



Comparative effect of different patient education modalities on quality of life in breast cancer survivors: A systematic review and network meta-analysis

Patricia Martínez-Miranda^{a,c}, José Jesús Jiménez-Rejano^{a,*}, Abel Rosales-Tristancho^d,
María Jesús Casuso-Holgado^{b,c}

^a Departamento de Fisioterapia, Facultad de Enfermería, Fisioterapia y Podología, Universidad de Sevilla, Seville, Spain

^b Instituto de Biomedicina de Sevilla, IBIS, Departamento de Fisioterapia, Universidad de Sevilla, Seville, Spain

^c CTS 1110, UMSS Research Group, Andalusia, Spain

^d Department of Statistics and Operational Research, Universidad de Sevilla, Avenida Reina Mercedes s/n, 41012, Seville, Spain

ARTICLE INFO

Keywords:

Health education
Breast cancer
Quality of life
Meta-analysis

ABSTRACT

Purpose: To assess the comparative effect of patient education modalities (online, telephonic, mixed, in-person meetings) on the improvement of quality-of-life in breast cancer survivors.

Methods: A search was conducted in different databases, being only included randomised controlled trials. The methodological quality and the risk of bias were assessed following the criteria of PEDro and Cochrane Rob-2 tools, respectively. The certainty of the evidence was judged using the GRADE tool. These evaluations were performed by two independent reviewers. When possible, data was pooled in a network meta-analysis (95% confidence interval [CI]).

Results: Fourteen studies were included in the qualitative synthesis (1632 participants) and 11 in the quantitative (1482 participants). Network comparisons revealed that mixed educational modality was the highest ranked intervention at short (MD = 0.62; 95% CI [-0.35, 1.6]) and long-term (MD = 1.1; 95% CI [-1.5, 3.8]); the control condition was the last in both cases, with a good convergence of the model observed. However, comparisons did not show significant differences.

Conclusions: Health policies could benefit from mixed modalities of patient education as it is expected to generate socio-economical savings and promote patient self-management. Probably, online mixed modalities, i.e. virtual face to face meetings, could be a more up-to-date option that fit best to nowadays patients' lifestyle. However, the limitations of this review force us to interpret our results with caution.

1. Introduction

The latest GLOBOCAN cancer burden report has pointed to female breast cancer as the most commonly diagnosed cancer worldwide, with an estimation of 2.3 million of new cases in 2020 (Sung et al., 2021), an incidence which is expected to increase in the next decades (Arnold et al., 2022). Survivorship rate is also high in transitioned countries, but breast cancer survivors (Khan et al., 2012) are likely to suffer chronic pain that impacts their quality of life (Wang et al., 2018; Lovelace et al., 2019). Moreover, breast cancer surgery scars are also associated with a deterioration of body image, mental health and quality of life in this population (Gass et al., 2019).

Current health policies assume that patients' active involvement in their own health condition is necessary and it should be based on the understanding of their own disease (Lorig et al., 2003). Patient education, as defined by the World Health Organization (WHO, 1998), is a therapeutic intervention aiming to promote active coping to improve or maintain patients' health status and therefore their quality of life.

The role of patient education in self-care skills development has been previously investigated for cancer-related fatigue (Du et al., 2015), cancer-related pain (Marie et al., 2013) or even for surgery recovery (Jurys et al., 2022; Faury et al., 2017; White and Dixon, 2015). Particularly for breast cancer survivors, a recent systematic review and meta-analysis evaluated the effect of patient education on quality of life,

* Corresponding author.

E-mail address: jjjimenez@us.es (J.J. Jiménez-Rejano).

<https://doi.org/10.1016/j.ejon.2023.102411>

Received 12 May 2023; Received in revised form 20 July 2023; Accepted 7 September 2023

Available online 13 September 2023

1462-3889/© 2024 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

showing the beneficial effects of this intervention. Furthermore, this study concluded that the content of the programmes that apply patient education is usually homogeneous, but they are implemented in different modalities (online, telephonic, in-person-meetings or in mixed format) (Martínez-Miranda et al., 2021). This fact raises a new research question, which was also proposed by previous studies as a gap of knowledge (Kim et al., 2017; Van Dijck et al., 2016): what is the comparative effect of different modalities of patient education programmes for quality of life improvement in breast cancer survivors? To our knowledge, no systematic reviews have ever tried to answer this question before.

Thus, the purpose of this review was to synthesize the current evidence on the use of therapeutic education in breast cancer survivors and to assess the comparative effect of different modalities frameworks for quality of life improvement in this population. Our results aim to provide useful information for future evidence-based clinical practice decisions.

2. Methods

2.1. Purpose

This study aims 1) to synthesize the current evidence on the use of the different modalities of therapeutic education to improve the quality of life in breast cancer survivors and 2) to assess the comparative effect of different patient education modalities on the improvement of quality of life in adult breast cancer survivors.

2.2. Type of studies and protocol

A systematic review and network meta-analysis following the PRISMA Extension Statement for Reporting of Systematic Reviews Incorporating Network Meta-analyses of Health Care interventions: Checklist and Explanations (Hutton et al., 2015) were carried out. It was prospectively registered in PROSPERO (Code: CRD42020219572). There were no deviations from review protocol.

2.3. Data Sources and search strategy

An electronic search was carried out in the databases Web of Science, PubMed, CINAHL, SCOPUS, the Cochrane Plus Library, PEDro, Dialnet and Clinicaltrials.gov. Different search terms related to our studied population (e.g. Breast Neoplasms), intervention (e.g. Health Education) and the outcome of interest (e.g. Quality of Life) were combined. Moreover, a manual search was conducted of the reference lists of several systematic reviews. A detailed description of the search strategies can be found in Supplementary file 1.

2.4. Eligibility criteria

The research question was established following recommendations from PICO framework (Population, Intervention, Comparison, Outcome measures and study design) as follows: What is the comparative effect of different patient education modalities (online, telephonic, in-person meetings and mixed) in improving the quality-of-life in breast cancer survivors?

The inclusion criteria were (P) breast cancer survivors over 18 years old who had completed primary treatment (surgery, radiotherapy and chemotherapy); (I) any modality of patient education program (in-person meetings, online, telephonic or mixed); (C) in comparison with no intervention, usual care and/or a different educational modality; (O) studies that included quality-of-life as assessed outcome; (S) randomised controlled clinical trials (RCTs) written in Spanish, English, French, Italian or Portuguese.

We excluded studies that applied educational interventions that did not fit with the patient education concept considered by this review

(Martínez-Miranda et al., 2021).

2.5. Study Selection and data extraction

P.M.M and M.J.C.H. completed the study selection. These same two reviewers extracted the most relevant information about the participants, intervention, control group and outcomes. The outcome founded were separated into short (until 3 months) and longer-term (4–6 months) to be analysed.

2.6. Methodological quality assessment

The same reviewers (P.M.M. and M.J.C.H.) also performed methodological quality assessment using the PEDro scale (Cashin and McAuley, 2020) and the Cochrane risk-of-bias tool for randomised trials (Higgins and Thomas, 2021). Level II evidence (4–5: deficient; <4: poor) (Cashin and McAuley, 2020). When necessary, a third independent reviewer (J.J.J.R.) evaluated disagreements.

2.7. Data Extraction and synthesis

The results for the outcome quality-of-life were described narratively and where possible study results were pooled. First, we carried out a pair-wise meta-analysis; we calculated the estimated effect and its standard error, and we used inverse variance methods for weighting in the meta-analyses, calculating the standardised mean difference (SMD), with 95% confidence intervals (CI) in all cases (Higgins and Thomas, 2021). We used fixed or random effects models according to the degree of heterogeneity, which we assessed using the I-squared (I^2) statistic. Specifically, for $I^2 > 50\%$, which indicates substantial heterogeneity, we used random effects models, and when $I^2 < 50\%$, which indicates substantial homogeneity, we used fixed effect models. We employed Review Manager (RevMan) version 5.3 software to summarise the effects and construct forest diagrams. We estimate the publication bias using the funnel plots. This first part of the analysis was performed by a reviewer (P.M.M) and revised by the others (M.J.C.H, A.R.T. and J.J.J.R).

