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

Leanne Monterosso

*University of Notre Dame Australia, leanne.monterosso@nd.edu.au*

Violet Platt

Max Bulsara

*The University of Notre Dame Australia, max.bulsara@nd.edu.au*

Melissa Berg

*The University of Notre Dame Australia, melissa.berg@nd.edu.au*

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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  $\geq 18$  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 to 7.50]; p=0.02) and social functioning (4 trials, 463 participants; MD=3.06 [0.14 to 5.97]; p=0.04) but worse appetite loss (3 trials, 354 participants; MD=4.43 [0.08 to 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.

## **Keywords**

Cancer, survivor, systematic review, meta-analysis, nurse-led, model of care

## 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 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  $\geq 18$  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  $\geq 18$  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  $\geq 18$  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 Figure 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 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<sup>2</sup> test ( $p < 0.10$ ) [38] and the I<sup>2</sup> 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 [30,40-59] publications described 15 interventions of nurse-led models of care for cancer survivorship. Extracted data are presented in Supplement 2; six publications [44,50,51,53,55,56] 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 [41,46,48,57,58], conventional nursing care [47,54], usual multi-disciplinary hospital care [43], no intervention [42] or usual care (provider not described) [30,45,59]. 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 [59]; most studies had two groups of equivalent size, apart from one study with 3 groups (2 experimental, 1 control) [54] 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 2. 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 [42,43,45,52,54], gynecological [40,47,49], head and neck [41,57], colorectal [30,59], oesophageal or gastric cardia [48,58] 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 [30,41-43,46,47,52,57-59], while in three studies care began during outpatient treatment [45,49,54]. Care settings and/or modalities included: an outpatient setting [42,57]; both outpatient and telephone follow-up [30,41,52]; telephone follow-up [45,46,48,54,59] with optional outpatient clinic visits [43]; both telephone follow-up and home visits [47,49] or only home visits [58]. Most interventions continued for 6 months [46-49,52,54,59], or continued for either 3 months [30,40], 12 months [41,57,58], 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 [41,43,46,47,52,54,57]. However, some initially required frequent visits which reduced in frequency over time [30,48,49,59]. The interventions frequently involved six visits [41,46,54,57,58], or less [30,40,42,43,59] however, one involved eight visits [52] 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 an advanced practice nurses, or sometimes both (Supplement 2). In a number of studies nurses were trained for delivery of the intervention [30,41,43,52,57-59]. 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 [30,40,41,43,45,46,48,49,52,57,59] while others provided one or two elements [42,54,58]. A few interventions included discharge planning [40,43,48] with several designed to promote well-being and prevent illness [30,42,45,47-49,52,54], or well-being alone [57,59]. Nurses made referrals to other health care providers [41,46,48,49,58] 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 [30,40,42,45,52].

Many models of care included some of the recommended features of survivorship care such as individualised care [30,41,43,45,46,48,49,52,57-59] and patient self-management [40,43,45,49,52,54,59]. Inclusion of the following elements of survivorship care was less frequently observed: integration of care across service levels [40,45,46,58,59]; coordinated care [46,48,49,59]; 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 [30,41-43,45,47-49,54,57-59], or a cancer survivorship-specific QoL measure [40,52] for example, Quality of Life Scale/Cancer Survivors (QOL-CS). Most studies measured symptom outcomes, either tumour-specific [30,41,45-48,57,58] or more common cancer-related symptoms [42,49]. Some studies assessed patient anxiety [30,43,45,57], depression [30,42,45,49,57], distress [30,46,49,54,59], coping [54,57] or perceived stress [54]. In addition, three studies [43,49,54] measured more specific psychological measures e.g. affect regulation. Other survivorship outcomes included unmet needs or problems [30,42,59], cancer care coordination [59] and health literacy or perceived information provision [42,48]. A few studies measured family function, social constraint or support outcomes, or psycho-social adjustment [41,47,54,57] and three studies measured patient satisfaction [30,42,46].

