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Systematic or Meta-analysis Studies

Systematic review and meta-analysis of patient reported outcomes for nurse-led models of survivorship care for adult cancer patients

Leanne Monterosso[a,b,c,d,*], Violet Platt[a,c,e], Max Bulsara[f,g,h], Melissa Berg[a]

[a] School of Nursing & Midwifery, University of Notre Dame Australia, PO Box 1225, Fremantle, Western Australia 6959, Australia
[b] St John of God Murdoch Hospital, 100 Murdoch Dr, Murdoch, Western Australia 6150, Australia
[c] School of Nursing and Midwifery, Edith Cowan University, 270 Joondalup Drive, Western Australia 6027, Australia
[d] School of Health Professions, Murdoch University, 90 South Street, Murdoch, Western Australia 6150, Australia
[e] WA Cancer & Palliative Care Network, A Block, Sir Charles Gairdner Hospital, Hospital Ave, Nedlands, Western Australia 6009, Australia
[f] Institute for Health Research, University of Notre Dame Australia, PO Box 1225, Fremantle, Western Australia 6959, Australia
[g] School of Population and Global Health, University of Western Australia, 35 Stirling Hwy, Crawley WA 6009, Australia
[h] University College London, Gower St, Bloomsbury, London WC1E 6BT, United Kingdom

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ABSTRACT

Purpose: This systematic review aimed to determine the effectiveness of nurse-led cancer survivorship care, compared with existing models of care, on patient reported outcomes for cancer survivors.

Methods: Randomised and non-randomised controlled trials and controlled before-after studies published in English between 1 January 2007 and 28 July 2017 were identified in bibliographic databases including Medline, Pubmed and PsychINFO. Included studies described nurse-led cancer care after treatment to adults (age ≥18 years) < 2 years post treatment completion. Risk of bias was assessed using Joanna Briggs Institute's tools and meta-analysis was undertaken.

Results: Twenty one publications were included describing 15 tumour-specific trials involving 3278 survivors of breast (n = 5), gynecological (n = 3), head and neck (n = 2), colorectal (n = 2), upper gastrointestinal (n = 2) and prostate (n = 1) cancers. Seven trials reported quality of life (QoL) using the EORTC QLQ-C30; participants receiving nurse-led care (4–6 months) had better cognitive (4 trials, 463 participants; mean difference [MD] = 4.04 [95% CI, 0.59–7.50]; p = 0.02) and social functioning (4 trials, 463 participants; MD = 3.06 [0.14–5.97]; p = 0.04) but worse appetite loss (3 trials, 354 participants; MD = 4.43 [0.08–8.78]; p = 0.05). After intervention completion, intervention participants had reduced fatigue (4 trials, 647 participants; MD = −4.45 [−7.93 to −0.97]; p = 0.01).

Conclusion: This systematic review synthesised outcomes of models of nurse-led survivorship care and contributes a meta-analysis of patient QoL to survivorship evidence. This review was limited by the risk of bias in many included studies for blinding of treatment personnel and outcome assessors. Nurse-led care appears beneficial for cancer survivors for some QoL domains.

Introduction

Advances in cancer care over the past three decades have led to dramatic improvements in survival rates with more than 66% of Australian cancer patients now surviving more than five years [1]. Multi-modal therapies are associated with numerous challenges for individuals who live with complex and debilitating side effects, that can interfere with wellbeing and quality of life (QoL), and disease-related problems [2]. These may include physical, psychological, social and existential needs manifesting as anxiety, fear of recurrence and uncertainty about the future; social isolation [2]; treatment effects including fatigue, sterility and loss of sexual function [3]; financial hardship and risk of second cancers and cardiovascular disease [4]. Cancer services in their current form may no longer have the capacity to provide care for the growth of patients who survive a cancer diagnosis, which in Australia will result in a projected overall increase of approximately 23–58% in the number of years lived with ill health or disability [5]. This has led to increased interest in nurse-led models of

* Corresponding author at: Chair of Nursing (Joint appointment with St John of God Murdoch Hospital), School of Nursing and Midwifery, The University of Notre Dame Australia, 19 Mouat St, PO Box 1225, Fremantle 6959, Australia.
E-mail addresses: leanne.monterosso@nd.edu.au (L. Monterosso), Violet.Platt@health.wa.gov.au (V. Platt), max.bulsara@nd.edu.au (M. Bulsara), melissa.berg@nd.edu.au (M. Berg).

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cancer survivorship care because of the opportunity to utilise advanced nursing roles and potential advantages over traditional follow-up including improved efficiency, quality of care and reduced costs [6]. This systematic review aims to determine the effectiveness of nurse-led cancer survivorship care compared with existing models for survivors who were diagnosed with cancer as adults (age ≥ 18 years) and who are < 2 years post treatment completion.

Comprehensive care for cancer survivors includes monitoring of: cancer spread; recurrence or second cancers; late effects or long term psychosocial and physical problems; preventative health; oral and dental health; legal and employment issues; and financial concerns [7]. The survivorship phase should involve reframing the patient's life which has been disrupted by cancer and the restoration of personal meaning. This can be guided by the International Classification of Functioning, Disability and Health (ICF) framework which defines health and health-related well-being domains according to function and restrictions from the perspective of the body, individual and society [8]. Providing information across the cancer continuum is an important aspect of care; it promotes coping and self-management and reduces anxiety, and, yet it is a frequently reported unmet need [9]. There is growing level I and II evidence for integration of healthy lifestyle behaviours as prevention strategies into routine care of patients with cancer [10–13]. It has been recommended that a written survivorship care plan and treatment summary are provided at the transition from the specialist to the survivorship program [14,15]. Recent evidence demonstrates that treatment summaries and care plans provided to patients with a verbal explanation lead to improved self-efficacy in patients more than 2 years from diagnosis, which is associated with a significantly lower risk of emergency presentation and hospitalisation [16].

A model of care defines the best practice, based on available evidence, for a group of patients with a particular disease including the care services and activities that should be provided at each stage, their location and health professionals who can best provide care [17]. Optimal care pathways (OCCP) are tumour-specific guides to best cancer care, recently endorsed nationally in Australia, which outline the critical steps in the care of a patient diagnosed with a particular cancer [18]. After initial treatment and recovery the OCCP describes the lead health care professional's role, although the profession is not stipulated. The Clinical Oncology Society of Australia (COSA) [15] defined critical components of a wellness model of cancer survivorship care as: survivor-centred; initiated at diagnosis; integrated across service levels at each stage; coordinated; promotes well-being; prevents illness; and has accessible and equitable care. In the COSA model care is directed by a needs assessment at diagnosis and on transition to follow-up. In addition, care is stratified after risk assessment for: disease related comorbidities and recurrence; treatment sequelae; existing comorbidities; and survivor ability and motivation to self-manage. A number of models of cancer survivorship care described in the literature are based in hospitals/cancer centres or the community and are led by: cancer specialists, nurses, family physicians, patients (self-managed) or shared care (two or more clinicians of different specialties) [19].