Secondly, a network meta-analysis (NMA) was carried out, which enables the making of direct, indirect and network estimates (Puhan et al., 2014). The former type is related to straight comparisons that appear in the data, whereas indirect estimates are performed between pairs of treatments that have a direct relationship, but through other intervention groups that are located in an intermediate position in the network. These groups allow the creation of a succession of direct links whose beginning and ending are marked by the pair of treatments of interest. Finally, network estimates are computed to every pair of treatments, including those that have not been contrasted in the involved studies. This model is based on a Bayesian hierarchical framework and on a Markov Chain Monte Carlo (MCMC) simulation (Harrer et al., 2021; Shim et al., 2019). Starting from the data and from a prior distribution, the objective is to obtain the best posterior distribution that fits the data. It is in this step that MCMC simulation comes into play, which allows the estimation of the posterior distributions and the NMA results to be generated. To consider both within-study and between-study variations, a random effects model was performed. Since the MCMC simulation is based on a number of iterations, a series of tools are necessary to evaluate the model convergence. Among them, there is the trace plot, which allows the direct visualization of the simulation result and the estimates of the Markov chains; the density plots, which present the posterior distribution of the parameters; and the potential scale reduction factor (PSRF), which compares the variation within each chain to the variation between chains in the simulation process over time. A PSRF value below 1.05 indicates that the model is convergent. Keeping in mind the previous specifications, it is possible to obtain the different results of the NMA, such as the treatment ranking, the surface under the cumulative ranking curve (SUCRA) score and the relative effects of network comparisons. This model was run in R 4.1.2. (Harrer

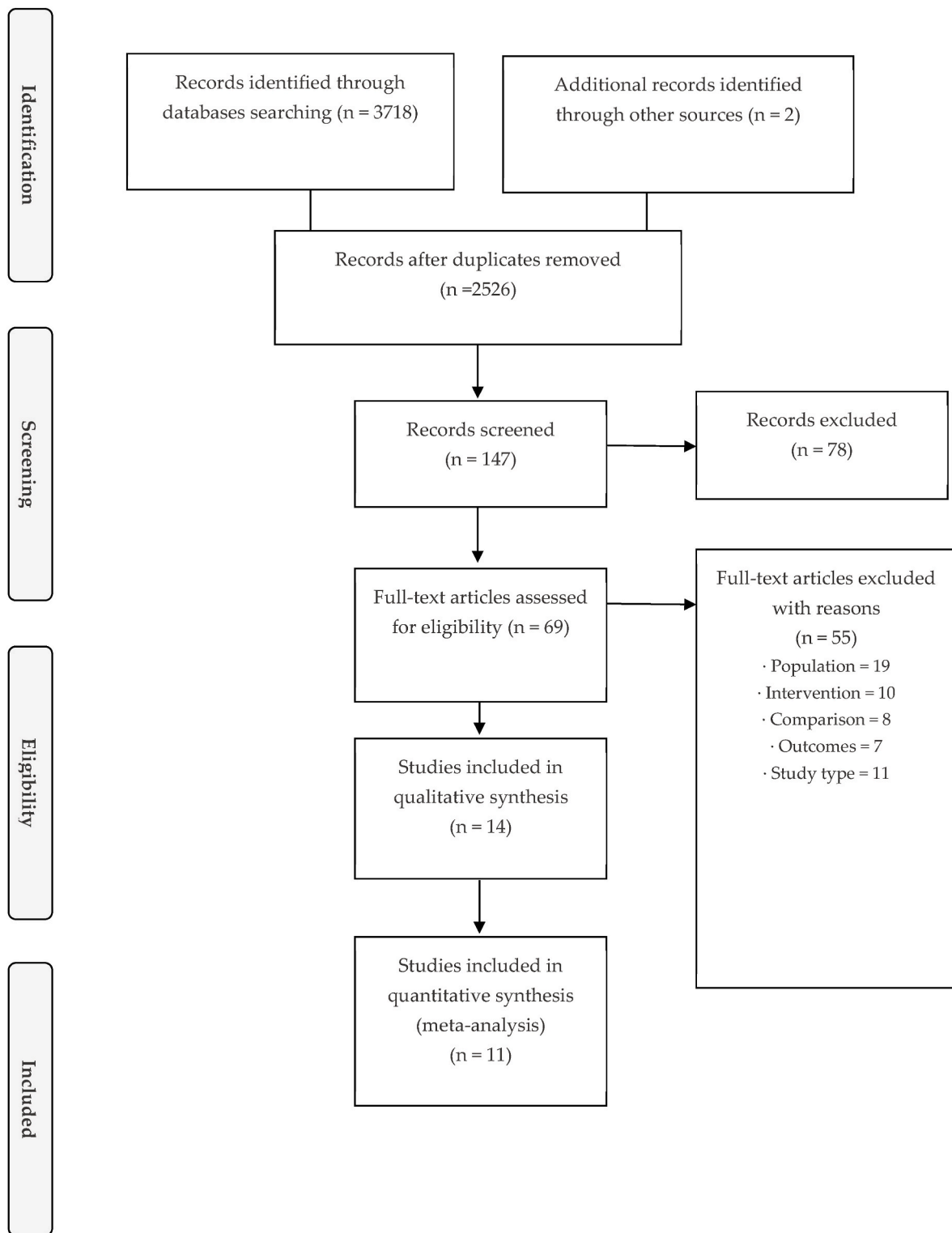


Fig. 1. Prisma flow diagram.

et al., 2021; Shim et al., 2019). This second part of the analysis was performed by a mathematician (A.R.T.) and revised by the other authors (P.M.M, M.J.C.H and J.J.J.R).

The certainty of the evidence was evaluated following the approach proposed by the Grading of Recommendations Assessment, Development and Evaluation (GRADE) (Sanabria et al., 2015), which allowed us to classify the evidence as high, moderate, low or very low and to discern the importance of the results. Factors that could decrease the quality of

the evidence are the studies design, the risk of bias, inconsistency in the results, indirect evidence, imprecision and/or other factors (Urquhart et al., 2019).

3. Results

A total of 3720 results were found in the data sources (3718 in the database and 2 in others). After removing duplicates, 2526 results were

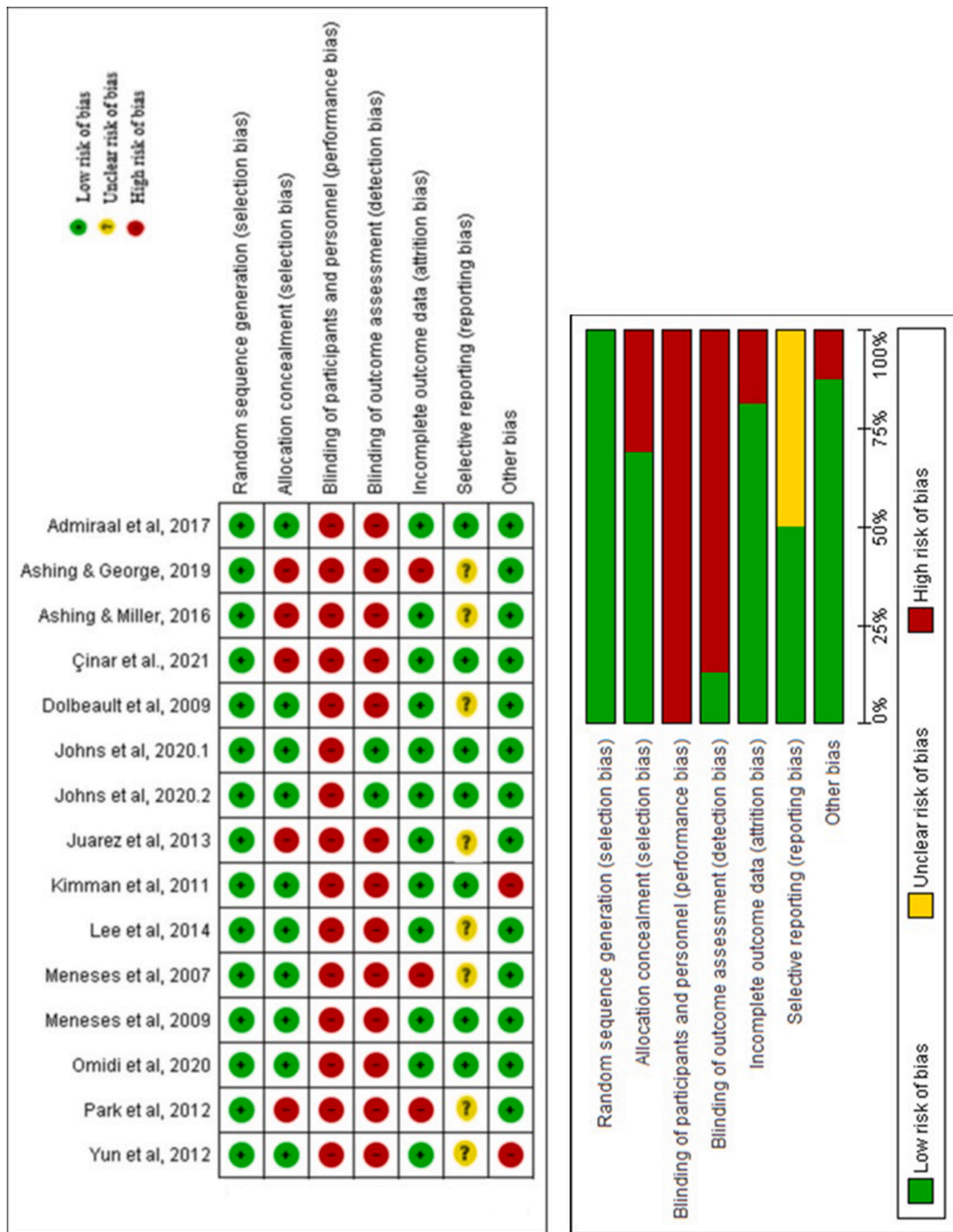


Fig. 2. Studies methodological quality assessment by the Cochrane Risk of Bias Tool for Randomized Trials.

