World Cancer Research Journal WCRJ 2022; 9: e2434

CANCER PATIENTS AND TELENURSING INTERVENTIONS IN ITALY: A SYSTEMATIC REVIEW

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Abstract – *Objective:* *The use of digital technologies could improve patients' quality of care, satisfaction, and health-related outcomes in cancer patients. This paper aims to explore the use of digital technologies in nursing management of cancer patients in Italy.*

Patients and Methods: *A systematic literature review was performed. PubMed, Excerpta Medica dataBASE (Embase), Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Cochrane Library databases were consulted from September 1, 2021, to January 31, 2022. Key terms for Telenursing/Telemedicine and cancer in Italy were used. The quality of each study was assessed through the Grading of Recommendations, Assessment, Development, and Evaluations method.*

Results: *131 articles were found and 5 were included: two randomized-clinical-trial protocols aimed to explore the impact of medication management apps on patients' quality of life; one validation trial suggested good reliability in the therapeutic adherence of patients on chemotherapy but limited sensitivity in detecting related adverse events; two observational studies described the validation of telephone triage prehospitalization programs performed by nurses during the pandemic.*

Conclusions: *The use of digital technologies in nursing management of cancer patients is infrequent in Italy, however, increased during the pandemic. Further studies are needed to evaluate the impact and effectiveness of the use of digital technologies in nursing management in cancer patients.*

KEYWORDS: *Cancer, Italy, Nurse, Systematic Review, Telemedicine, Telenursing.*

INTRODUCTION

The global socio-demographic changes and the technical-scientific advances of the last decades led to a reduction in mortality from infectious diseases and an increase in mortality from non-communicable diseases (NCD), including cancer[1]. Reasonably, cancer-related incidence and mortality are increasing due to the growth and ageing of the population, as well as to destructive behaviours and lifestyles, increasing the risk of cancer (smoking, alcohol, nutrition, obesity, physical inactivity, and air pollution, among the main ones)[2,3]. The burden of cancer forces global health systems to find innovative and practical solutions to improve cancer patients' management, treatment, and outcomes, whether in the presence or remote care, through digital technologies and Information and Communications Technology (ICT)[4]. Generally, Telemedicine is a complex of technological tools, techniques, and services for remote assistance, exchange of information be-

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DOI: 10.32113/wcrj_202211_2434

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tween health professionals, and support for research and evaluation of care[5]. According to the World Health Organization (WHO), Telemedicine could improve quality of care by enhancing traditional healthcare[4], specially in cancer patients[6]. Despite the increased use of Telemedicine in response to the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) pandemic[7,8] its use in global health systems is varied.

Furthermore, there are few rigorous studies that are often carried out on small samples, even in oncology. According to the International Council of Nurses (ICN)[9], ICT allows nurses to enhance their activity through Telenursing interventions, improving self-care, access to care, patient satisfaction, reduction in time and the use of means and resources. Its use in chronic patients, particularly cancer patients, needs further development beyond telephone follow-up[10,11]. Symptom management and control[12,13] and educational programs issued by health professionals[6,14] are essential in cancer patients enhanced by Telenursing interventions[10]. In Italy, the use of these instruments is still limited[15,16]; however, this approach is perceived by this population as safe and effective, with a good impact on care and the relationship with healthcare professionals[17]. Some international studies investigated the spread of Telenursing interventions in the national context[18,19]. To our knowledge, no systematic reviews of the literature summarise the nursing contribution and the use of digital technology in cancer patients in Italy. This systematic review aims to overview Telenursing interventions in Italy for this fragile population.

PATIENTS AND METHODS

A systematic review was performed accordingly to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement[20] (Table 1). This review was not recorded, and no research protocol was written. Due to the nature of the study, no approval was requested from the Ethics Committee.

Data sources and search strategy

The research was conducted on PubMed, Embase (Excerpta Medica dataBASE), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Cochrane Library databases from September 1st, 2021, to January 31st, 2022. The search strategy adapted to the four databases was conducted with the support of two librarians (Table 2). Free words and MeSH (Medical Subject Headings) or Emtree terms were identified and combined with Boolean operators AND - OR after preliminary research on the principal terms used in the literature for Telenursing, Cancer and Italy. All records were imported into RefWorks® bibliographic management software.

Study selection

Two reviewers established eligibility criteria to identify related studies on the use of Telenursing interventions in cancer patients ≥ 18 years old in Italy. Specifically, quantitative (observational, experimental, quasi-experimental, cross-sectional, pilot studies and protocols) and qualitative studies in English using validated tools were included. Gray literature (clinical practice recommendations, case reports, conference papers, expert opinions, and more) and literature reviews (systematic reviews, scoping, narratives, and more) were excluded. Moreover, the references of the reviews and included articles were reviewed, looking for additional studies related to the research question. The exclusion criteria were as follows: studies conducted in countries other than Italy or populations other than cancer patients; studies on populations <18 years; publications with topics unrelated to Telenursing interventions, or authors' interventions other than nurses, or unknown.

Data extraction and quality assessment

After reading the title and abstract, irrelevant articles were excluded. The studies that met the inclusion criteria were subsequently analysed by reading the full text. Consensus on reviewer disagreements was resolved through comparison or the opinion of a third independent reviewer who supervised the study. No time limits have been applied to the research. For each included study, the information reported in Table 3 was collected.