## **Risk of bias**

The assessment of risk of bias in each study is shown in Figure 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 [40,43,48,49,52,55,58,59], 4-6 months [41,45-49,52,55,58,59] and 7-23 months [43,45,55], and after completion of the intervention [30,41,42,54,55,58]. Three studies reported group effects with other factors included in the analysis such as time in 2 way ANOVAs [54] 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 [41,48,58,59], emotional [41,43,48,58,59], role [43,48,58,59], social [41,48,58,59] and overall QoL [41,43,48,58,59]. Two studies measured QoL during the intervention (7-23 months), one demonstrated a beneficial intervention effect on physical and emotional function [55], 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 [43,55]. Three studies demonstrated a beneficial intervention effect when measured after its completion for overall QoL [41,47,55], physical [41], emotional [47,55], role [41,55], 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 [45,49,54], but found significant effects of time [49,54] or a significant predictor of patient age [45]. Of the two studies which measured cancer survivorship-specific QoL during the intervention [40,52], 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 [52].

Most studies found no difference between groups for psychological distress levels at any time period [30,41,46,59] or group differences with time included as a factor [54]. 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 [55,57]. 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].

### **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 [48,58] or 4 to 6 months [41,48,58] however one study demonstrated that intervention participants experienced less pain at 7 to 23 months [55]. After completion of the intervention findings were mixed; two studies demonstrated a benefit to the intervention group [41,55] and three studies found no effect [30,58]. 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 [59], 4 to 6 months [41] or 7 to 23 months [55]. After the intervention, most studies found no effect of the intervention on sexuality [30,41,45,46,55] 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 [30,59]. One study found a significant benefit for the intervention in relation to patient satisfaction [30], another study found no difference [53] and another study showed increased satisfaction for spouses only [58].

## 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 [53] 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%;  $p = 0.002$ ) [53]. 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,  $p = 0.02$ ;  $I^2 = 24\%$ ; Figure 3) and social functioning was significantly higher by 3.06 units on average (MD=3.06, 95%CI [0.14, 5.97], 463 participants,  $p = 0.04$ ;  $I^2 = 0\%$ ; Figure 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,  $p = 0.05$ ;  $I^2 = 0\%$ ; Figure 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,  $p = 0.01$ ;  $I^2 = 15\%$ ; Figure 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 [47,55], physical [41], role [41,55], social [41,47] and global QoL [41,47,55]; pain [41,55]; sexuality [47]; and depression [55]. During the intervention, benefits of nurse-led care were found for emotional and physical QoL [55], and depression [55] and pain [55]. These findings were predominantly from two studies [41,55] 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 [27,60,61], 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) that 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 [62,63] 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 [64].

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 [44,53]. Some studies required multi-disciplinary team input for development of evidence based algorithms [41,46,59] or patient resources [30,45,49,52,55] and ongoing input may be required for their maintenance. Many interventions were supplementary to usual care and therefore would have financial and resource implications [30,41,47,48,55,59], 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 support for patients to meet financial needs [41,42,45,48,52,55], occupation and/or insurance needs [30,42,45,52,55]. These needs have been identified as important areas of survivorship care [65,66] and in cancer care, the impact of financial toxicity for patients has been recently acknowledged [67]. 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].

## **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 of nurse-led models of cancer survivorship care are currently underway [68-71]. 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**

Declarations of interest: none

## **Acknowledgements**

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## **Figure titles**

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

Figure 2 Risk of bias summary: review authors' judgements about each risk of bias item for each study included in the meta-analysis of PROMs. NRCT - Item only applicable to non-randomised controlled trial.

Figure 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- cancer survivorship care.

Figure 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- cancer survivorship care.

Figure 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- cancer survivorship care.

Figure 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- cancer survivorship care.