From a historical perspective, development and implementation of nurse led models of care has been varied and not well documented. Prior to the introduction of the first nurse-led models of care, advanced practice nursing roles had been developing for over twenty years (up to the late 1990s) in recognition of the need for nurses to extend their practice [20]. In 2003 Corner [6] reviewed the first nurse-led care models which were for chronic disease, highlighting that nursing roles at that time largely functioned within a restricted delegation model rather than a comprehensive advanced practitioner model. Corner reviewed emerging evidence for nurse-led care in cancer management through identification of a handful of studies. Although there is lack of clarity about what constitutes a nurse-led model of care [21,22] the following definition by Albarran (2005) is applied in this review "…in this model, a nurse is responsible for the overall co-ordination, management and continuity of care for a specific episode of treatment or intervention" [23]. A systematic review of qualitative studies identified key areas of patients' subjective experience of nurse-led clinics as being: therapeutic relationships enhanced by nurses' interpersonal skills and holistic approach; effective health communication, language and methods that meets patients' needs and health literacy levels, enabling patients' independent decisions; respect for specialist nurses' high level of clinical and medical knowledge; and patient-nurse collaboration empowering patients self-care and management [24]. Our recent work demonstrated that patients who received care from an experienced Cancer Nurse Coordinator (CNC) experienced a more coordinated patient journey and health professionals viewed the CNC role as a focal point of contact throughout the patient care trajectory; coordinating all aspects of patient care; providing patient education and information; and being reliable and accountable [25]. Reported barriers to implementation of nurse-led models of care include: funding and resource implications; developing service capacity to meet demand; time required to meet demands of a comparatively onerous audit culture; and lack of visibility and referrals [26].

Studies of nurse-led models of cancer follow-up have been conducted in the following cancer populations: prostate, colorectal, ovarian, oesophageal, breast, head and neck, mixed and lung [27–33]. Compared with physician-led follow-up, nurse-led follow-up was found to have comparable safety, adequate detection of cancer recurrence, equivalent health related QoL and patient satisfaction, reduced medical-specific costs, and similar overall costs [6,27]. Given the increasing interest in nurse-led models of care and recognition of the importance of cancer survivorship care, this systematic review aims to identify, review and synthesise publications which evaluated nurse-led models of cancer survivorship care. Specifically, the objective was to determine the effectiveness of nurse-led care compared with existing models of care for cancer survivors who were diagnosed with cancer as adults (age ≥ 18 years) and were < 2 years post treatment completion.

Method

This review followed Cochrane methodology [34] and used Joanna Briggs Institute's critical appraisal tools [35] to assess risk of bias in included studies.

Studies

This review included randomised controlled trials (RCTs), non-randomised controlled trials (NRCTs) and controlled before-after (CBA) studies. Only studies published in English were included.

Participants

Studies were included if participants were adult cancer patients (aged ≥18 years) who were < 2 years post cancer treatment completion.

Interventions

We included studies which evaluated cancer nurse-delivered cancer care, of any frequency or duration, for patients who completed cancer treatment < 2 years previously. The type of care included: monitoring; treatment and/or referral for recurrence; or assessment and treatment for side effects of treatment or QoL needs including physical, psychosocial, functional, financial, insurance, occupational, fertility, sexual function, sexuality and spiritual needs. Included studies compared the intervention with standard follow-up care for the tumour type in any treatment setting, for example delivered by a specialist or general practitioner, in a primary care or acute hospital setting.

Outcomes

The main outcomes reviewed were patient reported outcomes (e.g. physical and psychosocial symptoms) and other QoL indicators; resources (human, financial, time, and healthcare facilities) used; and benefits and

shortcomings of the model of care for patients, health professionals and/or the health system. Also considered were: tumour types; key components of the intervention/nurse's role; patient inclusion criteria; timing of introduction during the treatment continuum including duration and frequency; and whether a survivorship care plan and/or treatment summary was included. Each model of care was assessed in terms of the critical components of a wellness model of cancer survivorship care outlined by COSA [15].

Identification of studies

Studies published between 1 January 2007 and 28 July 2017 (previous 10 years) were identified through searches of the following bibliographic databases: Medline, Pubmed, PsychINFO, Scopus, Psychology & Behavioural Sciences Collection, Informit (Health Collection), CINAHL and PsychARTICLES. Our pre-study scoping for this study revealed there were few rigorously evaluated nurse-led cancer services published before our search date range which utilised a comprehensive advanced practitioner model [6] and the definition of what constitutes nurse-led care was inconsistent [23]. Since then, nurse-led care has evolved [27] and our intention was to include interventions which would best fit with current nursing roles and be applicable to current health services. Evidence-based practice and clinical practice guideline databases were also searched: JBI Connect, Worldviews on Evidence-based Nursing, Database of Abstracts of Reviews of Effects and Cochrane Library of Systematic Reviews. The following were hand searched: Nursing Research Journal; National Institute for Health and Care Excellence; National Guideline Clearinghouse and NHMRC Clinical Practice Guidelines Portal Australia. Keywords were selected from relevant publications and additional keywords were found by searching the Medical Subject Headings database (http://www.ncbi.nlm.nih.gov/). The search strategy was tested and the final strategy and keywords were decided by the research team (Table 1). Both spelling variations of tumour (tumor) were included in searches of all sources, apart from JBI Connect, in which the 'tumor' variant was inadvertently omitted; this is an Australian resource, a language in which the ‘tumour’ spelling is used, which provided a small proportion (6%) of our total search results; later testing revealed that adding the ‘tumor’ variant would only have resulted in an approximate and negligible 2% change to results. Depending on database functionality, truncation and wildcard searching were allowed and limits to English language and human studies were applied.

Data collection

A total of 8824 results were obtained from bibliographic databases. Following removal of a large proportion of duplicates 5077 articles were included. Of these, 4355 citations were excluded based on the title and 722 abstracts were screened. One hundred and seventy-six full-text articles were retrieved and further assessed for eligibility. Of these 21 articles met the inclusion criteria. A total of 155 articles were excluded for reasons shown in Fig. 1 which describes the data evaluation phase using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses [36]. Three papers, which otherwise met inclusion criteria, were excluded because two were earlier precursor trials or feasibility tests of included studies and for one paper we were unable to assess methodological quality of study processes due to lack of clarity in the final published paper. Abstracts or dissertations were excluded. One reviewer independently selected relevant titles and abstracts (MB), and all problematic decisions were discussed with a second reviewer (LM). Both reviewers confirmed the final list of included papers met the inclusion criteria. The reference lists of included studies were searched for suitable articles and relevant titles underwent the same review process described.