RESULTS

One hundred thirty-one records were initially extracted from the databases. After eliminating 22 duplicates, 57 articles were excluded by reading their title and abstracts. Fifty-two records were analysed by reading the full texts, leading to the identification of three papers included in this review[21-23]. Following the evaluation of the references of the articles included in the review, two additional studies were deemed relevant and were included in this review[24,25] (Figure 1).

TABLE 1. Prisma checklist.

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	1-2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	2-3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	3
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	4
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	3-4
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Table 2
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	4
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	4
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	4-Table 3
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Table 3
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Not applicable
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Not applicable
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Table 3
			Not applicable
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	4 -Table 3
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Not applicable
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Not applicable
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Not applicable
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Not applicable
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Not applicable
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Not applicable

Continued

TABLE 1 *(CONTINUED)*. Prisma checklist.

Section and Topic	*Item #*	*Checklist item*	*Location where item is reported*
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	4-Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	4-5
Study characteristics	17	Cite each included study and present its characteristics.	4-7
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	5-Table 4
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Table 3
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Table 3-Table 4
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Not applicable
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Not applicable
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Not applicable
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Table 4
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Not applicable
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	7-8
	23b	Discuss any limitations of the evidence included in the review.	8
	23c	Discuss any limitations of the review processes used.	8
	23d	Discuss implications of the results for practice, policy, and future research.	9-10
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	3
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	3
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Not applicable
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	10-11
Competing interests	26	Declare any competing interests of review authors.	11
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	11

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021; 372: n71. doi: 10.1136/bmj.n71
For more information, visit: http://www.prisma-statement.org/

TABLE 2. Search strategy.

Predictor	Coefficient	Z (Wald)	p-value	OR	95% CI
PubMed					
(((Telenursing[Title/Abstract] OR telehealth[Title/Abstract] OR telemedicine[Title/Abstract]) OR ("Telemedicine"[Mesh] OR "Telenursing"[Mesh])) AND ((Tumor*[Title/Abstract] OR Tumour*[Title/Abstract] OR Neoplas*[Title/Abstract] OR Cancer*[Title/Abstract] OR Malignan*[Title/Abstract] OR Carcin*[Title/Abstract] OR Adenocarcinoma*[Title/Abstract]) OR ("Neoplasms"[Mesh]))) AND (("Italy"[Mesh]) OR (italy[Title/Abstract]))					
Embase					
('telenursing'/exp OR 'telemedicine'/exp OR telenursing:ti,ab OR 'tele nursing':ti,ab OR telemedicine:ti,ab OR 'tele medicine':ti,ab) AND (neoplasm*:ab,ti OR tumo*:ab,ti OR tumours:ab,ti OR cancer*:ti,ab OR carcinoma*:ab,ti OR adenocarcinoma*:ab,ti OR malignant:ab,ti OR 'neoplasm'/exp) AND ('italy'/exp OR 'italy':ti,ab) AND [embase]/lim NOT ([embase]/lim AND [medline]/lim)					
CINHAL					
(Tumor* OR Tumour* OR Neoplas* OR Cancer* OR Malignan* OR Carcin* OR Adenocarcinoma*) AND (Telenursing OR telehealth OR telemedicine) AND (italy OR ital*)					
Cochrane Library					
Tumor* OR Tumour* OR Neoplas* OR Cancer* OR Malignan* OR Carcin* OR Adenocarcinoma* in Title Abstract Keyword AND Telenursing OR telehealth OR telemedicine in Title Abstract Keyword AND "Italy" OR ital* in Title Abstract Keyword					

The quality of the included studies (Table 4) was assessed using the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) method[26].

Two studies were randomised controlled clinical trial (RCT) protocols[22,23] of remote monitoring via drug management application (app). Two were observational studies [21,24] on the effectiveness of telephone triage in containing the spread of the SARS-CoV-2 infection. The last was the validation trial[25] of the Passardi study protocol[22]. Both study protocols aim to assess the efficacy, usability, acceptability, and satisfaction of cancer treatment apps in symptom management. They also assessed the users' quality of life (QoL) and the impact on care needs. The validation study[25] customised the platform and assessed its impact, usability, and adverse events (AEs) management in 60 cancer patients receiving chemotherapy.

Multicentre RCT protocols

Ciani et al[23] aimed to enroll 120 patients with lung cancer to evaluate the impact of the drug management app "LuCApp" (Lung Cancer App, Milan, Italy), on the Health-Related QoL (HRQoL), from drug prescription to 12-24 weeks of follow-up. The improvement of HRQoL was assessed through a generic measure of health status based on preferences, EuroQol-5-Dimensions-5 Level[27] and anxiety and depression reported by users. The impact on care needs was assessed as a burden on the well-being of health professionals, caregivers and patients' care needs.

Passardi et al[22] aims to evaluate the impact of a remote monitoring system ONCO-TreC (CCC, Citizen Clinical Record, Trento, Italy) for home-based management of oral anticancer therapies on 80 cancer patients: 20 subjects in the first training phase and 60 in the validation one. The effectiveness of the "ONCO-TreC" will be related to recording information transcription, patient compliance and safety through Patient Reported Outcomes, healthcare-patient communication, anxiety levels, and quality of care perceived and provided. The electronic tools Functional Assessment of Cancer Therapy-General (FACT-G) [28] and Hospital Anxiety and Depression Scale (HADS) [29] were used at baseline, during the treatment, and at the end of the study. The impact on care needs will be assessed as shared pharmacological management, prevention of complications, and reduction of access in the Emergency Department.