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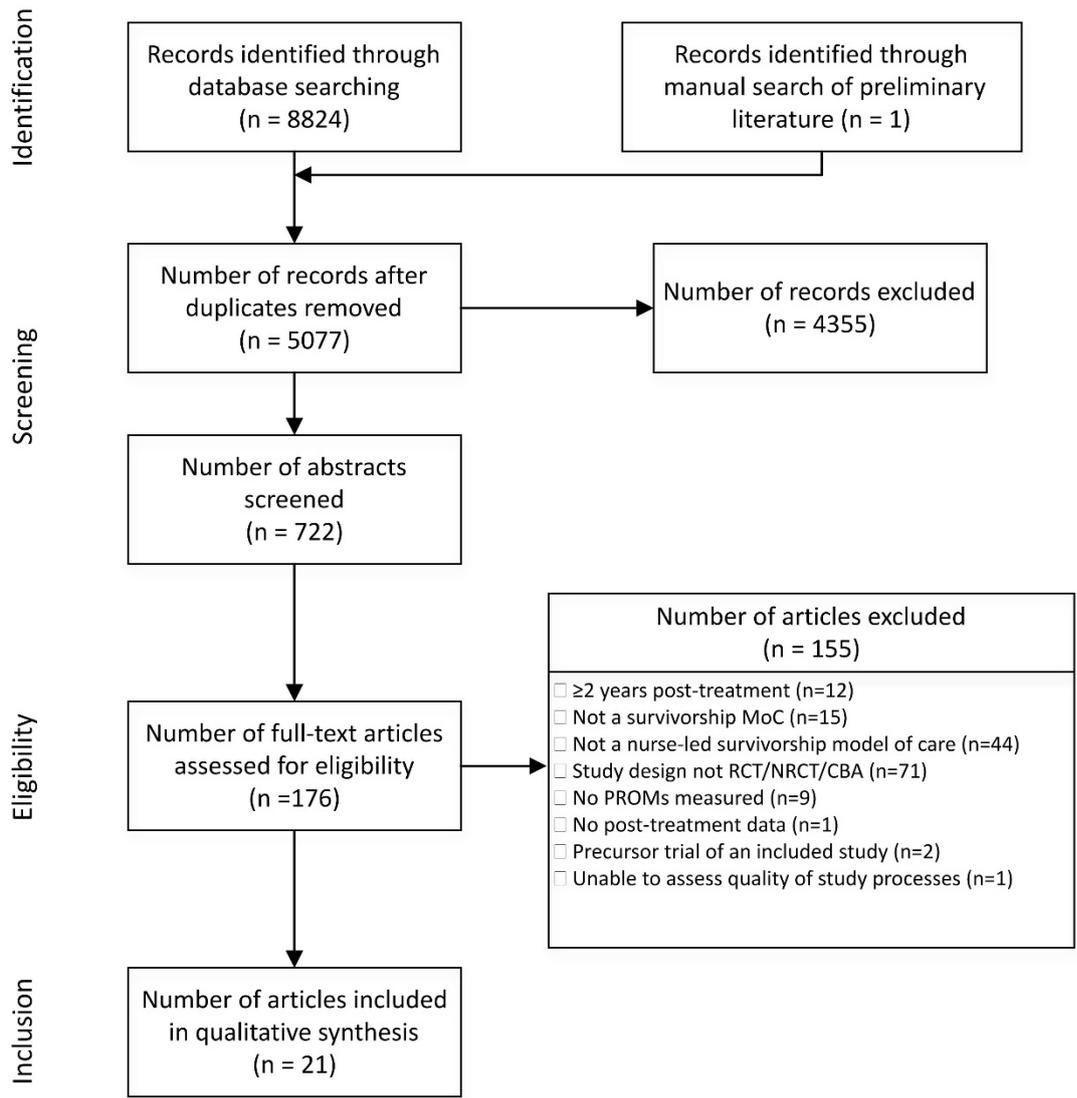
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Table 1 Search categories and terms for nurse-led models of cancer survivorship care. Keywords were truncated according to database settings to allow for multiple endings for these words. The “or” operator, or equivalent according to each database, 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 carcinoma malignancy neoplasm oncology tumour	after cancer after treatment/s cancer survivor/s follow-up late effects life after cancer life after cancer care living with cancer long term effects long-term survivor/s post treatment/s survivor/s survivorship survivorship care	care continuity of patient care follow up studies health care healthcare health care delivery healthcare delivery health service health status managed care model of care oncology model optimal care pathway optimal pathway outcome patient care planning patient education quality of life rehabilitation self care self-management survivorship care plan	Clinical nurse specialist Macmillan nurse Nurse nurse practitioner nurse specialist nurse’s practice patterns nurse’s role nurse-led nurse-led service nursing administration research nursing intervention nursing model nursing staff oncology nursing specialist nurse