Outcome measures data described above, along with publication information, study characteristics, participant information, key components of the nurse-led intervention, and main findings, were extracted from each included paper by one reviewer (MB) and were checked by a second reviewer (LM). Risk of bias of included studies were independently assessed by two reviewers (LM, MB) by use of Joanna Briggs Institute’s critical appraisal tools for RCTs and Quasi-Experimental Studies [35] and discrepancies were resolved by discussion.

Data synthesis

The narrative synthesis presented findings where three or more included studies measured conceptually similar outcomes and included: quality of life and psychological measures; symptoms; patient satisfaction; and economic measures. RevMan (Review Manager version 5.3.5) [37] was used to conduct meta-analyses where three or more studies had used the same instrument and reported a group mean, standard deviation and sample size. Seven studies used the EORTC QLQ-C30 instrument (four reported all sub-scales) and three used the CES-D; both instruments report continuous data. Because the timing of intervention initiation

Table 1
Search categories and terms for nurse-led models of cancer survivorship care. Keywords were truncated according to database settings to allow for multiple endings for these words. The “or” operator, or equivalent according to each database, was used between the search terms within each category i.e. cancer, survivorship, models of care and nursing. The “and” operator, or equivalent, was used to combine the categories of search terms into one search.

Category	1. Cancer	2. Survivorship	3. Models of care	4. Nursing
Search terms	Cancer	After cancer	Care	Clinical nurse specialist
	Carcinoma	After treatment/s	Continuity of patient care	Macmillan nurse
	Malignancy	Cancer survivor/s	Follow up studies	Nurse
	Neoplasm	Follow-up	Health care	Nurse practitioner
	Oncology	Late effects	Healthcare	Nurse specialist
	Tumour	Life after cancer	Health care delivery	Nurse’s practice patterns
		Life after cancer care	Healthcare delivery	Nurse’s role
		Living with cancer	Health service	Nurse-led
		Long term effects	Health status	Nurse-led service
		Long-term survivor/s	Managed care	Nursing administration research
		Post treatment/s	Model of care	Nursing intervention
		Survivor/s	Oncology model	Nursing model
		Survivorship	Optimal care pathway	Nursing staff
		Survivorship care	Optimal pathway	Oncology nursing
			Outcome	Specialist nurse
			Patient care planning	
			Patient education	
			Quality of life	
			Rehabilitation	
			Self care	
			Self-management	
			Survivorship care plan	

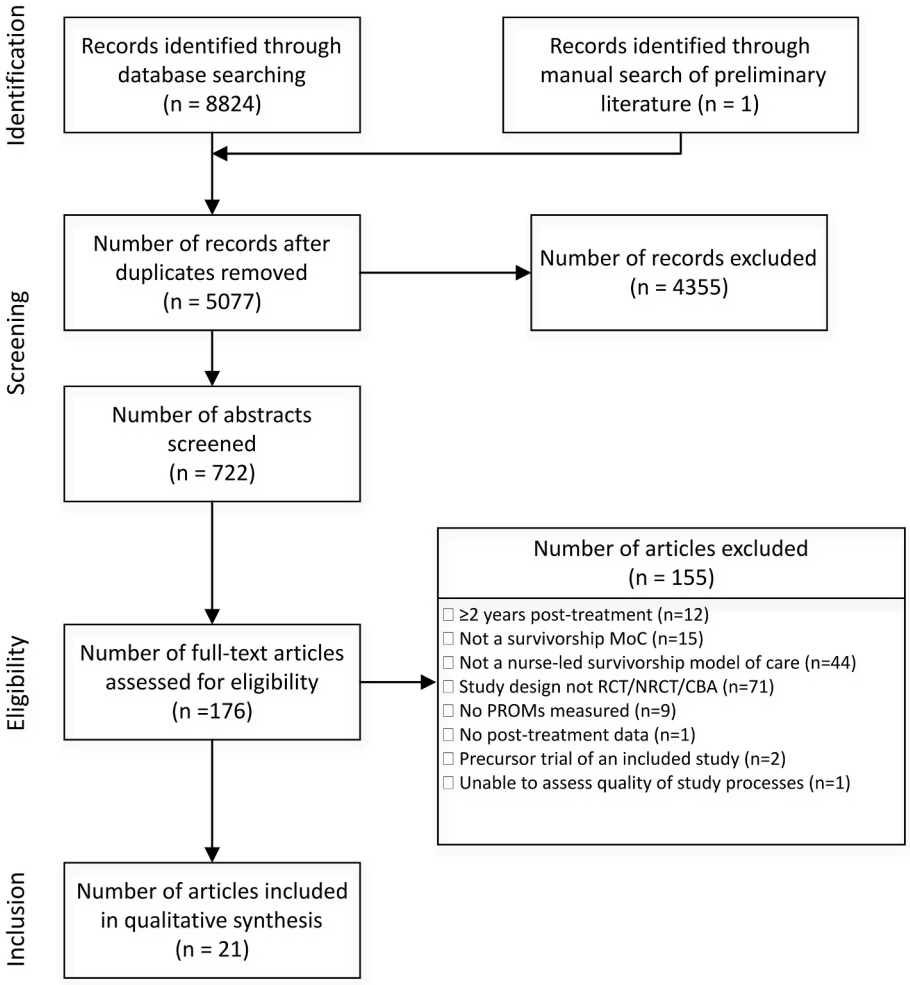

Fig. 1. Search results and screening for nurse-led cancer survivorship models of care reported using the PRISMA.

relative to cancer treatment and intervention duration varied across studies, all outcomes were categorized based on time since the start of the intervention which was treated as a sub-group in the analysis: during the intervention up to 3 months, 4–6 months and 7–23 months, and after completion of the intervention. Studies which reported measurement times in terms of time since baseline were realigned relative to intervention start and if baseline measures occurred during a long recruitment period, the median time between baseline and intervention start was used to re-align the data. Where studies used repeated measurements within a defined time period, the data was averaged within groups. For each study reporting findings for the specified domain within the time period, the mean difference between intervention and control groups and 95% CI was calculated. A random effects inverse variance model was used. Pooled results by time period and individual results are presented using forest plots. Heterogeneity was determined using the Chi^2 test ($p < 0.10$) [38] and the I^2 statistic (0–30% low, 30–50% moderate, > 50% substantial) [38,39]. For reasons of brevity, only meta-analyses with a significant overall effect test at any time period are presented in this paper. The corresponding author can be contacted regarding the remaining non-significant meta-analyses.

Results

Description of included studies

Twenty one [30,31,40–58] publications described 15 interventions of nurse-led models of care for cancer survivorship. Extracted data are presented in Supplement 1; six publications [44,50–52,54,55] were secondary analyses of included trials (e.g. economic, rural or a long term time point) and their findings are considered together with the original publication in this review and are reported in the same table row. Twelve studies were RCTs, two were CBA studies and one was a randomised case-control study. The interventions were compared to physician-led follow-up [41,46,48,56,57], conventional nursing care [47,53], usual multi-disciplinary hospital care [43], no intervention [42] or usual care (provider not described) [30,45,58]. Some comparison groups consisted of "attention control", with referral to physicians if needed [40,49], or attention control in addition to multi-disciplinary care [31].