Training-Validation Trial

Twenty patients from 3 hospitals in northern Italy were enrolled in this study[25] after the initial training phase on 20 patients. The study procedures are described in the protocol included in the review[22]. The authors reduced the population of the validation study from 60 to 20 subjects, considered a sufficient number for clinical validation of the platform. ONCO-TreC suggested good reliability in monitoring therapeutic adherence in more than 97 % of cases. The detection of the AEs grade estimated by patients, and controlled by nurses or doctors every 24-48 hours, underestimated the severity of AEs, especially for severe ones.

TABLE 3. Data extraction.

Authors	*Study design*	*Aim*	*Sampling*	*Timing intervention*	*Tools*	*Outcomes*	*Summary of main findings*	*Conclusions and implication for clinical practice*
Ciani et al[23] (2019)	Multicenter RCT protocol	To promote monitoring and early management of patients' symptoms and evaluate the usability, efficacy and cost-effectiveness of LuCApp vs. u.c	120 lung cancer patients assigned 1:1 to LuCApp in addition to u.c. vs. u.c.	Baseline assessment, daily symptom monitoring and patient-reported outcome measures every 3 ± 1 week and up to 24 weeks.	The Trial Outcome Index in the FACT-L questionnaire, the Lung Cancer Subscale, the EuroQoL 5D-5L questionnaire, the HADS, the SCNS SF34, the App modified CSUQ	Primary outcomes: HRQoL scores Secondary outcomes: Improved HRQoL, reduced anxiety and depression, impact on patients' cancer supportive care needs, on caregiver burden; cost-effectiveness, usability and user satisfaction	The LuCApp trial is still in progress. No preliminary data are available for usability, efficacy and cost-effectiveness.	The use of mobile devices and digital technologies could lead to improved symptom management, clinical practice and QoL of cancer patients.
Passardi et al[22] (2017)	Multicenter RCT protocol (qualitative and quantitative approach)	To optimize patient-clinician communication; home management and remote monitoring of oral chemotherapy, adherence, drug safety, QoL, anxiety, quality of care, usability and acceptability of Onco-TreC by patients and healthcare professionals	80 cancer patients treated with capecitabine or sunitinib: 20 patients in the training phase and 60 patients in the validation one	Face-to-face sessions at baseline, during and at the end of the study. Daily monitoring of patient reported outcomes. 6-12 weeks training validation phase	Semi-structured interviews, ECOG-Performance Status, CTCAE Version 4.03 Mobile diary App, Web dashboard, FACT-G, HADS, Italian version of the SUS	Therapeutic adherence, prevention of serious adverse events at home, impact on dose reduction, treatment interruptions, access to the ED, usability, acceptability.	This project could promote empowerment, patient self-efficacy, doctor-patient communication, sustainability and efficiency	Digital technology could have a meaningful impact on the accessibility and use of health services.
Fregatti et al[21] (2020)	Observational study	Validation of a pre-admission screening program for SARS-CoV-2 prevention and evaluation of emergencies and surgical priorities.	From March 9th to April 9th 2020: 91 breast cancer patients	Telephone triage at home prior to hospitalization for breast surgery; hospitalization, and post-discharge triage	Telephone triage for SARS-CoV-2 symptoms: checklist for fever, cough and respiratory symptoms.	85 patients (93.4 %) were deemed eligible for surgery and five patients (5.5 %) were temporarily excluded from the operative program for fever (n = 3) or hospitalization for SARS-CoV-2 infection (n = 2)	No hospitalization and no proven SARS-CoV-2 infection among patients and healthcare professionals. 93.4 % of patients underwent surgery without postoperative morbidity, readmissions and prolonged hospital stay	These screening measures are easily applicable in high-volume breast units, can support clinical decision making, reallocation of healthcare resources, prevent Covid-19 infections and contain delay in cancer care.

Continued

TABLE 3 *(CONTINUED).* Data extraction.

Authors	*Study design*	*Aim*	*Sampling*	*Timing intervention*	*Tools*	*Outcomes*	*Summary of main findings*	*Conclusions and implication for clinical practice*
Pertile et al[24] (2021)	Observational study	Validation of a pre-admission screening program for SARS-CoV-2 prevention and evaluation of surgical priorities	From March 9th to May 9th 2020: 25 colorectal cancer patients and third day after	Telephone triage was carried out 7 days before admission and on the first throat, shortness of discharge.	A screening flowchart for suspected SARS-CoV-2 symptoms: fever, cough, sore for SARS-CoV-2, breath and other respiratory symptoms.	All 25 patients were deemed eligible for admission. One patient tested positive minimized and no two weeks after hospital admission. The median hospitalization was 7.8 days	25 patients underwent safe colorectal surgery, hospitali-zation times were contexts, avoiding spread of SARS-CoV-2 infections between healthcare professionals and patients.	Telephone triage could be useful in preventing SARS-CoV-2 contagion also in other surgical delays in treatments
Passardi et al[25] (2022)	Phase II trial	ONCO-TreC platform validation study: to customize the platform and evaluate its ability to facilitate the management of oral chemotherapies, the usability and acceptability by patients and healthcare	treated with TKIs: 20 patients in the training phase and 40 patients in the validation one patient reported out-comes. 6-12 weeks training phase. 24 weeks validation phase	Face-to-face education sessions at baseline, during and at the end of the study. Daily monitoring of App, Web dashboard, FACT-G, HADS, Italian version of the SUS questionnaire	Semi-structured interviews, ECOG-Performance Status, CTCAE Version 4.03 Mobile diary interruptions, access to the ED, usability, acceptability.	Therapeutic adherence, prevention of serious adverse events at home, impact on dose reduction, treatment and clinicians of 97.3 % (95 % CI 86.1 % - 99.9 %). Patients undere-stimated their AEs	38 patients (95 %) were assessed for treatment adherence, with a concordance between the platform Its reliability in detecting AEs could be improved. compared to clinicians: 60 % of grade 3; 54 % of grade 2; and 19 % of grade 1. 94 % (33/35) of patients utilized ≥ 1 time the App each week, with 2 the median accesses/patient, and 71 % (27/38) and 68 % (26/38) of patients sent messages and registered vital sign through the App	ONCO-TreC is a useful, usable and acceptable tool for measuring and monitoring adherence to oral anticancer drugs.

