy has been published in an English journal. The People's Tumor Hospital of Henan Province in 2012 reported 120 cases, the largest number of cases in holistic nursing care of esophageal cancer patients in radiotherapy [17]. The authors concluded that holistic nursing can reduce the occurrence of radioactive esophagitis. The other six reports are from 2010 to 2012 and describe the effect of holistic nursing on patients with esophageal cancer radiotherapy (Supplementary Table S9). Three of them are controlled clinical studies. These studies indicated that the rate of multiple complications for the holistic nursing group is significantly lower than that in normal group. Length of hospital stay in holistic nursing group is also lower than in the normal nursing group. Other three articles are clinical observation

research. The major conclusion from these studies is that patients' satisfaction in the holistic nursing group is greatly increased.

Category 10: Category #10 is the collection of reports on other aspects of patient care of esophageal cancer under radiotherapy. These reports include patient care for advanced esophageal cancer with local infiltration chemotherapy; nursing care of patients treated by inflatable metal stents combined with radiation therapy; nursing care of patient bleeding problems during radiotherapy; the effect of radiotherapy on left and right axillary temperature; nursing care of pain in patients with radiotherapy; nursing care of complications caused by radiotherapy; care of radiation in the esophageal cavity; care of patients with acute radiation reaction during radiotherapy; making patients feel comfortable by nursing care of patients with multiple obstructions; and how to reduce anxiety in patients by nursing care (Supplementary Table S10).

Discussion

Limitations of the review

We collected all the Chinese literature from Chinese webpages of publications. It is very possible that we miss the publications that are not included in the webpages. Because of large number of Chinese literature, 107 articles, we were not able to describe each of them. We described what we think are important. However, we might miss ones that are important to some readers.

Implications for nursing and health policy

It is very important to realize that, despite the progress of nursing studies, nursing research in China is still in the developing stage. Most reports used superficial data collection and observations. Even in very recent years, many publications lack a standard protocol and randomized design. Although the studies involve a wide range of topics and institutions, most report nursing care for traditional radiotherapy. It is also important that experience and practice of nursing should be exchanged internationally. Studies using standardized protocols and with ethical conduct regulations seem essential for the future.

Research implications

A very disappointing conclusion drawn from this review is the lack of attention to nursing care of patients with esophageal cancer in many well-known hospitals and institutes. Most of these published reports are from small local hospitals. Reports from highly respected hospitals and medical schools are very few. While many of these hospitals publish large quantities of data in basic and clinical research, they ironically did not publish much on nursing care. This fact may reflect the situation that traditionally nurses and nursing care are less respected in the medical system in China, not only in the government level but also in the public opinions. Hopefully this tradition will change along the development of economy and health care system in China.

Implications at the international level

We believe that future collaboration and communication with other countries is essential to conduct studies on nursing with international standardized protocols. Encouraging publications of Chinese nursing care in international journal is one of the important measures to improve the research and practice of patient care in China.

Conclusion

In summary, considerable research on the nursing care of esophageal cancer patients in radiotherapy has been done in various hospitals and

institutes in China. Most studies were done within last decade and many involved large numbers of patients with esophageal cancer. These studies provide valuable information and resources for future clinic trials of nursing care. This review provides an overall summary and necessary information for continued research and publications.

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Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

Author contributions

All authors designed experiments collected the data and analyzed data, contributed to manuscript preparation. All authors contribute to manuscript finalization.

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