reviewed reading only the title. In the next step, 147 results were analysed according to titles and abstracts. After that, 69 full texts were obtained and 78 excluded. Finally, 55 results were excluded during full text screening, including 14 studies (Admiraal et al., 2017; Yun et al., 2012; Kimman et al., 2011; Ashing et al., 2016; Park et al., 2012; Meneses et al., 2009; Meneses et al., 2007; Lee et al., 2014; Ashing et al., 2020; Dolbeault et al., 2009; Juarez et al., 2013; Çınar et al., 2021; Omidi et al., 2020; Johns et al., 2020) in the qualitative synthesis and 11 in the quantitative synthesis (Admiraal et al., 2017; Yun et al., 2012; Kimman et al., 2011; Ashing et al., 2016; Park et al., 2012; Meneses

et al., 2009; Meneses et al., 2007; Dolbeault et al., 2009; Juarez et al., 2013; Çınar et al., 2021; Omidi et al., 2020). Three studies (Lee et al., 2014; Ashing et al., 2020; Johns et al., 2020) were excluded of the quantitative synthesis because of the lack of some statistical data that were necessary to carry out the analyses. The PRISMA flow diagram of the selection process is shown in Fig. 1.

3.1. Methodological quality analysis

In Table S1 are shown the result of the methodological quality of the

Table 1
Main characteristics of the included studies according to its patient education modality.

ONLINE PATIENT EDUCATION PROGRAM					
STUDY	POPULATION	INTERVENTION	CONTROL	EVALUATION OF QUALITY OF LIFE	MAIN RESULTS
Çınar et al. (2021) PEDro = 4/10	N = 64 EG = 31 CG = 33 Women's average age: 45.7 years	PATIENT EDUCATION (3 months) Educational material Relaxation exercises and guided imagery Diary module and possible contact with a therapist to solve questions.	USUAL CARE	ASSESSMENT POINTS T0 (baseline) T1 (3 months) ASSESSMENT TOOL FACT-ES	No statistically significant differences between EG and CG related to global quality of life or its dimensions (all $p > 0.05$). There were significant improvements in the pre-post analysis in the global quality of life both in the EG ($p < 0.001$) and in the CG ($p = 0.003$). In addition, the EG obtained significant improvements in the physical, emotional, and endocrine quality of life, and the CG in the emotional, functional and endocrine dimensions (all $p < 0.05$).
Admiraal et al. (2017) PEDro = 6/10	N = 127 CG = 63 EG = 64 Women's average age: 53.15 years	PATIENT EDUCATION (3 months) Educational material Possibility of contact for questions	USUAL CARE	ASSESSMENT POINTS T0 (baseline) T1 (6 weeks) T2 (3 months) ASSESSMENT TOOLS EORT QLQ - C30 EORT QLQ - BR23	At 3 months (T2) global quality of life and its dimensions improved in EG and CG but there were not significant differences between them (all $p > 0.05$).
Lee et al. (2014) PEDro = 6/10	N = 57 CG = 28 EG = 29 Women's average age: 42.35 years	PATIENT EDUCATION (3 months) . 24 educational sessions using automatic SMS	USUAL CARE AND INFORMATION BOOKLET	ASSESSMENT POINTS T0 (baseline) T1 (3 months) ASSESSMENT TOOL EORT QLQ-C30	Although EG and CG had improvements in global quality of life and its dimensions, there were not found significant differences between them at 3 months (T1) (all $p > 0.05$).
Yun et al. (2012) PEDro = 6/10	N = 273 CG = 137 EG = 136	PATIENT EDUCATION (3 months) . Online educational content	WAIT LIST - OBSERVATION	ASSESSMENT POINTS T0 (baseline) T1 (3 months) ASSESSMENT TOOL EORT QLQ-C30	At 3 months (T1) there were found significant differences between EG and CG in favour to EG related to global quality of life ($p = 0.017$). In addition, significant differences were observed between both groups regarding emotional cognitive and social quality of life in favours to EG ($p = 0.022$, $p = 0.002$, $p = 0.027$). Not significant differences were obtained regarding physical and role quality of life.
TELEPHONIC PATIENT EDUCATION PROGRAM					
STUDY	POPULATION	INTERVENTION	CONTROL	EVALUATION OF QUALITY OF LIFE	MAIN RESULTS
Ashing & Miller (2016) PEDro = 5/10	N = 39 EG = 20 CG = 19 Women's average age: 55.50 years	PATIENT EDUCATION AND INFORMATION BOOKLET (4 months) 8 educational sessions) of 40–50 min every 15 days.	USUAL CARE AND INFORMATION BOOKLET	ASSESSMENT POINTS T0 (baseline) T1 (4–6 months) ASSESSMENT TOOL FACT-G	At 4–6 months (T1) there were found significant differences between EG and CG related to global quality of life ($p = 0.028$) in favours to EG. In addition, there were found improvements in pre-post analysis in EG related to global quality of life ($p = 0.049$), physical quality of life ($p < 0.042$) and emotional quality of life ($p < 0.042$), but not in the CG.
Ashing & George (2020) PEDro = 6/10	N = 40 CG = 20 EG = 20	PATIENT EDUCATION AND INFORMATION BOOKLET (4 months) 7 educational sessions + 1 reinforcement 1 month after intervention. 1st session of 1 h and the rest of 30–40 min.	USUAL CARE AND INFORMATION BOOKLET	ASSESSMENT POINTS T0 (baseline) T1 (4–6 months) ASSESSMENT TOOL FACT-G (only emotional well-being subscale EWB)	There was found a significant improvement in pre-post analysis in EG ($p = 0.002$) but not in CG ($p = 0.499$). In EG there was a moderate ES ($d = 0.45$).
MIXED PATIENT EDUCATION PROGRAM					
STUDY	POPULATION	INTERVENTION	CONTROL	EVALUATION OF QUALITY OF LIFE	MAIN RESULTS
Park et al. (2012) PEDro = 6/10	N = 48 CG = 23 EG = 25 Women's average age: 45.95 years	PATIENT EDUCATION AND INFORMATION BOOKLET (3 months) 3 group educational in-person meetings (5–8 women), 1 session/month, in the educational room of the nursing college. 6 telephonic educational sessions, every 15 days, from 10 to 30 min	USUAL CARE AND INFORMATION BOOKLET	ASSESSMENT POINTS T0 (baseline) T1 (3 months) T2 (6 months) ASSESSMENT TOOL FACT-B	At 6 months (T2) there were found significant differences between EG and CG in global quality of life in favours to EG ($p = 0.014$) and in emotional quality of life (< 0.001). There were not found differences in others quality of life dimensions (all $p > 0.05$).
Meneses et al. (2009) PEDro = 6/10	N = 53 EG = 27 CG = 26 Women's average age: 53.58 years	PATIENT EDUCATION (6 months) 3 educational in-person meetings of 60–90 min (month 1) 5 telephonic educational follow-up	USUAL CARE	ASSESSMENT POINTS T0 (baseline) T1 (3 months)	There were found significant differences between EG and CG in favours to EG, adjusted to the baseline, related to global quality of life in the mean between T1 and T2 ($p = 0.013$). There

(continued on next page)

Table 1 (continued)