RCT: Randomised Controlled Trial; u.c.: usual care;FACT-L: Functional Assessment of Cancer Ther apy-Lung; QoL: Quality of Life; HADS: Hospital Anxiety and Depression Scale; SCNS SF34: Supportive Care Needs Survey Short Form; App: Application; ED: Emergency Department;
CSUQ: Computer System Usability Questionnaire; HRQoL: Health Related Quality of Life; ECOG: Eastern Cooperative Oncology Group; CTCAE: Common Terminology Criteria for Adverse Events; FACT-G: Functional Assessment of Cancer Therapy-General; TKI: Tyrosine Kinase Inhibitors.

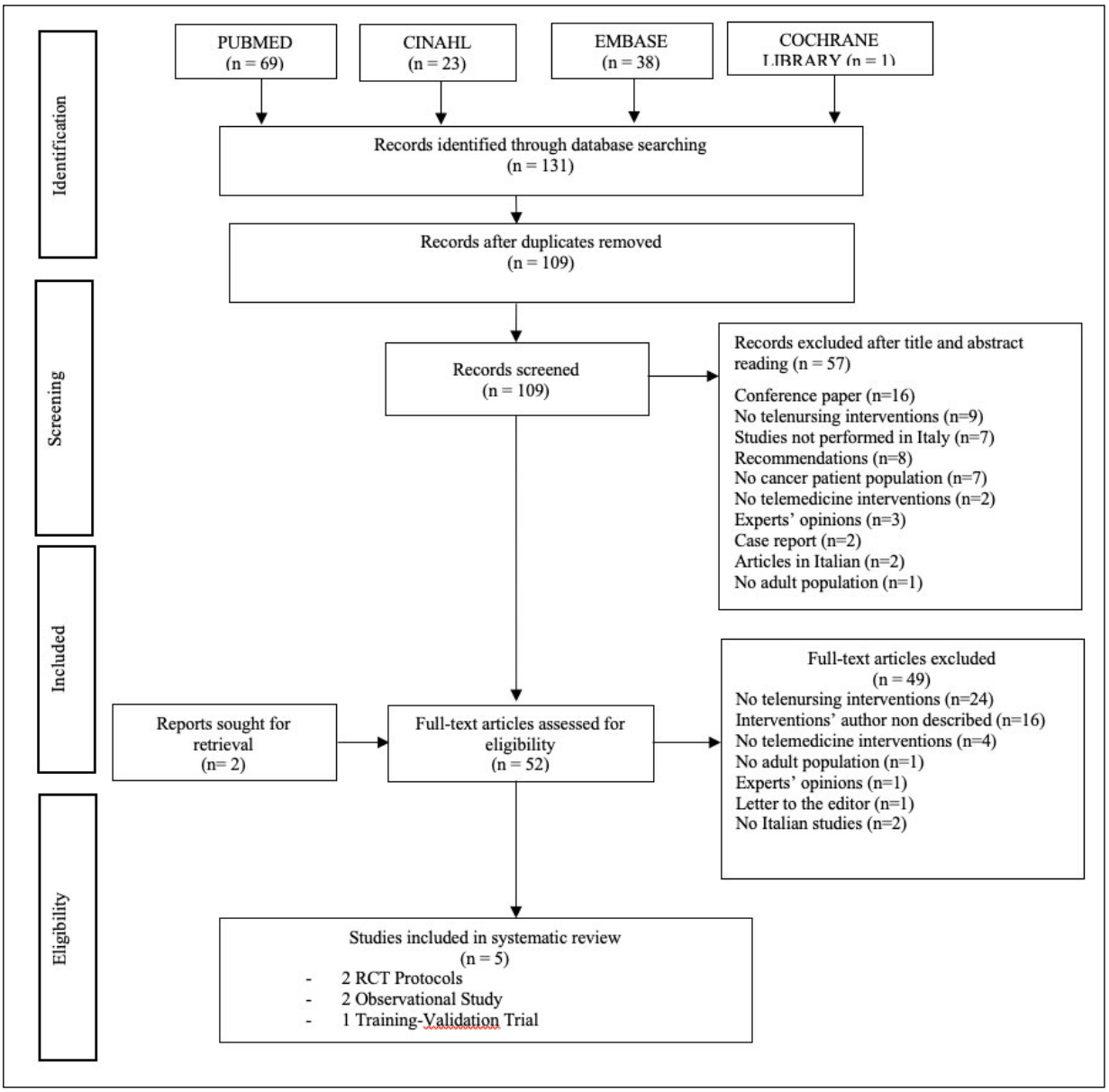

Fig. 1. Screening process.

Approximately 70% of patients entered ≥ 1 parameter in the system, mainly blood pressure, and used the app to send messages to clinicians. The system also triggered alarms for ≥ 3-day missing data and severe AEs, with a median clinicians' response time of two days.