Participant characteristics

Total sample sizes of studies ranged from N = 70 [40] to N = 756 [58]; most studies had two groups of equivalent size, apart from one study with 3 groups (2 experimental, 1 control) [53] and one 2x2 factorial design RCT [43]. The average age of participants, reported for the total sample or each study group separately, ranged from 46.1 to 70.2 years. Details of anticancer treatment varied in each study and are shown in Supplement 1. Eligible participants in the majority of studies (12 of 15) had received surgical treatment with or without chemotherapy or radiation therapy. No studies reported patients had received immunotherapy.

Description of interventions

Models of care were tumour-specific and for adult survivors with the following cancers: breast [31,42,43,45,53], gynecological [40,47,49], head and neck [41,56], colorectal [30,58], oesophageal or gastric

cardia [48,57] and prostate [46]. Two interventions commenced during surgical inpatient treatment and provided preoperative, postoperative and discharge care for gynaecological cancer patients with follow-up at home [40] or discharge care for oesophageal and gastric cardia cancer patients with telephone follow-up [48]. Of the remaining interventions, the majority commenced after treatment completion [30,31,41–43,46,47,56-58], while in three studies care began during outpatient treatment [45,49,53]. Care settings and/or modalities included: an outpatient setting [42,56]; both outpatient and telephone follow-up [30,31,41]; telephone follow-up [45,46,48,53,58] with optional outpatient clinic visits [43]; both telephone follow-up and home visits [47,49] or only home visits [57]. Most interventions continued for 6 months [31,46-49,53,58], or continued for either 3 months [30,40], 12 months [41,56,57], 18 months [43], up to 5 years [45] or involved only one consultation after treatment [42]. Almost all followed a planned follow-up schedule of predominantly evenly spaced visits [31,41,43,46,47,53,56]. However, some initially required frequent visits which reduced in frequency over time [30,48,49,58]. The interventions frequently involved six visits [41,46,53,56,57], or less [30,40,42,43,58] however, one involved eight visits [31] and three involved more than 12 visits [47–49]. One had an open access model and the average number of patient contacts was not reported [45].

The qualifications and experience of nurses were incompletely described across studies. Nurses were generally described as either oncology nurses or advanced practice nurses, or sometimes both (Supplement 1). In a number of studies nurses were trained for delivery of the intervention [30,31,41,43,56–58]. In the majority of interventions, nurses provided the following three elements of care: patient assessment, general management of a problem and patient education or advice [30,31,40,41,43,45,46,48,49,56,58] while others provided one or two elements [42,53,57]. A few interventions included discharge planning [40,43,48] with several designed to promote well-being and prevent illness [30,31,42,45,47–49,53], or well-being alone [56,58]. Nurses made referrals to other health care providers [41,46,48,49,57] or ordered and/or reviewed tests [43,45] in some models of care. A patient manual or resource was used in five survivorship models of care [30,31,40,42,45].

Many models of care included some of the recommended features of survivorship care such as individualised care [30,31,41,43,45,46,48,49,56–58] and patient self-management [31,40,43,45,49,53,58]. Inclusion of the following elements of survivorship care was less frequently observed: integration of care across service levels [40,45,46,57,58]; coordinated care [46,48,49,58]; survivorship care plans and treatment summaries [30,42] and risk stratification [45,46,49]. Some issues regarding whether care was accessible or equitable were identified with almost all studies, likely related to the constraints of conducting a randomised controlled trial. Examples included the exclusion of patients with: higher grade, non-primary, or metastatic cancers; co-morbidities/disabilities; cognitive impairments; psychiatric illnesses/mental health conditions; illiteracy; or limited travel or phone access.

Description of outcomes

Aside from one study, all included a QoL measure as an outcome [30,41–43,45,47–49,53,56–58], or a cancer survivorship-specific QoL measure [31,40] for example, Quality of Life Scale/Cancer Survivors (QOL-CS). Most studies measured symptom outcomes, either tumour-specific [30,41,45–48,56,57] or more common cancer-related symptoms [42,49]. Some studies assessed patient anxiety [30,43,45,56], depression [30,42,45,49,56], distress [30,46,49,53,58], coping [53,56] or perceived stress [53]. In addition, three studies [43,49,53] measured more specific psychological measures e.g. affect regulation. Other survivorship outcomes included unmet needs or problems [30,42,58], cancer care coordination [58] and health literacy or perceived information provision [42,48]. A few studies measured family function, social constraint or support outcomes, or psycho-social adjustment [41,47,53,56] and three studies measured patient satisfaction [30,42,46].

Risk of bias

The assessment of risk of bias in each study is shown in Fig. 2. All studies were rated as having a high or unclear risk of bias for blinding of treatment personnel which is a probable consequence of the interventions being delivered by an alternative provider. Whether outcome assessors were blinded was not addressed in almost all studies, resulting in a predominantly unclear risk for this item. As patient reported outcomes were the primary outcomes in the included studies, whether outcomes were measured reliably was not applicable to most studies and there was low risk of bias in relation to whether outcomes were measured in the same way for all groups.

Effects of interventions

Quality of life

The duration and timing of interventions and outcome measurements varied between studies with many studies measuring outcomes at multiple times including at baseline, during the intervention period through to completion and post-completion follow-up. This review therefore considered findings in terms of four time periods: during the intervention up to 3 months [31,40,43,48,49,54,57,58], 4–6 months [31,41,45–49,54,57,58] and 7–23 months [43,45,54], and after completion of the intervention [30,41,42,53,54,57]. Three studies reported group effects with other factors included in the analysis such as time in 2 way ANOVAs [53] or mixed effect regressions [49], or age in nested models [45].

In studies which measured QoL or specific domains, there were no significant differences between groups when measured during the intervention from 0 to 3 months and 4–6 months in: physical [41,48,57,58], emotional [41,43,48,57,58], role [43,48,57,58], social [41,48,57,58] and overall QoL [41,43,48,57,58]. Two studies measured QoL during the intervention (7–23 months), one demonstrated a beneficial intervention effect on physical and emotional function [54], while the other demonstrated no effect on emotional function and did not report physical QoL [43], and neither demonstrated an effect of the intervention on role or social function [43,54]. Three studies demonstrated a beneficial intervention effect when measured after its completion for overall QoL [41,47,54], physical [41], emotional [47,54], role [41,54], or social QoL domains [41,47]. Adverse intervention effects were less frequently demonstrated; one study found an effect in the QoL role domain when measured after the intervention [47]. Three studies investigated QoL outcomes in terms of change over time and found no significant differences between the experimental and control groups [45,49,53], but found significant effects of time [49,53] or a significant predictor of patient age [45]. Of the two studies which measured cancer survivorship-specific QoL during the intervention [31,40], both demonstrated a significant benefit of the intervention for overall QoL, and psychological and social domains. One study demonstrated beneficial effects of the intervention for physical and spiritual QoL domains [40] whereas the other showed no intervention effect in these domains [31].