MIXED PATIENT EDUCATION PROGRAM					
STUDY	POPULATION	INTERVENTION	CONTROL	EVALUATION OF QUALITY OF LIFE	MAIN RESULTS
Meneses et al., (2007)	N = 256 CG = 131 EG = 125	sessions (month 2–6) + 2 face-to-face (month 3, 6) Written and audio educational material. PATIENT EDUCATION (6 months) 3 educational in-person meetings of 60–90 min (month 1) 5 telephonic educational follow-up sessions (month 2–6) + 2 face-to-face (month 3, 6) Written and audio educational material	USUAL CARE	T2 (6 months) ASSESSMENT TOOL CVRS - BC ASSESSMENT POINTS T0 (baseline) T1 (3 months) T2 (6 months) ASSESSMENT TOOL CVRS - BC	were also found significant differences between both groups in favours to EG in psychological quality of life, adjusted to the baseline (mean T1 – T2) (p = 0.048). At 3 months (T1) there were significant differences between EG and CG in favours to EG regarding global quality of life and in relation to psychological and social quality of life (all p < 0.01). There were not found significant differences between groups to physical and spiritual quality of life. At 6 months (T2), there were also found a significant differences between EG and CG related to global, psychological and social quality of life (all p < 0.01). In addition, there was a significant intragroup improvement in EG, and a significant intragroup worsening in CG (all <0.01).
Juarez et al. (2013)	N = 50 CG = 18 EG = 32	PATIENT EDUCATION (6 months) 4 educational in-person meetings 40–60 min (month 1) 5 monthly telephonic educational follow-up sessions (month 2–6) Written educational material	USUAL CARE	ASSESSMENT POINTS T0 (baseline) T1 (3 months) T2 (6 months) ASSESSMENT TOOL The City of Hope QoL Breast Cancer questionnaire	There were not found significant differences in global quality of life or its dimensions between EG and CG (p > 0.05).
IN-PERSON MEETINGS PATIENT EDUCATION PROGRAM					
STUDY	POPULATION	INTERVENTION	CONTROL	EVALUATION OF QUALITY OF LIFE	MAIN RESULTS
Dolbeault et al. (2009)	N = 168 CG = 87 EG 81	PATIENT EDUCATION (2 months) 8 educational in-person meetings 2 h	USUAL CARE	ASSESSMENT POINTS T0 (baseline) T1 (3 months) ASSESSMENT TOOL EORT QLQ-C30 EORT QLQ-BR23	At 3 months (T1) there were statically significant differences between EG and CG in favour to EG related to global quality of life (p = 0.005), role and emotional quality of life (p = 0.017, p < 0.001). The intragroup analysis was not significant for global quality of life, but it was a significant improvement in GE related to physical, emotional, cognitive and social functioning (p = 0.027, p = 0.006, p = 0.045, p = 0.001).
MULTIGROUP INTERVENTIONS					
STUDY	POPULATION	INTERVENTION	CONTROL	EVALUATION OF QUALITY OF LIFE	MAIN RESULTS
Kimman et al. (2011)	N = 150 CG = 74 EG 76	EG1 - TELEPHONIC PATIENT EDUCATION (18 months) A mammography at 12 months, a outpatient clinic visit and telephone interviews by a breast cancer nurse. EG2 - PRESENTIAL PATIENT EDUCATION (2 months) 2 presential sessions in group of 2.5 h. EG3 - PRESENTIAL AND TELEPHONIC PATIENT EDUCATION (18 months)	USUAL CARE	ASSESSMENT POINTS T0 (baseline) T1 (3 months) T2 (6 months) T3 (12 months) T4 (18 months) ASSESSMENT TOOL EORT QLQ-C30	At 12 months (T3), there were not found significant differences between EG1 or EG2 and CG or EG1 compared with EG2 (all p > 0.05). However, there were found a significant improvement in the intra-group analysis in EG1 (p = 0.01).
Omid et al. (2020)	N = 105 CG = 35 EG1 = 35 EG2 = 35	EG1 - PRESENTIAL PATIENT EDUCATION + MAIN THERAPY (3 months) 5 group sessions (60–90min) in clinic. EG2 - ONLINE PATIENT EDUCATION + MAIN THERAPY (3 months) 5 online sessions by Telegram TM Messenger.	MAIN THERAPY 20 DLT sessions (in 2 phases: clinic and home) Audiovisual educational material	ASSESSMENT POINTS T0 (baseline) T1 (3 months) T2 (6 months) ASSESSMENT TOOL LLIS	At 3 months (T1) and 6 months (T2) there were not found significant differences between EG1/EG2 and CG in relation to global quality of life (p = 0.359, p = 0.097), although it was found an intra-group improvement in EGs (p = 0.007). In these assessment points there was found a significant difference in the functional quality of life (p = 0.017), but not in the physical or psychosocial quality of life (both p > 0.05).
Johns et al. (2020)	N = 91 CG = 26; EG1 = 33; EG2 = 32	EG1 - PRESENTIAL PATIENT EDUCATION 1 Acceptance and commitment (1.5 months) 6 group sessions (2 h/session) and home practices. EG2 - PRESENTIAL PATIENT EDUCATION 2 survivorship education (1.5 months) 6 group sessions (2 h/session) and self-help assignments.	USUAL CARE AND INFORMATION BLOOC	ASSESSMENT POINTS T0 (baseline) T1 (1 months) T2 (6 months) ASSESSMENT TOOL PROMIS	At 6 months (T2) there were a significant difference between EG1/EG2, and CG related to physical and psychological quality of life (p < 0.05, p < 0.001) and a significant improvement in EG1 in the intra-subject analysis (p < 0.001).

Note: CG: control group; EG: experimental group; EORT QLQ C30/BR23: the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30/Breast 23; FACT-G/B/ES: Functional Assessment of Cancer Therapy - General/Breast/Endocrine Symptoms; LLIS: the lymphedema life impact scale; N = sample size.

selected studies using the PEDro scale while Fig. 2 shows those obtained using the Cochrane risk-of-bias tool for randomised trials. In relation to the PEDro scale, the scores ranged from 5 to 8, with 9 studies classified as level I evidence (good), and 5 studies classified as level II evidence (deficient).

3.2. Description of the included studies

Fourteen RCTs (Admiraal et al., 2017; Yun et al., 2012; Kimman et al., 2011; Ashing et al., 2016; Park et al., 2012; Meneses et al., 2009; Meneses et al., 2007; Lee et al., 2014; Ashing et al., 2020; Dolbeault et al., 2009; Juarez et al., 2013; Çınar et al., 2021; Omidı et al., 2020; Johns et al., 2020) in the narrative synthesis comprising 1670 adult women who survived breast cancer and 11 RCTs (Admiraal et al., 2017; Yun et al., 2012; Kimman et al., 2011; Ashing et al., 2016; Park et al., 2012; Meneses et al., 2009; Meneses et al., 2007; Dolbeault et al., 2009; Juarez et al., 2013; Çınar et al., 2021; Omidı et al., 2020) were included in the meta-analysis comprising 1482 women.

Five educational modalities were identified: four online programmes (Admiraal et al., 2017; Yun et al., 2012; Lee et al., 2014; Çınar et al., 2021); two telephone interventions (Ashing et al., 2016; Ashing et al., 2020); four mixed modalities (Park et al., 2012; Meneses et al., 2009; Meneses et al., 2007; Juarez et al., 2013); one in-person meetings (Dolbeault et al., 2009) and three multi-group formats (Kimman et al., 2011; Omidı et al., 2020; Johns et al., 2020).

We considered an intervention as online if they used online resources to implement an educational intervention (such as web platforms, applications, social media, or Short Message Service); as telephone if they used telephone resources and as in-person meetings if they were implemented face-to-face with participants. Mixed programs were those that combined different modalities and multi group when different modalities were compared in a same study. The duration of educational programs ranged from 1.5 to 18 months, with a duration of between 3 and 6 months in 11 of the 14 studies and. the content of the interventions was homogeneous, including all programmes the following issues: general knowledge about the disease and its sequelae, knowledge of their management and core self-management skills.

Usual care was the most common condition in the control group. In usual care, participants attended the standard medical or nursing visits, but no additional treatment was administered. In some cases, they also received an information booklet with standard information. One study had a wait list-observation in the control group and another applied a main therapy that also was implemented in the experimental groups. More detailed information about the characteristics of the programmes is available in Table 1. Table S2 presents a summary of the outcomes obtained in all studies included in the qualitative synthesis.

3.3. Pair-wise meta-analysis

From the 14 studies in the qualitative synthesis 10 of them obtained a significant effect in favour of education for quality of life improvement (Yun et al., 2012; Ashing et al., 2016; Park et al., 2012; Meneses et al., 2009; Meneses et al., 2007; Lee et al., 2014; Ashing et al., 2020; Dolbeault et al., 2009; Omidı et al., 2020; Johns et al., 2020) (Table S2). We performed two different pairwise meta-analyses, including 11 of the studies in them (Admiraal et al., 2017; Yun et al., 2012; Kimman et al., 2011; Ashing et al., 2016; Park et al., 2012; Meneses et al., 2009; Meneses et al., 2007; Dolbeault et al., 2009; Juarez et al., 2013; Çınar et al., 2021; Omidı et al., 2020): one in relation to quality of life measured in the short-term (at 3 months after intervention) and other in relation to quality of life measured in the longer-term (4–6 months after intervention). The effect of education versus no intervention/usual care

were compared, considering the different educational modalities as subgroups.

Fig. 3 shows the forest diagrams of the pair-wise meta-analysis that evaluated the effectiveness of patient education, considering educational modalities, to improve global quality-of-life (a) at short-term and (b) at longer-term. At short term, there were found significant differences in favour of the application of patient education in overall (SMD = 0.32; 95% CI [0.09, 0.56], $p = 0.008$) and online modality (SMD = 0.28; 95% CI [0.06, 0.50], $p = 0.01$). At longer-term, there were found significant differences in favour of the application of patient education in overall (SMD = 0.55; 95% CI [0.09, 1.01], $p = 0.02$) and in-person meetings modality (SMD = 0.55; 95% CI [0.26, 0.84], $p = 0.0002$).