Observational studies

Two observational studies were conducted[21,24] to evaluate the priorities of surgical procedures in cancer patients and the effectiveness of preoperative screening programs in containing the spread of SARS-CoV-2 infection.

Fregatti et al[21] validated a pre-hospitalisation screening program for SARS-CoV-2 infection on 91 breast cancer patients. Telephone triage allowed nurses to identify 85 patients deemed suitable for surgery and to refer five (5.5 %) for fever or SARS-CoV-2 infection.

Pertile et al[24] evaluated a pre-hospitalisation screening program to limit exposure to SARS-CoV-2 infection in 25 patients with colorectal cancer. A general surgery and oncology nurse carried out the telephone triage seven days before admission (assessing fever, cough, and dyspnoea) and on the first- and third-day following discharge to assess symptoms (body temperature, pain, physiological functions, and more) and clinical status.

TABLE 4. Quality assessment using GRADE methods.

Certainty assessment								
Authors (year)	***Title***	***Study design***	***Risk of bias***	***Inconsistency***	***Indirectness***	***Imprecision***	***Other considerations***	***Certainty***
Ciani et al[23] (2019)	Lung Cancer App (LuCApp) Study Protocol: A Randomised Controlled Trial to Evaluate a Mobile Supportive Care App for Patients with Metastatic Lung Cancer	RCT protocol	not serious	not serious	not serious	not serious	none	⊕⊕◯◯ LOW
Passardi et al[22] (2017)	Optimisation and Validation of a Remote Monitoring System (Onco-TreC) for Home-Based Management of Oral Anticancer Therapies: An Italian Multicentre Feasibility Study	RCT protocol	serious	not serious	not serious	not serious	None	⊕◯◯◯ VERY LOW
Fregatti et al[21] (2020)	Breast Cancer Surgery during the COVID-19 Pandemic: An Observational Clinical Study of the Breast Surgery Clinic at Ospedale Policlinico San Martino - Genoa, Italy.	Observational study	not serious	not serious	serious	not serious	none	⊕◯◯◯ VERY LOW
Pertile et al[24] (2021)	Colorectal Cancer Surgery during the COVID-19 Pandemic: A Single Center Experience	Observational study	not serious	not serious	serious	serious	none	⊕◯◯◯ VERY LOW
Passardi et al[25] (2022)	A Remote Monitoring System to Optimize the Home Management of Oral Anticancer Therapies (ONCO-TreC): Prospective Training-Validation Trial	Phase II trial	serious	not serious	not serious	not serious	none	⊕⊕◯◯ LOW

RCT: Randomised Controlled Trial.

All 25 patients were considered fit for admission, and only one was positive for SARS-CoV-2 two weeks after discharge.

DISCUSSION

This systematic review on Telenursing interventions for cancer patients in Italy described the low use of digital tools in this country. The heterogeneity by study design and kind of cancer did not allow for a meta-analysis. Most of the 131 Italian records initially identified were related to a recent period in response to the pandemic[7], but few structured studies would have been conducted[21,24,25]. However, mainly, they involved triage and telephone consultation in pre-hospitalisation to decrease the spread of SARS-CoV-2 infection among healthcare professionals and surgery patients. Only one validation trial was conducted[25], but the authors arbitrarily reduced the short sample from 60 to 20 patients; unlike the protocol, the nursing intervention is not clarified. Furthermore, the system shows weak efficacy in the detection of AEs. Observational studies[21,24] showed homogeneous results: preoperative nursing telephone triage significantly reduced the risk of SARS-CoV-2 infection in surgical cancer patients and healthcare professionals, limited hospitalisation and overload of the healthcare system. The average hospital stay was, in fact, almost only one day longer than in the pre-pandemic era, and it was mainly due to specific preventive measures necessary before the patients' hospitalisation[24]. During the pandemic, the pilot study by Buttiron Webber et al[30] also used nursing telephone triage to identify SARS-CoV-2 infections, reduce patient hospital admissions and send chemotherapy administration back to the home. However, it was deemed to be of low quality and excluded from the review because it used non-validated tools to measure patient satisfaction. Pre-hospital screening measures and apps for remote support and care, could be successfully transferred to other oncological settings, avoiding delays in cancer treatments, supporting the decision-making process of healthcare professionals and the reallocation of healthcare resources[31]. Nevertheless, the screening process revealed that nurses are often involved in telemedicine interventions, but their contribution is unclear[32,33]. Many authors were physicians in the 131 records initially included in the review. Therefore, it could be supposed a lack of specific reference to nursing interventions. In this regard, in the study by Tiozzo et al[34], a nurse team developed an app for pain management, and the intervention and nursing contribution were described in detail. However, this observational study was excluded because it was primarily for paediatric cancer patients, (< 18 years) and the results for the adult population were indeed reported in the age group 13-21 years old. The study by Galligioni et al[35] described the effectiveness of a safe therapy mobile system for administering intravenous and oral chemotherapy. The tool monitors the patient-nurse-drug sequence to trace the drug administration process and promote safety. The Telenursing intervention is detailed and effective; however, it analysed nursing satisfaction with the usability and acceptability of the system. Further studies are needed to assess the implementation and evaluation of Telenursing interventions on the promotion of safety, satisfaction in use by cancer patients, and the impact on their QoL.