Most studies found no difference between groups for psychological distress levels at any time period [30,41,46,58] or group differences with time included as a factor [53]. In studies which measured anxiety, no group differences were demonstrated at any time period [30,43,45,48]. Findings for depression were mixed. One intervention showed benefit during (approximately 10 months) and shortly after completion of the intervention but this difference was not sustained at longer term follow-up approximately 10 months later [54,56]. Another study found no group differences for depression following the intervention (3 months) or at long term follow-up (6 months) [42]. One study demonstrated significantly higher depressive symptoms in patients who received the nurse-led intervention during the intervention (6 months) [49].

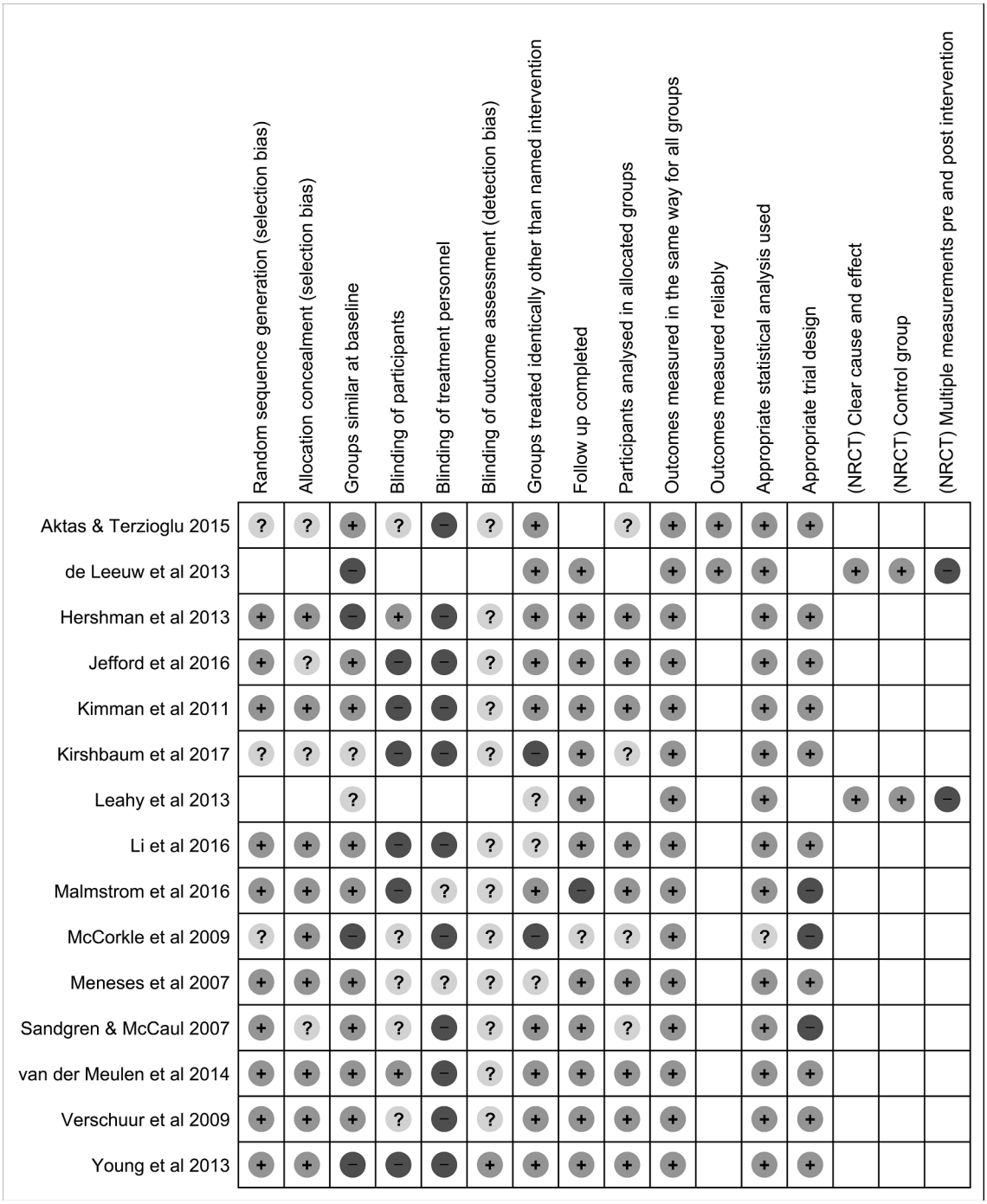

Fig. 2. Risk of bias summary: review authors' judgements about each risk of bias item for each included study. NRCT – Item only applicable to non-randomised controlled trial.

Symptoms and patient satisfaction

The following outlines specific QoL domain outcomes reported in three or more studies. Of studies which reported pain domain outcomes, no effect was found during the intervention when measured up to 3 months [48,57] or 4 to 6 months [41,48,57] however one study demonstrated that intervention participants experienced less pain at 7 to 23 months [54]. After completion of the intervention findings were mixed; two studies demonstrated a benefit to the intervention group [41,54] and three studies found no effect [30,57]. There were no significant differences in pain symptoms between groups when analysed in nested models with age included [45]. No effect of the intervention was demonstrated for any sexuality domains when measured during the intervention at up to 3 months [58], 4 to 6 months [41] or 7 to 23 months [54]. After the intervention, most studies found no effect of the intervention on sexuality [30,41,45,46,54] however, one demonstrated a benefit [47]. Several studies investigated body image however, no significant differences between groups at any time were reported [30,45,48]. In studies which measured unmet needs, including survivorship-specific measures, one study found reduced health worry in the intervention group post intervention [42] and two found no significant group difference during or after completion of the intervention [30,58]. One study found a significant benefit for the intervention in relation to patient satisfaction [30], another study found no difference [52] and another study showed increased satisfaction for spouses only [57].

Economic analyses

Three studies undertook economic evaluations or assessed economic implications. Two studies which substituted nurse-led care for usual care found cost reductions. Polinder et al. [52] found costs of nurse-led visits were significantly less than standard visits (€234 versus €503; $p < 0.001$). The average cost of nurse-led follow-up was lower than standard care (€2592 versus €3798; $p = 0.11$) even though more patients in the nurse-led group attended all five protocol visits (82% vs 60%; $p = 0.002$) [52]. Kimman et al [44] found that nurse-led telephone follow-up with group education was most cost-effective for mean annual costs (€3 971, 95%CI, 2975–5186) and had the second highest mean quality-adjusted life years (0.772, 95%CI, 0.745–0.797; highest 0.776, 95%CI, 0.753–0.799) of the strategies tested. McCorkle et al found that significantly fewer patients who received the nursing intervention had one or more primary care visits (mean = 2.75 (S.D. = 2.03) vs 3.59 (S.D. = 4.66)) during 6 months post-surgery however, the related costs were not reported [50].