Funnel diagrams revealed no publication bias ($p > 0.05$). Furthermore, the sensitivity analyses indicated that eliminating the different studies from the meta-analyses carried out did not substantially modify their results. Fig. S1 shows the funnel diagrams for each meta-analysis.

3.4. Network meta-analysis

Two network meta-analysis were performed associated with quality-of-life in short-term and longer-term variables.

3.4.1. Quality of life in the short-term

Fig. 4. a. shows the network graph related to the variable quality of life in the short term. Control group (which covers no intervention, usual care or a different educational modality) is compared with in-person educational meetings, mixed education, online education and telephonic education. The interactions showed good convergence, with the parameter PRFS very close to 1 (PRFS = 1.000022).

Table 2. a. shows no significant differences were found in the direct and network comparisons performed (direct: control vs in-person meetings, mixed, online and telephonic; network: in person-meetings vs mixed, online and telephonic; mixed vs online and telephonic; online vs telephonic). However, the greatest mean differences were found in the comparisons between mixed education versus telephonic education and versus control group, with the results always being in favour of the mixed modality. These results are presented in a forest plot (Fig. 5. a.).

The ranking probability (Fig. 6. a.) and the SUCRA (Fig. S2. a.) show how the mixed modality is clearly ranked as the first one, followed by the online modality, in-person meetings modality, telephonic modality and control.

3.4.2. Quality of life in the longer-term

Fig. S1. b. shows the network graph related to the variable quality of life in the longer-term. Control condition is also compared with in-person meetings education, mixed education, online education and telephonic education. The interactions also showed good convergence (PRFS = 1.000016).

As we can see in Table 2. b., no significant differences were found in the direct and network comparisons performed (direct: control vs in-person meetings, mixed, online and telephonic; network: in person-meetings vs mixed, online and telephonic; mixed vs online and telephonic; online vs telephonic). The biggest mean differences were also found in the comparisons between mixed education versus control group, online education and telephonic education, with the results always being in favour of the mixed modality. These results are presented in a forest plot (Fig. 5. b.).

In the same way, the ranking probability (Fig. 6. b.) and the SUCRA (Fig. S2. b.) show how the mixed modality is ranked as the first one, followed by the in-person meetings modality, telephonic modality, online modality and control.

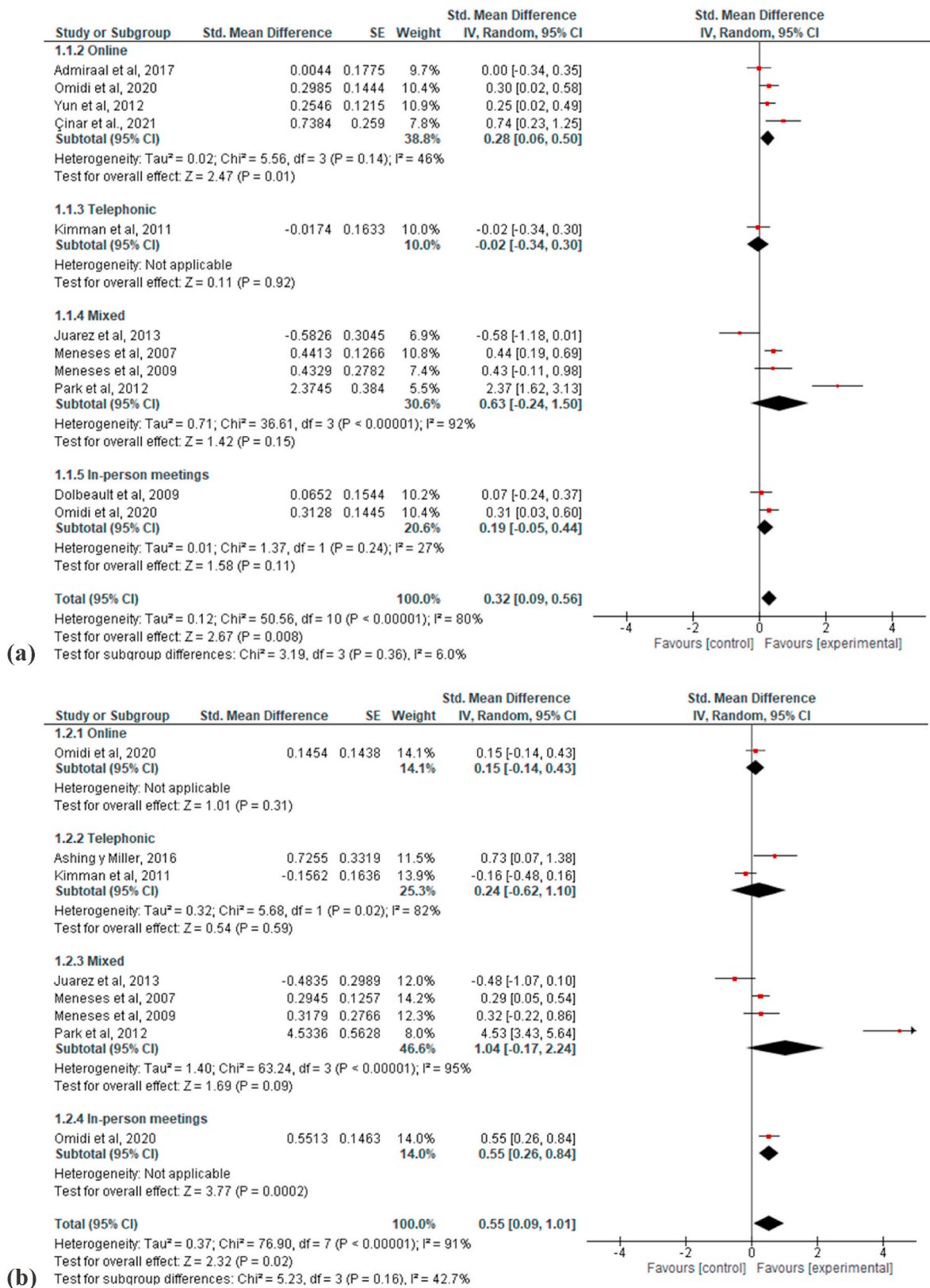


Fig. 3. Forest diagrams of the meta-analysis of those studies evaluating the effect of patient education compared to control group in relation to global quality of life: (a) short term; (b) longer term.

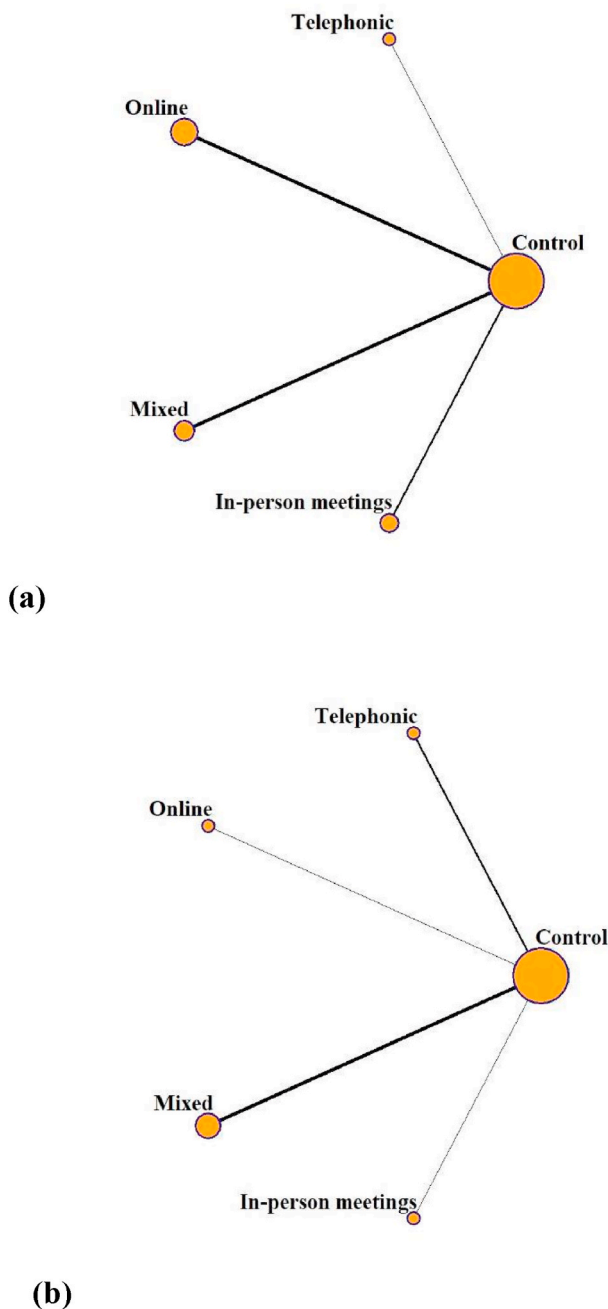


Fig. 4. Network graph related to global quality of life: (a) short term; (b) longer term.

3.4.3. Evidence synthesis

Evidence synthesis was carried out using the GRADE system and following the model for network meta-analysis proposed by Puhan et al. (2014).