Limits

Three studies included in this systematic review represent limited Italian experiences developed during the SARS-CoV-2 pandemic[21,24,25] and two RCT protocols with unavailable results[22,23]. The authors further reduced the population of the validation trial[25] in the validation phase compared to the original protocol[22]. The clinical and methodological heterogeneity of the studies did not allow for a meta-analysis. Observational studies reported possible biases relating to any false statements by patients during telephone triage, which could have altered the results. Moreover, the quality of all studies assessed using the GRADE methodology is significantly low; the results refer only to some types of cancer (breast, colorectal, and lung) and a few Italian centers.

Take-home message

According to our opinion, even if Telemedicine and ICT have a great potential, particularly in managing cancer and chronic diseases in general, they should not completely replace traditional practice but improve it and enhance its results, especially in terms of communication, quality and safety of care[36,38]. Telenursing interventions aimed at reaching remote populations[39], strengthening nursing activities with remote interventions that should currently be in addition to and not in the place of the usual care to safeguard the essential health-patient relationship. The use of technologies for care improvement represents a challenge that Italian nurses are already demonstrating to adhere to and to which they can make a significant contribution.

Relevance for clinical practice and research

In Italy, there is a lack of Telenursing interventions for the increasing needs of cancer patients who achieved a five years-survival from diagnosis, 63 % for women and 54 % for men[40]. Their application is uneven and mainly concerned in northern Italy, mainly for the spread control of the SARS-CoV-2 pandemic[21,24]. Many Italian health facilities reduced hospital access during the pandemic by adopting protocols with virus containment measures, (isolation, masks, and more) including telephone triage managed by nurses. However often no data has been provided on the effects of these efforts[41]. In cancer patients, the Italian validation trial[25] confirmed the efficacy of remote monitoring in improving therapeutic adherence, usability and patient acceptability but suggested the need to improve reliability in detecting AEs. The use of Telenursing in cancer patients in other countries is more widespread[11,42], especially in United States[18,43]. A 2018 meta-analysis[43] investigated the effect of telephone interventions on symptoms and HRQoL in breast cancer patients and survivors, positively impacting patients' depression, fatigue, and symptoms. Nursing telephone interventions promote the self-management of cancer patients' symptoms[42], especially depression, anxiety, emotional distress, and fatigue. Moreover, some telephone interventions are more effective when combined with traditional visits and the supply of paper or digital support material. These results could highlight the essential importance of the traditional healthcare-patient relationship. In our opinion, Telenursing interventions should perform a support function for the provided care. It can simplify and improve access to care and rationalise healthcare costs and resources[42] without replacing the helping relationship, the "core" of nursing care. Despite the scarce Italian experience in oncological Telenursing interventions, a growing trend has emerged in this sector. Two multicentre RCT protocols and one validation trial aim to evaluate the application of symptom management systems in cancer patients undergoing chronic drug treatment: "LuCApp"[23] and "Onco-Trec"[22,25]. Farther, the extension of digital technology to the Italian Health System could favour efficient solutions and promote patient empowerment, accessibility to health services, and health-patient and interprofessional communication.

CONCLUSIONS

The pandemic has increased Telenursing interventions in Italy. The studies included in this review suggested that Telenursing interventions may have a positive impact on containing SARS-CoV-2 infection in surgery cancer patients[21,24] and monitoring for treatment-related Aes[25]. However, the available data is still limited, of low quality, mainly focused on nursing telephone triage and did not allow definitive conclusions regarding efficacy, usability, and patient satisfaction. Rigorous future studies may allow for a better assessment of the impact of Telenursing interventions on the effectiveness, safety, satisfaction, QoL, and quality of care of Italian cancer patients. Indeed, nursing interventions could positively impact the assistance, involving patients in the care pathway, improving communication between professionals, care teams and patients, quality, and safety of care[36].

Author contributions:
Aurora De Leo: Conceptualization, Methodology, Writing - original draft, Writing - review & editing. Gloria Liquori: Writing - original draft and data acquisition. Chiara Iemulo: Data acquisition and interpretation. Sara Dionisi: Methodology and Software. Noemi Giannetta: Methodology, Data analysis and Validation. Alessandro Spano: Data analysis. Valerio Ragnoli: Data acquisition. Fabrizio Petrone: Project administration. Marco Di Muzio: Validation, Project administration and Supervision. Emanuele Di Simone: Conceptualization, Visualization and Supervision. The authors read, revised and agreed with the final version of the manuscript.

Acknowledgements:
A special thanks to the librarians of the Digital Library-Center of Knowledge "R. Maceratini", National Cancer Institute" Regina Elena ", Dr Francesca Servoli and Dr Virginia Scarinci for their invaluable support in the implementation phase of the research strategy.

Funding:
None

Ethics approval and consent to participate:
Not applicable

Availability of data and material:
Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

Conflict of interests:
The authors declare that they have no conflict of interest to disclose

REFERENCES

1. World Health Organization. Global Health Estimates 2020: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2019. Available from: https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death. Accessed March 22, 2022