Quality of life meta-analysis

Four significant mean differences between groups were found by meta-analysis, all were in domains of the EORTC QLQ-C30. During the intervention (4–6 months) in the intervention group, cognitive functioning was significantly higher by 4.04 units on average (MD = 4.04, 95%CI [0.59, 7.50], 463 participants, $p = 0.02$; $I^2 = 24\%$; Fig. 3) and social functioning was significantly higher by 3.06 units on average (MD = 3.06, 95%CI [0.14, 5.97], 463 participants, $p = 0.04$; $I^2 = 0\%$; Fig. 4). Appetite loss during the intervention (4–6 months) was significantly lower in the control group by 4.43 units on average (MD = 4.43, 95%CI [0.08, 8.78], 354 participants, $p = 0.05$; $I^2 = 0\%$; Fig. 5). After the intervention, symptoms of fatigue were significantly reduced in the intervention group by 4.45 units on average (MD = −4.45, 95%CI [−7.93, −0.97], 647 participants, $p = 0.01$; $I^2 = 15\%$; Fig. 6).

Discussion

This systematic review of literature published over a ten year period found 15 RCTs and CBA studies of nurse-led models of cancer survivorship care for patients with breast, gynecological, head and neck, colorectal, oesophageal or gastric cardia or prostate cancer, and who were within two years of treatment completion. The majority of nurse-led survivorship interventions commenced after treatment completion and continued for 6 months with a planned schedule of 6 or less evenly spaced visits. Care settings and intervention modalities varied and included outpatient, telephone, home or a combination of settings. Nurses were generally described as either oncology nurses or advanced practice nurses, or sometimes both, although this was incompletely described across studies. In most models of care, the nurse's role included at least two of the following elements: patient assessment, general management of a problem, and patient education or advice. Some recommended features of survivorship care [15] were delivered such as individualised care, patient self-management, illness prevention and well-being promotion however, other recommended elements were less frequently observed.

Almost all studies assessed QoL and most studies measured tumour-specific or common cancer-related symptom outcomes. Several also included psychological measures and some evaluated unmet needs, care coordination, health information and patient satisfaction. Generally, within studies, there were few significant differences between the control group and the nurse-led care group for most measures. Some studies demonstrated a benefit of nurse-led survivorship care post intervention completion on: emotional [47,54], physical [41], role [41,54], social [41,47] and global QoL [41,47,54]; pain [41,54]; sexuality [47]; and depression [54]. During the intervention, benefits of nurse-led care were found for emotional and physical QoL [54], and depression [54] and pain [54]. These findings were predominantly from two studies [41,54] which were notable for being the two head and neck tumour models of care, both of 12 months duration with 6 visits.

Meta-analysis of the EORTC-C30 scale scores synthesised the results from seven studies and found higher cognitive and social functioning in patients who were receiving the nurse-led survivorship intervention (4–6 months). Post intervention completion, patients who had received the nurse-led survivorship care intervention had significantly reduced fatigue symptoms. Although a number of previous reviews have focused on nurse-led models of survivorship care [27,59,60], this is one of the first known meta-analyses of patient QoL outcomes after nurse-led survivorship care. The finding that nurse-led care provides a benefit to cancer survivors in terms of cognitive and social QoL is an important contribution which suggests cancer nurses can assist survivors adjust to life after treatment and nurse-led care results in reduced fatigue symptoms for cancer survivors in the longer term.

One deleterious effect of nurse-led interventions found by meta-analysis was appetite loss (4–6 months) was significantly lower in the control group. Half of the weighting for this sub-group analysis was attributed to head and neck, esophageal and gastric cardia models of care. Side effects from these tumour groups and their treatment impact on appetite [61,62] and it is possible the interventions improved patients' abilities to identify and report symptoms of appetite loss as a consequence of nurses focusing care on these symptoms. Alternatively, this finding could indicate that nurse-led care during treatment does have a deleterious effect on appetite loss possibly through inappropriate or insufficient management of symptoms impacting on appetite. This would highlight a need for further nursing education, and/or referral to specialist health professionals such as dietitians or nutritionists to more appropriately support patients' symptoms of appetite loss. Post intervention completion, appetite loss scores were not significantly different in the meta- analysis; scores were evenly weighted from studies with participants with head and neck and colorectal tumours. Future research should explore these effects on appetite loss or malnutrition in patients who experience nurse-led models of survivorship care; qualitative nursing research may provide areas for future investigation of this issue. Two individual studies did report significantly worse scores in the intervention group for depression during the intervention (4–6 months) [49] and role functioning QoL post intervention [47]. Both evaluated nurse-led survivorship care for gynaecological cancers and one study had a number of concerns related to unclear or high risk of bias [49].

Apart from the meta-analysis and other significant findings discussed, there were no significant differences between the control and nurse-led care group for most measures. Although this suggests outcomes from nurse-led models of cancer survivorship care are not inferior to standard care, this conclusion cannot be drawn as the randomized controlled trials were not designed to demonstrate non-inferiority. Future prospective studies would need to determine the non-inferiority margin for death, recurrence, symptoms or QoL outcomes, for which this meta-analysis may provide some guidance, and would require a larger sample size due to the smaller margin and higher study power required [63].

As well as providing a benefit to patients, interventions should be sustainable and economically viable through a measurable reduction in costs, reduced workload and demand on current services. Although few studies included an economic analysis, the general hypothesis that nurse-led care substituted for usual care can be cost effective, neutral, or reduces health service utilisation appeared to be supported [44,52]. Some studies required multi-disciplinary team input for development of evidence based algorithms [41,46,58] or patient resources [30,31,45,49,54] and ongoing input may be required for their maintenance. Many interventions were supplementary to usual care and therefore would have financial and resource implications [30,41,47,48,54,58], whereas others may be practically difficult to implement routinely, in particular the multi-faceted home-based health promotion program by Li et al. [47].