Following this method, GRADE allows us to rate the quality of direct, indirect and NMA effect estimates. Regarding the first and the third ones, the results are those that we have presented in Table 3. To perform indirect effects, there are several methods that keep in mind the different ways that exist to connect the pair of intervention groups to be studied (Puhan et al., 2014).

In our case, it is evident that for both variables we studied (quality-of-life in the long and the short-term), the only direct relationships that exist are between each of the intervention groups and the control group. Therefore, it is not possible to establish alternative treatment loops to make any indirect comparison. Consequently, our GRADE analysis

Table 2

Mean Difference (95% CrI) in the Network Meta-Analysis related to Global Quality-of-Life: (a) short-term; (b) longer-term.

(a)					
	Control	In-person meetings	Mixed	Online	Telephonic
Control	Control	N = 2; 0.19 (-0.05, 0.44)	N = 4; 0.63 (-0.24, 1.50)	N = 4; 0.28 (0.06, 0.50)	N = 1; -0.02 (-0.34, 0.30)
In-person meetings	0.19 (-1.19, 1.56)	In-person meetings			
Mixed	0.62 (-0.35, 1.64)	0.43 (-1.24, 2.15)	Mixed		
Online	0.32 (-0.66, 1.30)	0.13 (-1.56, 1.81)	-0.30 (-1.72, 1.07)	Online	
Telephonic	-0.02 (-1.97, 1.94)	-0.21 (-2.60, 2.18)	-0.64 (-2.85, 1.53)	-0.33 (-2.53, 1.85)	Telephonic
(b)					
	Control	In-person meetings	Mixed	Online	Telephonic
Control	Control	N = 1; 0.55 (0.26, 0.84)	N = 4; 1.04 (-0.17, 2.24)	N = 1; 0.15 (-0.14, 0.43)	N = 2; 0.24 (-0.62, 1.10)
In-person meetings	0.55 (-4.74, 5.84)	In-person meetings			
Mixed	1.11 (-1.52, 3.81)	0.56 (-5.33, 6.51)	Mixed		
Online	0.15 (-5.17, 5.45)	-0.41 (-7.86, 7.08)	-0.96 (-6.95, 4.91)	Online	
Telephonic	0.27 (-3.48, 4.03)	-0.28 (-6.77, 6.18)	-0.83 (-5.47, 3.72)	0.13 (-6.37, 6.61)	Telephonic

reflects only the quality of direct and NMA effect estimates (Table 3).

4. Discussion

The results of this network meta-analysis suggest that mixed patient education modality seems to be the most effective type of intervention for quality of life improvement in breast cancer survivors; it is positioned in first place in the short and longer-term, with 20 and 16 points difference with the next position, respectively. Another finding to be highlighted is that the control group ranked last in both the short- and longer-term meta-analyses. It is important that these findings be understood with caution as the methodological quality assessment of the included studies was moderate (PEDro 5 to 8 points; deficient to good) and the blinding of therapists, patients or evaluators was not usually applied. This limitation is common to other studies on a similar theme (Martínez-Miranda et al., 2021; Kim et al., 2017; Van Dijck et al., 2016). A previous direct analysis conducted by Martínez-Miranda et al. (2021) claimed that the application of patient education seems to be associated with improvements in the overall quality-of-life and its dimensions in cancer breast survivors; they found significant differences in short-term and overall quality-of-life when they combined different assessment instruments. They reported a low level of evidence using the GRADE tool regarding short and longer-term global quality-of-life, classified as not important, and there were no minimal clinical differences using the EORT QLQ-C30 scale. Similarly, Van Dijck et al. (2016) and Kim et al. (2017) also observed a positive effect from self-management interventions in global-quality-of-life in adult cancer survivors. The latter

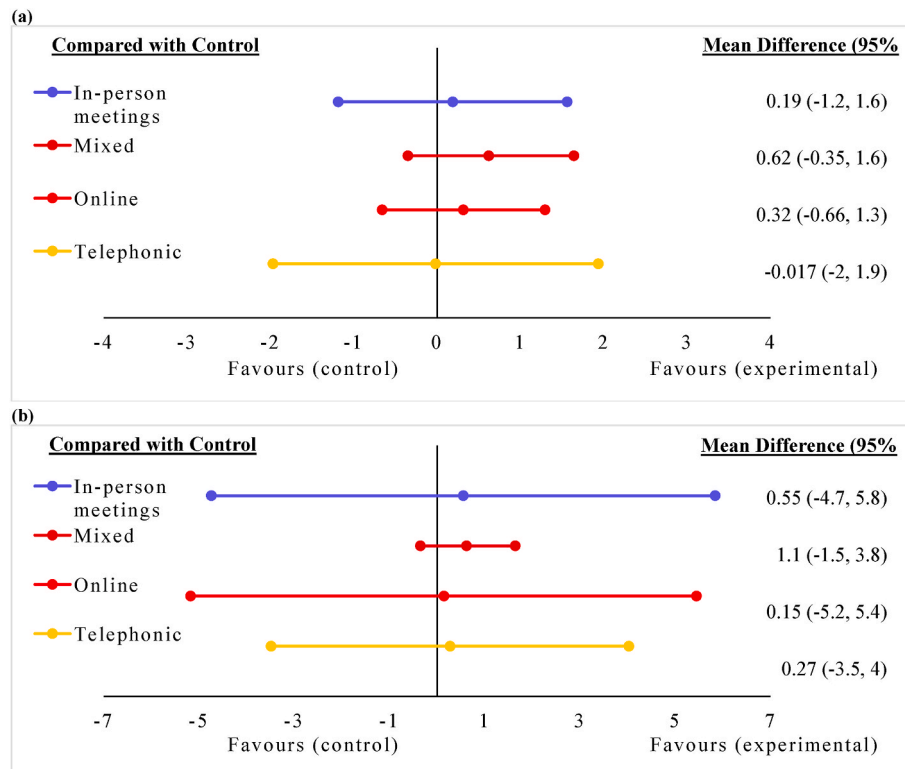


Fig. 5. Forest diagrams of the network meta-analyses related to global quality of life: (a) short term; (b) longer term.

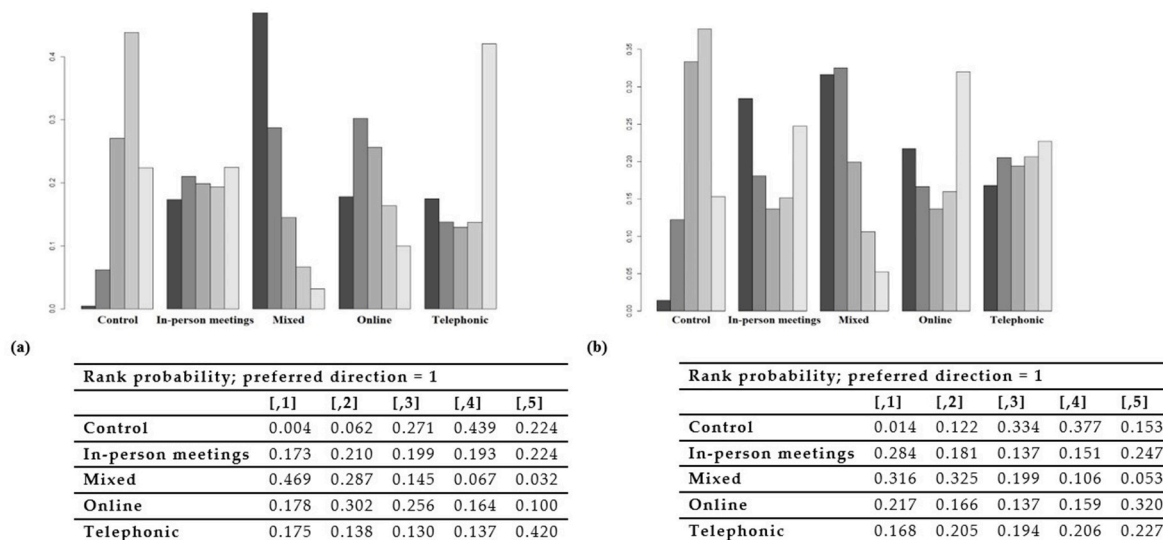


Fig. 6. Ranking probability graph of the network meta-analyses related to global quality of life: (a) short term; (b) longer term.

performed a meta-analysis and obtained significant difference in favour of the education for quality of life, with a moderate SMD (SMD = 0.55, 95% CI [0.001, 1.1]).

These three previous studies (Martínez-Miranda et al., 2021; Kim et al., 2017; Van Dijck et al., 2016) pointed out that the educational modalities used in the different studies could be a possible bias for the findings, because they make the interventions heterogeneous, concluding that a proper analysis to answer this question was still needed. Therefore, we tried to answer this question never addressed before and our results seem to confirm the influence of the type of educational modality in the results. However, independently of the modality, the content of the programmes was similar; they all included

general information about the disease and self-management skills.