2. World Health Organization. WHO Report on Cancer. Setting priorities, investing wisely and providing care for all. Available from: https://www.who.int/publications/i/item/who-report-on-cancer-setting-priorities-investing-wisely-and-providing-care-for-all. Accessed May 23, 2022
3. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 2021; 71: 209-49.
4. World Health Organization. WHO Guideline: Recommendations on Digital Interventions for Health System Strengthening. Guideline ed. Geneva; 2019.
5. World Health Organization. A health telematics policy in support of WHO's Health-for-all strategy for global health development: report of the WHO Group Consultation on Health Telematics. Geneva, 1998.
6. Omranipour R, Mahmoodzadeh H, Hadjilooei F, Alipour S. Recommendations for breast surgical care during COVID-19 outbreak in Iran: Setting priorities of management. WCRJ 2020; 7: e1588: 1-8.
7. Grasselli G, Pesenti A, Cecconi M. Critical care utilization for the COVID-19 outbreak in Lombardy, Italy: Early experience and forecast during an emergency response. JAMA 2020; 323: 1545-6.
8. Doraiswamy S, Abraham A, Mamtani R, Cheema S. Use of telehealth during the COVID-19 pandemic: Scoping review. J Med Internet Res 2020; 22: e24087.
9. International Council of Nurses (ICN). International Competencies for Telenursing. In: International Competencies for Telenursing; Geneva, Switzerland; 2007.
10. Moretto IG, Contim CLV, Santo, FHDE. Telephone follow-up as a nursing intervention for patients receiving outpatient chemotherapy: integrative review. Rev Gaucha Enferm 2019; 40: e20190039.
11. Souza-Junior VD, Mendes IA, Mazzo A, Godoy S. Application of telenursing in nursing practice: An integrative literature review. Appl Nurs Res 2016; 29: 254-60.
12. De Leo A, Di Simone E, Spano A, Puliani G, Petrone F. Nursing management and adverse events in thyroid cancer treatments with tyrosine kinase inhibitors. A narrative review. Cancers (Basel) 2021; 13: 5961.
13. Sollazzo F, Liquori G, Di Nitto M, Failla A, De Leo A, D'Inzio V, Chiappetta L, Amodei G, Messina C, Forte D, Montesano M, De Nuzzo D, Di Muzio M, Di Simone E, Orsi GB, Giannetta N. Management and treatment of taste and smell alterations in oncologic patients undergoing antitumoral therapy and radiotherapy. WCRJ 2021; 8: e2123.
14. Sollazzo F, Liquori G, Trotta F, Urban J, Di Simone E, Dionisi S, De Nuzzo D, Cappitella C, Di Nitto M, Giannetta N, Tafuri A, Di Muzio M. How to improve educational behaviors for caregivers and patients having central venous access device (CVAD): A scoping review. WCRJ 2021; 8: e1846.
15. Miceli L, Dal Mas F, Biancuzzi H, Bednarova R, Rizzardo A, Cobianchi L, Holmboe ES. Doctor@Home: Through a Telemedicine Co-production and Co-learning Journey. J Cancer Educ 2022; 37: 1236-1238.
16. Tibaldi V, Aimonino Ricauda N, Rocco M, Bertone P, Fanton G, Isaia G. Technological advances and hospital-at-home care. Recenti Prog Med 2013; 104: 181-8.
17. Hasson SP, Waissengrin B, Shachar E, Hodruj M, Fayngor R, Brezis M, Nikolaevski-Berlin A, Pelles S, Safra T, Geva R, Wolf I. Rapid implementation of telemedicine during the COVID-19 pandemic: Perspectives and preferences of patients with cancer. Oncologist 2021; 26: 679-85.
18. Castner J, Bell SA, Hetland B, Der-Martirosian C, Castner M, Joshi AU. National Estimates of Workplace Telehealth Use Among Emergency Nurses and All Registered Nurses in the United States. J Emerg Nurs 2022; 48: 45-56.
19. Sarria Guerrero JA, Guix Comellas EM, Isla Pera M. Implementing telemedicine, EHealth and telephonic nursing assistance in spain. Rev Enferm 2017; 40: 14-8.
20. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, Shamseer L, Tetzlaff JM, Akl EA, Brennan SE, Chou R, Glanville J, Grimshaw JM, Hróbjartsson A, Lalu MM, Li T, Loder EW, Mayo-Wilson E, McDonald S, McGuinness LA, Stewart LA, Thomas J, Tricco AC, Welch VA, Whiting P, Moher D. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ 2021; 372: n71.
21. Fregatti P, Gipponi M, Giacchino M, Sparavigna M, Murelli F, Toni ML, Calabrò MT, Orsino L, Friedman D. Breast Cancer Surgery During the COVID-19 Pandemic: An Observational Clinical Study of the Breast Surgery Clinic at Ospedale Policlinico San Martino - Genoa, Italy. In Vivo 2020; 34: 1667-73.
22. Passardi A, Rizzo M, Maines F, Tondini C, Zambelli A, Vespignani R, Andreis D, Massa I, Dianti M, Forti S, Piras EM, Eccher C. Optimisation and validation of a remote monitoring system (Onco-TreC) for home-based management of oral anticancer therapies: An italian multicentre feasibility study. BMJ Open 2017; 7: e014617.
23. Ciani O, Cucciniello M, Petracca F, Apolone G, Merlini G, Novello S, Pedrazzoli P, Zilembo N, Broglia C, Capelletto E, Garassino M, Nicod E, Tarricone R. Lung Cancer App (LuCApp) study protocol: A randomised controlled trial to evaluate a mobile supportive care app for patients with metastatic lung cancer. BMJ Open 2019; 9: e025483.
24. Pertile D, Gipponi M, Aprile A, Batistotti P, Ferrari CM, Massobrio A, Soriero D, Epis L, Scabini S. Colorectal Cancer Surgery During the COVID-19 Pandemic: A Single Center Experience. In Vivo 2021; 35: 1299-305.
25. Passardi A, Foca F, Caffo O, Tondini CA, Zambelli A, Vespignani R, Bartolini G, Sullo FG, Andreis D, Dianti M, Eccher C, Piras EM, Forti S. A Remote Monitoring System to Optimize the Home Management of Oral Anticancer Therapies (ONCO-TreC): Prospective Training-Validation Trial. J Med Internet Res 2022; 24: e27349.
26. Guyatt G, Oxman AD, Akl EA, Kunz R, Vist G, Brozek J, Norris S, Falck-Ytter Y, Glasziou P, DeBeer H, Jaeschke R, Rind D, Meerpohl J, Dahm P, Schünemann HJ. GRADE guidelines: 1. Introduction-GRADE evidence profiles and summary of findings tables. J Clin Epidemiol 2011; 64: 383-94.
27. EuroQol Group. EQ-5D-5L. Available modes of administration. Available from: https://euroqol.org/eq-5d-instruments/eq-5d-5l-available-modes-of-administration. Accessed February 16, 2022
28. Webster K, Cella D, Yost K. The Functional Assessment of Chronic Illness Therapy (FACIT) Measurement System: properties, applications, and interpretation. Health Qual Life Outcomes 2003; 1: 79.
29. Costantini M, Musso M, Viterbori P, Bonci F, Del Mastro L, Garrone O, Venturini M, Morasso G. Detecting psychological distress in cancer patients: validity of the Italian version of the Hospital Anxiety and Depression Scale. Support Care Cancer 1999; 7: 121-7.