Potential deficits in the construct of the nurse-led models of care were observed by this systematic review. Some interventions provided

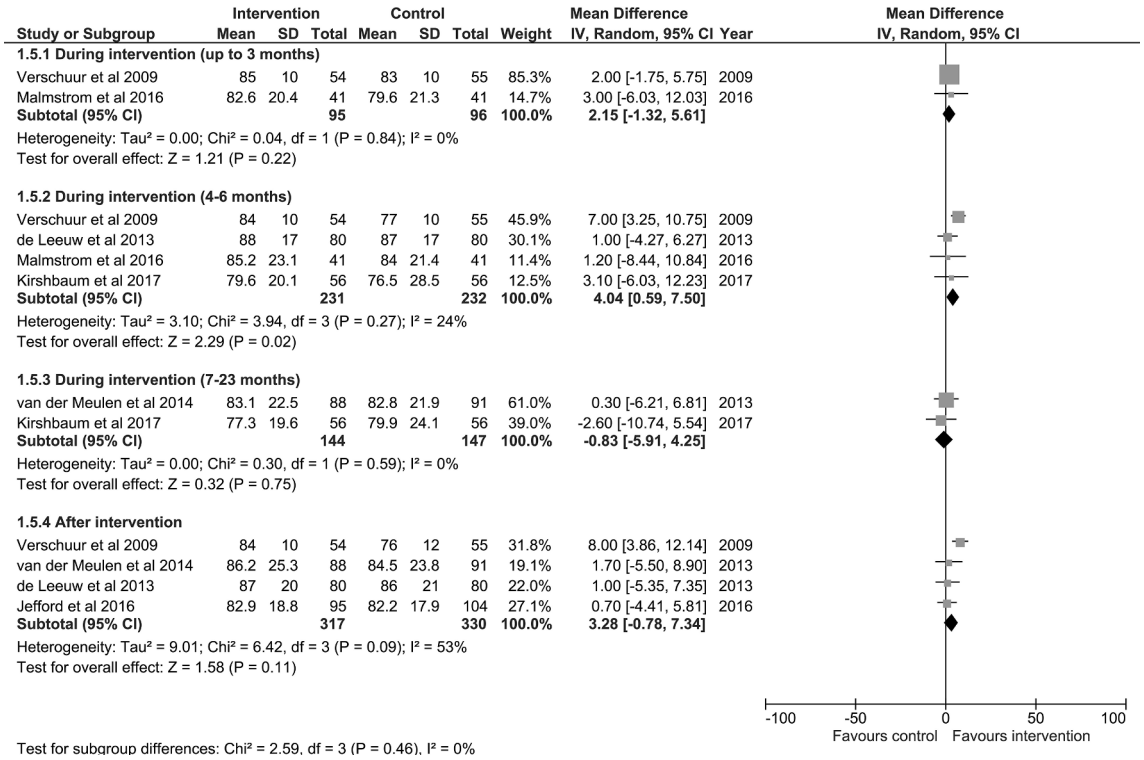

Fig. 3. Forest plot of comparison of cognitive function quality of life, measured by European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ), in cancer survivor intervention and control participants in studies of nurse-led cancer survivorship care.

support for patients to meet financial needs [31,41,42,45,48,54], occupation and/or insurance needs [30,31,42,45,54]. These needs have been identified as important areas of survivorship care [64,65] and in cancer care, the impact of financial toxicity for patients has been recently acknowledged [66]. Interestingly, despite consistent recommendations and recent evidence supporting their use [14,16], only two included interventions provided survivorship care plans and/or treatment summaries to patients [30,42].

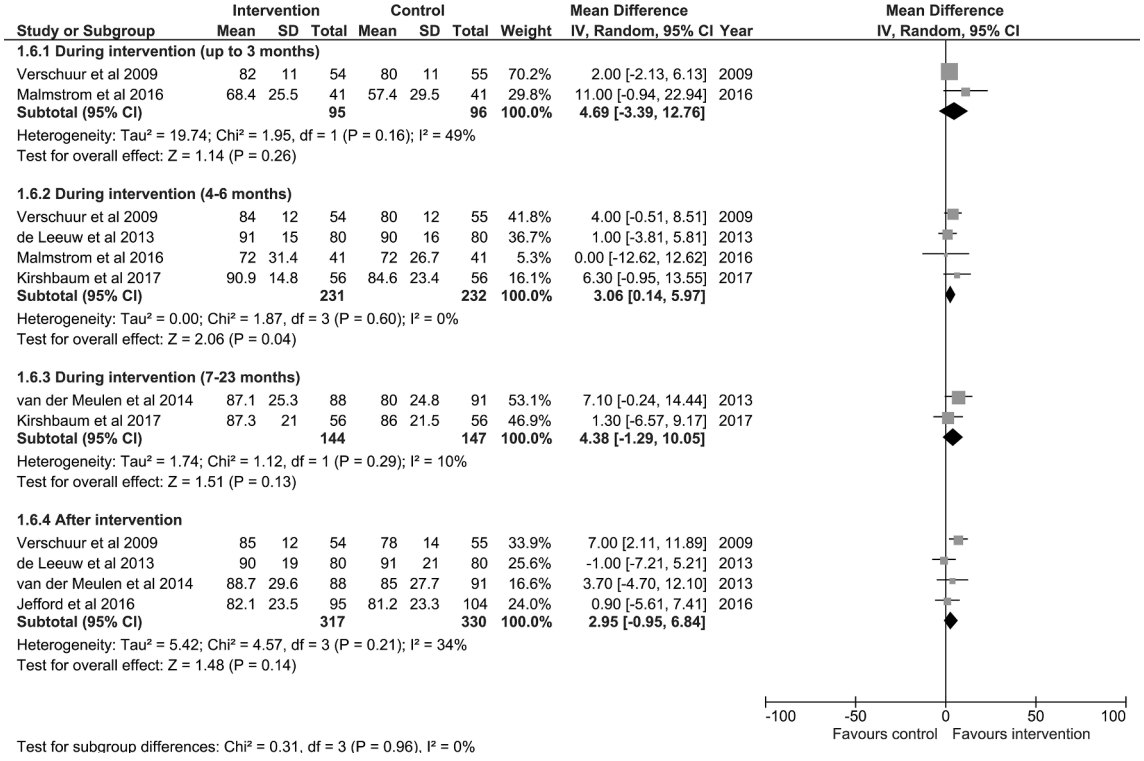

Fig. 4. Forest plot of comparison of social function quality of life, measured by European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ), in cancer survivor intervention and control participants in studies of nurse-led cancer survivorship care.