4.1. Limitations

The main limitations of this review are the small number of studies analysed; their moderate methodological quality and risk of bias, and the possible exclusion of some educational studies because of the concept of patient education considered (WHO, 1998; Kickbush., 2004; Martínez-Miranda et al., 2021). However, thanks to having been strict with the concept of what constitutes an educational programme in our screening, we have had a uniform selection in relation to the content of the interventions.

Table 3
GRADE. Summary of the Evidence of the NMA results according to their certainty and their importance using the GRADE tool.

Comparison	Direct evidence		Network meta-analysis	
	Odds ratio (95% confidence interval)	Quality of evidence	Odds ratio (95% confidence interval)	Quality of evidence
ST in-person meetings vs. control	0.19 (-0.05 to 0.44)	⊕⊕⊕⊕ High	0.19 (-1.19 to 1.56)	⊕⊕⊕⊕ High
ST mixed vs. control	0.63 (-0.24 to 1.50)	⊕⊕○○ Low ^{a,b}	0.62 (-0.35 to 1.64)	⊕⊕○○ Low ^{a,b}
ST online vs. control	0.28 (0.06–0.50)	⊕⊕⊕○ Moderate ^a	0.32 (-0.66 to 1.30)	⊕⊕⊕○ Moderate ^a
ST telephonic vs. control	-0.02 (-0.34 to 0.30)	⊕⊕○○ Low ^{a,c}	-0.02 (-1.97 to 1.94)	⊕⊕○○ Low ^{a,c}
ST mixed vs. in-person meetings	-	-	0.43 (-1.24 to 2.15)	⊕⊕○○ Low ^{a,b}
ST online vs. in-person meetings	-	-	0.13 (-1.56 to 1.81)	⊕⊕⊕○ Moderate ^a
ST telephonic vs. in-person meetings	-	-	-0.21 (-2.60 to 2.18)	⊕⊕○○ Low ^{a,c}
ST mixed vs. online	-	-	-0.30 (-1.72 to 1.07)	⊕⊕○○ Low ^{a,b}
ST mixed vs. telephonic	-	-	-0.64 (-2.85 to 1.53)	⊕⊕○○ Low ^{a,b}
ST online vs. telephonic	-	-	-0.33 (-2.53 to 1.85)	⊕⊕⊕○ Moderate ^a
LT in-person meetings vs. control	0.55 (0.26–0.84)	⊕⊕⊕○ Moderate ^c	0.55 (-4.74 to 5.84)	⊕⊕⊕○ Moderate ^c
LT mixed vs. control	1.04 (-0.17 to 2.24)	⊕⊕○○ Low ^{a,b}	1.11 (-1.52 to 3.81)	⊕⊕○○ Low ^{a,b}
LT online vs. control	0.15 (-0.14 to 0.43)	⊕⊕⊕○ Moderate ^c	0.15 (-5.17 to 5.45)	⊕⊕⊕○ Moderate ^c
LT telephonic vs. control	0.24 (-0.62 to 1.10)	⊕○○○ Very Low ^{a,b,c}	0.27 (-0.48 to 4.03)	⊕○○○ Very Low ^{a,b,c}
LT mixed vs. in-person meetings	-	-	0.56 (-5.33 to 6.51)	⊕⊕○○ Low ^{a,b}
LT online vs. in-person meetings	-	-	-0.41 (-7.86 to 7.08)	⊕⊕⊕⊕ High
LT telephonic vs. in-person meetings	-	-	-0.28 (-6.77 to 6.18)	⊕○○○ Very Low ^{a,b,c}
LT mixed vs. online	-	-	-0.96 (-6.95 to 4.91)	⊕⊕○○ Low ^{a,b}
LT mixed vs. telephonic	-	-	-0.83 (-5.47 to 3.72)	⊕⊕○○ Low ^{a,b}
LT online vs. telephonic	-	-	0.13 (-6.37 to 6.61)	⊕⊕○○ Low ^{a,b}

Note: CG: LT, longer-term; ST, short-term. (a) risk of bias (some of the included studies were classified like ‘deficient by the PEDro scale); (b) inconsistency (the included studies used different measurement instrument); (c) imprecision (the sample size was small)).

On the other hand, it is important to underline the lack of studies and their low methodological quality, not only as a limitation, but also as the reality of the current state of scientific evidence on the issue studied. This, together with the potential beneficial effects of therapeutic education for improving the quality of life of breast cancer survivors, highlights the need to continue carrying out more quality studies in future research. Future research in this area should consider “The meaningful learning theory” (Cadorin et al., 2014) as a key point in the development of health educational interventions. Moreover, to promote clinical usefulness, interventions should be described in depth as

proposed by the Template for Intervention Description and Replication (TIDieR) checklist (Hoffmann et al., 2014).

4.2. Clinical implications

In addition to underlining this need, our review has other implications for future research and clinical practice. First, because it could be a help to decide what format seems to be more effective in breast cancer survivors to improve their quality-of-life, being the mixed modality, which seems to be the most effective. Secondly, because advances in the knowledge of some actual modalities – such as online/mixed – could have important benefits to create socio-economical savings, gain patient autonomy or develop more dynamic interventions that fit the individual patient’s dairy life and arrangements. Finally, because it helps to understand that educational interventions should be involved in the process of developing better methods to have an effective educational process.

5. Conclusions

The existing evidence about the implementation of patient education programmes seems to support this intervention for quality of life improvement in breast cancer survivors. Among the different modalities of patient education studied, the combination of telephone and in-person formats seems to be the most useful approach for improving the quality of life in the short and long term. These results move us to hypothesise that an online modality that allows participants to interact with therapists in real time could be a more up-to-date mixed option for developing educational interventions nowadays in this population. However, its suitability needs to be tested.

Author contributions

P.M.M.: Conceptualization, Introduction, Methodology, Results, Discussion, Writing; J.J.J.R.: Conceptualization, Methodology and Results. A.R.T.: Methodology and Results; M.J.C.H: Conceptualization, Introduction, Discussion, Writing; All authors have read and agreed to the published version of the manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ejon.2023.102411>.

References

Admiraal, J.M., van der Velden, A.W.G., Geerling, J.I., et al., 2017. Web-based tailored psychoeducation for breast cancer patients at the onset of the survivorship phase: a multicenter randomized controlled trial. *J. Pain Symptom Manag.* 54 (4), 466–475. <https://doi.org/10.1016/j.jpainsymman.2017.07.009>.

Arnold, M., Morgan, E., Runggay, H., Mafra, A., Singh, D., Laversanne, M., et al., 2022. Current and future burden of breast cancer: global statistics for 2020 and 2040. *Breast* 66, 15–23. <https://doi.org/10.1016/j.breast.2022.08.010>.

Ashing, K.T., George, M., 2020. Exploring the efficacy of a paraprofessional delivered telephonic psychoeducational intervention on emotional well-being in African American breast cancer survivors. *Support. Care Cancer* 28 (3), 1163–1171. <https://doi.org/10.1007/s00520-019-04899-7>.

Ashing, K.T., Miller, A.M., 2016. Assessing the utility of a telephonically delivered psychoeducational intervention to improve health-related quality of life in African American breast cancer survivors: a pilot trial. *Psycho Oncol.* 25 (2), 236–238. <https://doi.org/10.1002/pon.3823>.

Cadorin, L., Bagnasco, A., Rocco, G., Sasso, L., 2014. An integrative review of the characteristics of meaningful learning in healthcare professionals to enlighten