30. Buttiron Webber T, Giuliano S, Patrone C, Briata IM, Franconeri M, Marceca F, Magnani M, Paciolla F, Provinciali N, Defferrari C, Clavarezza M, D'Amico M, Gozza A, Boitano M, Alessio-Mazzola M, Cevasco I, DeCensi A. Home Se-Cure: A Home Care Service for Cancer Patients during the COVID-19 Pandemic. Int J Environ Res Public Health 2021; 18: 10913.
31. Dionisi S, Giannetta N, Di Simone E, Ricciardi F, Liquori G, De Leo A, Moretti L, Napoli C, Di Muzio M, Orsi GB. The Use of mHealth in Orthopedic Surgery: A Scoping Review. Int J Environ Res Public Health 202; 18: 12549.
32. Marino MM, Rienzo M, Serra N, Marino N, Ricciotti R, Mazzariello L, Leonetti CA, Ceraldi MP, Casamassimi A, Capocelli F, Martone G, Caracciolo AL. Mobile Screening Units for the Early Detection of Breast Cancer and Cardiovascular Disease: A Pilot Telemedicine Study in Southern Italy. Telemed J E Health 2020; 26: 286-93.
33. Mascagni D, Eberspacher C, Mascagni P, Arezzo A, Selvaggi F, Sturiale A, Milito G, Naldini G. From high volume to "zero" proctology: Italian experience in the COVID era. Int J Colorectal Dis 2020; 35: 1777-80.
34. Tiozzo E, Fondi S, Biagioli V, Piccinelli E, Alibrandi F, Gawronski O, Dall'Oglio I, Margarella E, Piga S, Ricci R, Ciaralli I. Electronic Assessment and Tracking of Pain at Home: A Prospective Study in Children with Hematologic or Solid Tumors. J Pediatr Oncol Nurs 2021; 38: 82-93.
35. Galligioni E, Piras EM, Galvagni M, Eccher C, Caramatti S, Zanolli D, Santi J, Berloffa F, Dianti M, Maines F, Sannicolò M, Sandri M, Bragantini L, Ferro A, Forti S. Integrating mHealth in Oncology: Experience in the Province of Trento. J Med Internet Res 2015; 17: e114.
36. Dionisi S, Di Simone E, Liquori G, De Leo A, Di Muzio M, Giannetta N. Medication errors' causes analysis in home care setting: A systematic review. Public Health Nurs 2022; 39: 876-97.
37. Angelini S, Alicastro GM, Dionisi S, Di Muzio M. Structure and characteristics of diabetes self-management applications: A systematic review of the literature. Comput Inform Nurs 2019; 37: 340-8.
38. Luz PLD. Telemedicine and the Doctor/Patient Relationship. Arq Bras Cardiol 2019; 113: 100-2.
39. Sagaro GG, Amenta F. Past, present, and future perspectives of telemedical assistance at sea: A systematic review. Int Marit Health 2020; 71: 97-104.
40. Associazione Italiana di Oncologia Medica (AIOM), Associazione Italiana dei Registri Tumori (AIRTUM). I numeri del cancro in Italia 2019. Brescia: Intermedia Editore; 2019 Available from: https://www.fondazioneaiom.it/wp-content/uploads/2019/09/2019_Numeri_Cancro-pazienti-web.pdf. Accessed March 15, 2022.
41. Krengli M, Ferrara E, Mastroleo F, Brambilla M, Ricardi U. Running a Radiation Oncology Department at the Time of Coronavirus: An Italian Experience. Adv Radiat Oncol 2020; 5: 3-6.
42. Ream E, Hughes AE, Cox A, Skarparis K, Richardson A, Pedersen VH, Wiseman T, Forbes A, Bryant A. Telephone interventions for symptom management in adults with cancer. Cochrane Database Syst Rev 2020; 6: CD007568.
43. Zhang Q, Zhang L, Yin R, Fu T, Chen H, Shen B. Effectiveness of telephone-based interventions on health-related quality of life and prognostic outcomes in breast cancer patients and survivors-A meta-analysis. Eur J Cancer Care (Engl) 2018; 27: e12632.