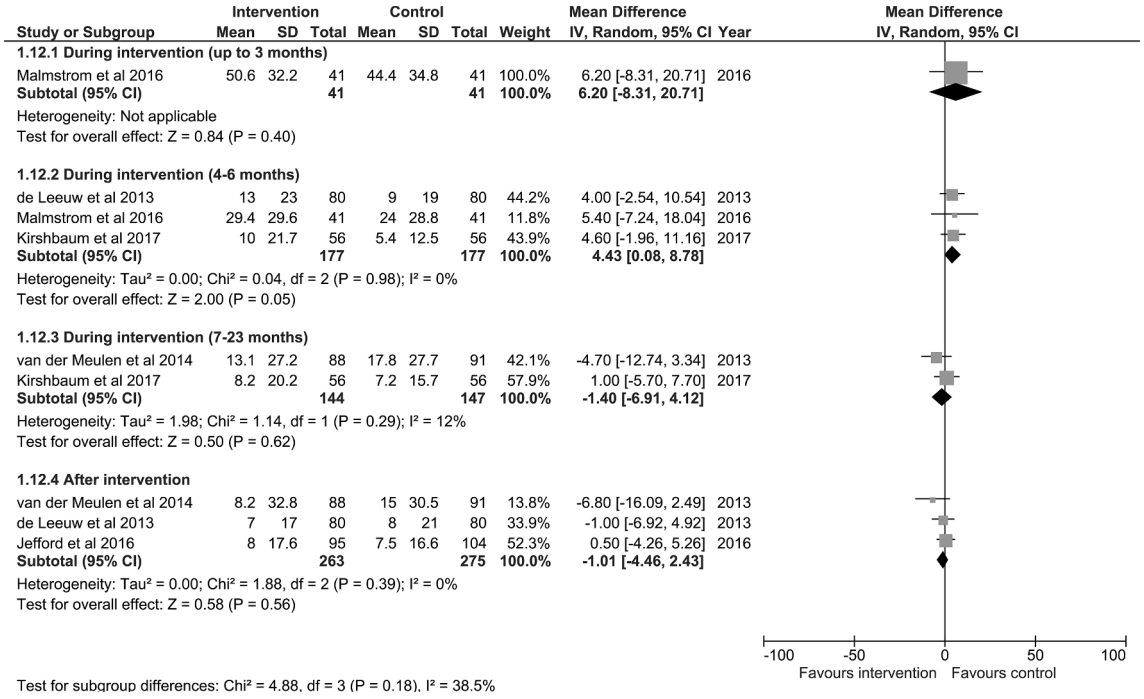

Fig. 5. Forest plot of comparison of appetite loss symptoms, measured by European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ), in cancer survivor intervention and control participants in studies of nurse-led cancer survivorship care.

Limitations

We acknowledge this review was limited by the focus on English articles and the omission of unpublished data. Therefore findings may reflect a publication bias. However, many studies appeared to have multi-disciplinary stakeholder investment which could potentially have improved the likelihood of publication regardless of findings. The meta-analysis strengthened findings of this review however we observed that three of the four significant findings included data from the same four publications due to the limited number of papers which used the EORTC-QLQ instrument in the time period analysed; this may have biased results however the studies used diverse tumour groups (n = 2 gastric; n = 1 head and neck, and n = 1 breast). An exploratory literature search identified that a number of randomised controlled trials

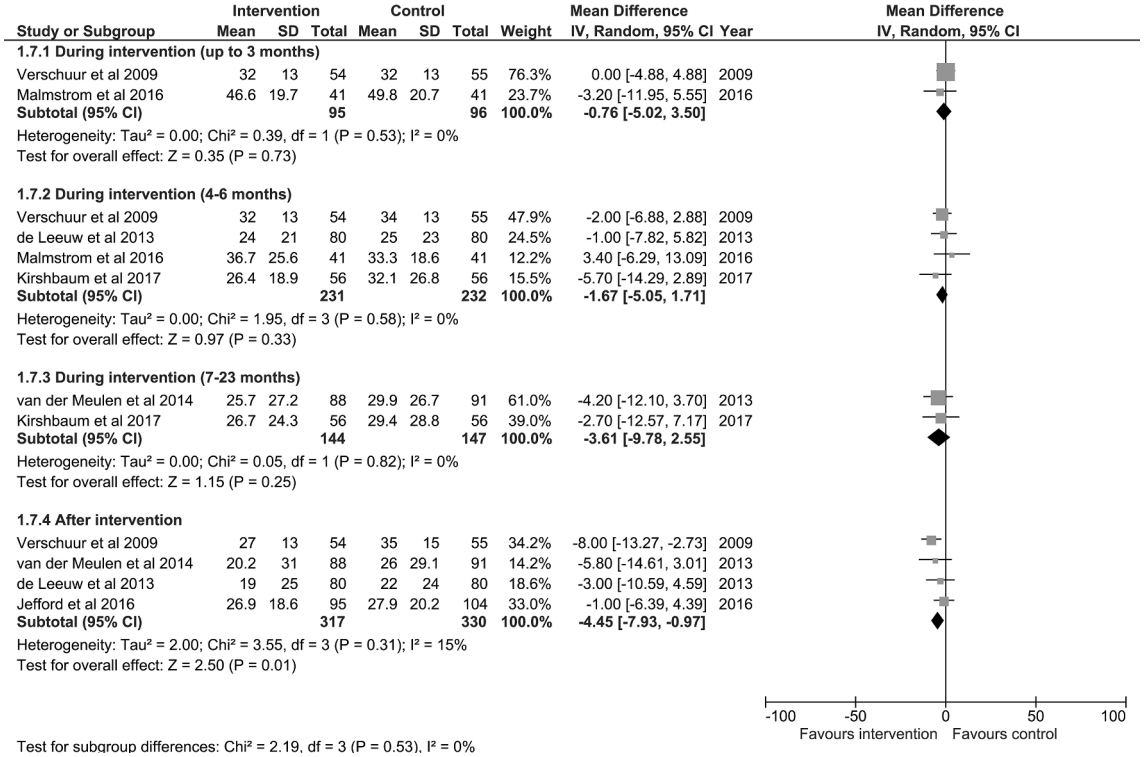

Fig. 6. Forest plot of comparison of fatigue symptoms, measured by European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ), in cancer survivor intervention and control participants in studies of nurse-led cancer survivorship care.

of nurse-led models of cancer survivorship care are currently underway [67–70]. As more data is published this meta-analysis should be repeated to verify the findings. Our literature search omitted some broad models of care terms, such as patient engagement, patient empowerment and patient activation, which should be considered in future reviews. However we propose the scope of our search terms enabled identification of the majority of relevant studies that used such methods.

Conclusion

This systematic review identified 15 RCT or CBA evaluations of nurse-led cancer survivorship models of care and presented a meta-analysis. The tumour-specific models of care for a variety of tumours were generally introduced after treatment completion with a planned schedule delivered over 6 months and provided patient assessment, clinical management of a problem, education or advice, individualised care, and supported self-management. Meta-analysis found a significant benefit to survivors who received nurse-led care for cognitive and social QoL, and fatigue; however control patients reported significantly lower appetite loss symptoms. This comprehensive systematic review provides a synthesis of nurse-led models of survivorship care, describes the patient outcomes compared with usual follow-up and contributes a meta-analysis of patient QoL outcomes to survivorship research. Role delegation to nurse-led survivorship care appears to be reliable and feasible, and shows good performance compared to standard approaches. A multi-disciplinary setting which provides comprehensive survivorship care, through access to other specialist non-physician providers, may be a necessary component of nurse-led models of care. As more RCTs are published, the meta-analysis of QoL findings should be repeated to confirm these findings and future studies of nurse-led models of survivorship care should consider appropriate study designs and measures to ensure applicability and transferability of findings.

Declaration of interest

None.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ctrv.2018.12.007.

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