- educational practices in health care. *Nurs Open* 1 (1), 3–14. <https://doi.org/10.1002/np2>.
- Cashin, A.G., McAuley, J.H., 2020. Clinimetrics: physiotherapy evidence database (PEDro) scale. *J. Physiother.* 66 (1), 59. <https://doi.org/10.1016/j.jphys.2019.08.005>.
- Çınar, D., Karadakovan, A., Erdoğan, A.P., 2021. Effect of mobile phone app-based training on the quality of life for women with breast cancer. *Eur. J. Oncol. Nurs.* 52, 101960. <https://doi.org/10.1016/j.ejon.2021.101960>.
- Dolbeault, S., Cayrou, S., Brédart, A., et al., 2009. The effectiveness of a psycho-educational group after early-stage breast cancer treatment: results of a randomized French study. *Psycho Oncol.* 18 (6), 647–656. <https://doi.org/10.1002/pon.1440>.
- Du, S., Hu, L., Dong, J., Xu, G., Jin, S., Zhang, H., Yin, H., 2015. Patient education programs for cancer-related fatigue: a systematic review. *Patient Educ. Counsel.* 98 (11), 1308–1319. <https://doi.org/10.1016/j.pec.2015.05.003>.
- Faury, S., Koleck, M., Foucaud, J., M'Bailara, K., Quintard, B., 2017. Patient education interventions for colorectal cancer patients with stoma: a systematic review. *Patient Educ. Counsel.* 100 (10), 1807–1819. <https://doi.org/10.1016/j.pec.2017.05.034>.
- Gass, J., Mitchell, S., Hanna, M., 2019. How do breast cancer surgery scars impact survivorship? Findings from a nationwide survey in the United States. *BMC Cancer* 19 (1), 342. <https://doi.org/10.1186/s12885-019-5553-0>.
- Harrer, M., Cuijpers, P., Furukawa, T.A., Ebert, D.D., 2021. Doing Meta-Analysis with R. Chapman and Hall/CRC. <https://doi.org/10.1201/9781003107347>.
- Higgins, J., Thomas, J., 2021. In: Higgins, J.G.S. (Ed.), *Cochrane Handbook for Systematic Reviews of Interventions Version 6.2, 2021*. <https://training.cochrane.org/handbook/current>.
- Hoffmann, T.C., Glasziou, P.P., Boutron, I., et al., 2014. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *Br Med J* 348 (mar07 3), g1687. <https://doi.org/10.1136/bmj.g1687>.
- Hutton, B., Salanti, G., Caldwell, D.M., et al., 2015. The PRISMA extension statement for reporting of systematic reviews incorporating network meta-analyses of health care interventions: checklist and Explanations. *Ann. Intern. Med.* 162 (11), 777. <https://doi.org/10.7326/M14-2385>.
- Johns, S.A., Stutz, P.V., Talib, T.L., et al., 2020. Acceptance and commitment therapy for breast cancer survivors with fear of cancer recurrence: a 3-arm pilot randomized controlled trial. *Cancer* 126 (1), 211–218. <https://doi.org/10.1002/ncr.32518>.
- Juarez, G., Hurria, A., Uman, G., Ferrell, B., 2013. Impact of a bilingual education intervention on the quality of life of latina breast cancer survivors. *Oncol. Nurs. Forum* 40 (1), E50–E60. <https://doi.org/10.1188/13.ONF.E50-E60>.
- Jurys, T., Kupilas, A., Rajwa, P., Bryniarski, P., Burzyński, B., 2022. Role of preoperative patient education among prostate cancer patients treated by radical prostatectomy. *Cent European J Urol* 75 (3), 272–276. <https://doi.org/10.5173/ceju.2022.0037>.
- Khan, N.F., Rose, P.W., Evans, J., 2012. Defining cancer survivorship: a more transparent approach is needed. *J Cancer Surviv* 6 (1), 33–36. <https://doi.org/10.1007/s11764-011-0194-6>.
- Kickbusch, I., 2004. *The End of Public Health as We Know it: Constructing Global Health in the 21st Century*.
- Kim, S., Kim, K., Mayer, D., 2017. Self-management intervention for adult cancer survivors after treatment: a systematic review and meta-analysis. *Oncol. Nurs. Forum* 44 (6), 719–728. <https://doi.org/10.1188/17.ONF.719-728>.
- Kimman, M.L., Dirksen, C.D., Voogd, A.C., et al., 2011. Nurse-led telephone follow-up and an educational group programme after breast cancer treatment: results of a 2×2 randomised controlled trial. *Eur. J. Cancer* 47 (7), 1027–1036. <https://doi.org/10.1016/j.ejca.2010.12.003>.
- Lee, M.K., Yun, Y.H., Park, H.-A., Lee, E.S., Jung, K.H., Noh, D.-Y., 2014. A Web-based self-management exercise and diet intervention for breast cancer survivors: pilot randomized controlled trial. *Int. J. Nurs. Stud.* 51 (12), 1557–1567. <https://doi.org/10.1016/j.ijnurstu.2014.04.012>.
- Lorig, K.R., Holman, H.R., 2003. Self-management education: history, definition, outcomes, and mechanisms. *Ann. Behav. Med.* 26 (1), 1–7.
- Lovelace, D.L., McDaniel, L.R., Golden, D., 2019. Long-term effects of breast cancer surgery, treatment, and survivor care. *J. Midwifery Wom. Health* 64 (6), 713–724. <https://doi.org/10.1111/jmwh.13012>.
- Marie, N., Lockett, T., Davidson, P.M., Lovell, M., Lal, S., 2013. Optimal patient education for cancer pain: a systematic review and theory-based meta-analysis. *Support. Care Cancer* 21 (12), 3529–3537. <https://doi.org/10.1007/s00520-013-1995-0>. Epub 2013 Oct 2. PMID: 24085650.
- Martínez-Miranda, P., Casuso-Holgado, M.J., Jesús Jiménez-Rejano, J., 2021. Effect of patient education on quality-of-life, pain and fatigue in breast cancer survivors: a systematic review and meta-analysis. *Clin. Rehabil.* 35 (12), 1722–1742. <https://doi.org/10.1177/02692155211031081>.
- Meneses, K., McNeese, P., Azuero, A., Loerzel, V.W., Su, X., Hassey, L.A., 2009. Preliminary evaluation of psychoeducational support interventions on quality of life in rural breast cancer survivors after primary treatment. *Cancer Nurs.* 32 (5), 385–397. <https://doi.org/10.1097/NCC.0b013e3181a850e6>.
- Meneses, K.D., McNeese, P., Loerzel, V.W., Su, X., Zhang, Y., Hassey, L.A., 2007. Transition from treatment to survivorship: effects of a psychoeducational intervention on quality of life in breast cancer survivors. *Oncol Nurs Forum* 34 (5), 1007–1016. <https://doi.org/10.1188/07.ONF.1007-1016>.
- Omid, Z., Kheirkhah, M., Abolghasemi, J., Haghighat, S., 2020. Effect of lymphedema self-management group-based education compared with social network-based education on quality of life and fear of cancer recurrence in women with breast cancer: a randomized controlled clinical trial. *Qual. Life Res.* <https://doi.org/10.1007/s1136-020-02455-z>.
- Park, J.-H., Bae, S.H., Jung, Y.S., Kim, K.S., 2012. Quality of life and symptom experience in breast cancer survivors after participating in a psychoeducational support program. *Cancer Nurs.* 35 (1), E34–E41. <https://doi.org/10.1097/NCC.0b013e318218266a>.
- Puhan, M.A., Schunemann, H.J., Murad, M.H., et al., 2014. A GRADE Working Group approach for rating the quality of treatment effect estimates from network meta-analysis. *Br Med J* 349 (sep24 5), g5630. <https://doi.org/10.1136/bmj.g5630>.
- Sanabria, A.J., Rigau, D., Rotaache, R., Selva, A., Marzo-Castillejo, M., Alonso-Coello, P., 2015. Sistema GRADE: metodología para la realización de recomendaciones para la práctica clínica. *Atención Primaria* 47 (1), 48–55. <https://doi.org/10.1016/j.aprim.2013.12.013>.
- Shim, S.R., Kim, S.-J., Lee, J., Rucker, G., 2019. Network meta-analysis: application and practice using R software. *Epidemiol Health* 41, e2019013. <https://doi.org/10.4178/epih.e2019013>.
- Sung, H., Ferlay, J., Siegel, R.L., Laversanne, M., Soerjomataram, I., Jemal, A., et al., 2021. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA A Cancer J. Clin.* 71 (3), 209–249. <https://doi.org/10.3322/caac.21660>.
- Urquhart, O., Tampi, M.P., Pilcher, L., et al., 2019. Nonrestorative treatments for caries: systematic review and network meta-analysis. *J. Dent. Res.* 98 (1), 14–26. <https://doi.org/10.1177/0022034518800014>.
- Van Dijk, S., Nelissen, P., Verbelen, H., Tjalma, W., Gebruers, N., 2016. The effects of physical self-management on quality of life in breast cancer patients: a systematic review. *Breast* 28, 20–28. <https://doi.org/10.1016/j.breast.2016.04.010>.
- Wang, K., Yee, C., Tam, S., Drost, L., Chan, S., Zaki, P., Rico, V., Ariello, K., Dasios, M., Lam, H., De Angelis, C., Chow, E., 2018. Prevalence of pain in patients with breast cancer post-treatment: a systematic review. *Breast* 42, 113–127.
- White, J., Dixon, S., 2015. Nurse led Patient Education Programme for patients undergoing a lung resection for primary lung cancer. *J. Thorac. Dis.* 7 (Suppl. 2), S131–S137. <https://doi.org/10.3978/j.issn.2072-1439.2015.03.11>.
- World Health Organization. Regional Office for Europe, 1998. *Therapeutic Patient Education: Continuing Education Programmes for Health Care Providers in the Field of Prevention of Chronic Diseases: Report of a WHO Working Group*. WHO Regional Office for Europe, Copenhagen.
- Yun, Y.H., Lee, K.S., Kim, Y.-W., et al., 2012. Web-based tailored education program for disease-free cancer survivors with cancer-related fatigue: a randomized controlled trial. *J. Clin. Oncol.* 30 (12), 1296–1303. <https://doi.org/10.1200/JCO.2011.37.2979>.