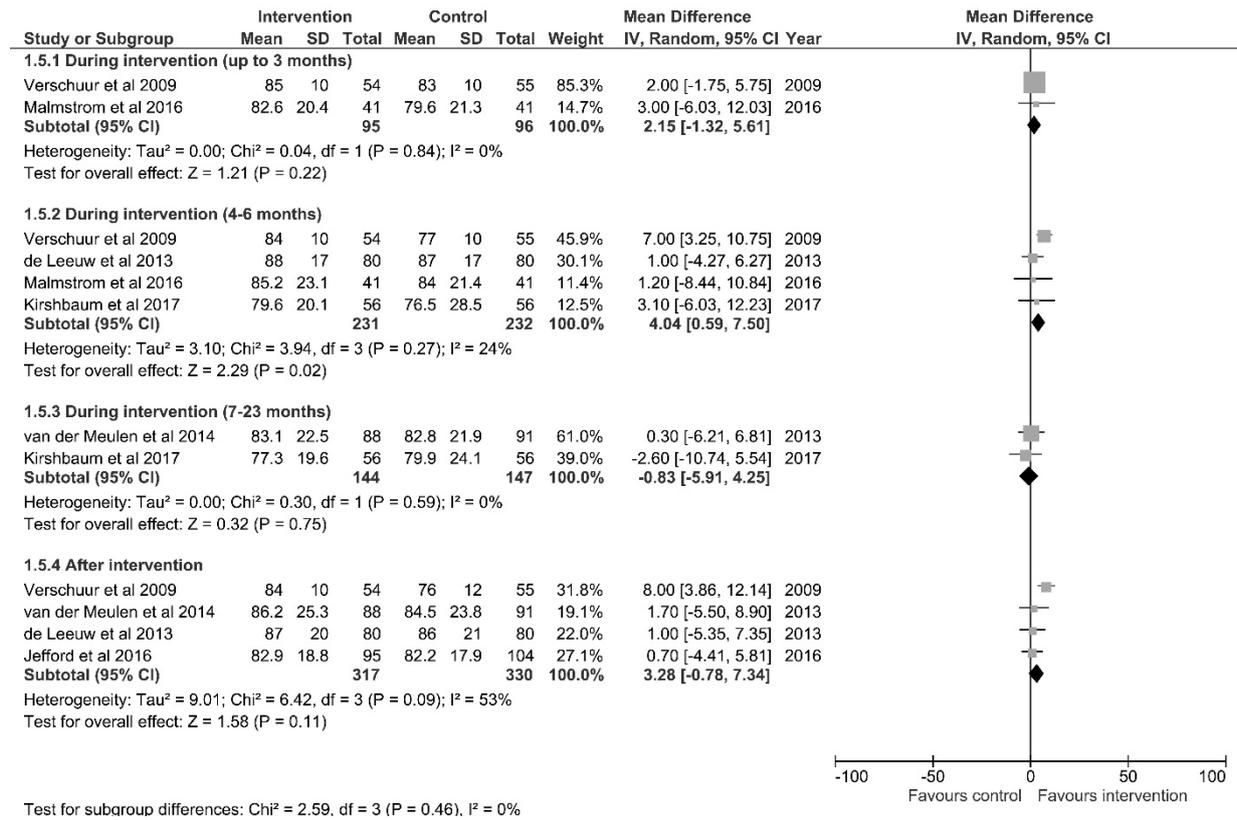
**Figure 1**



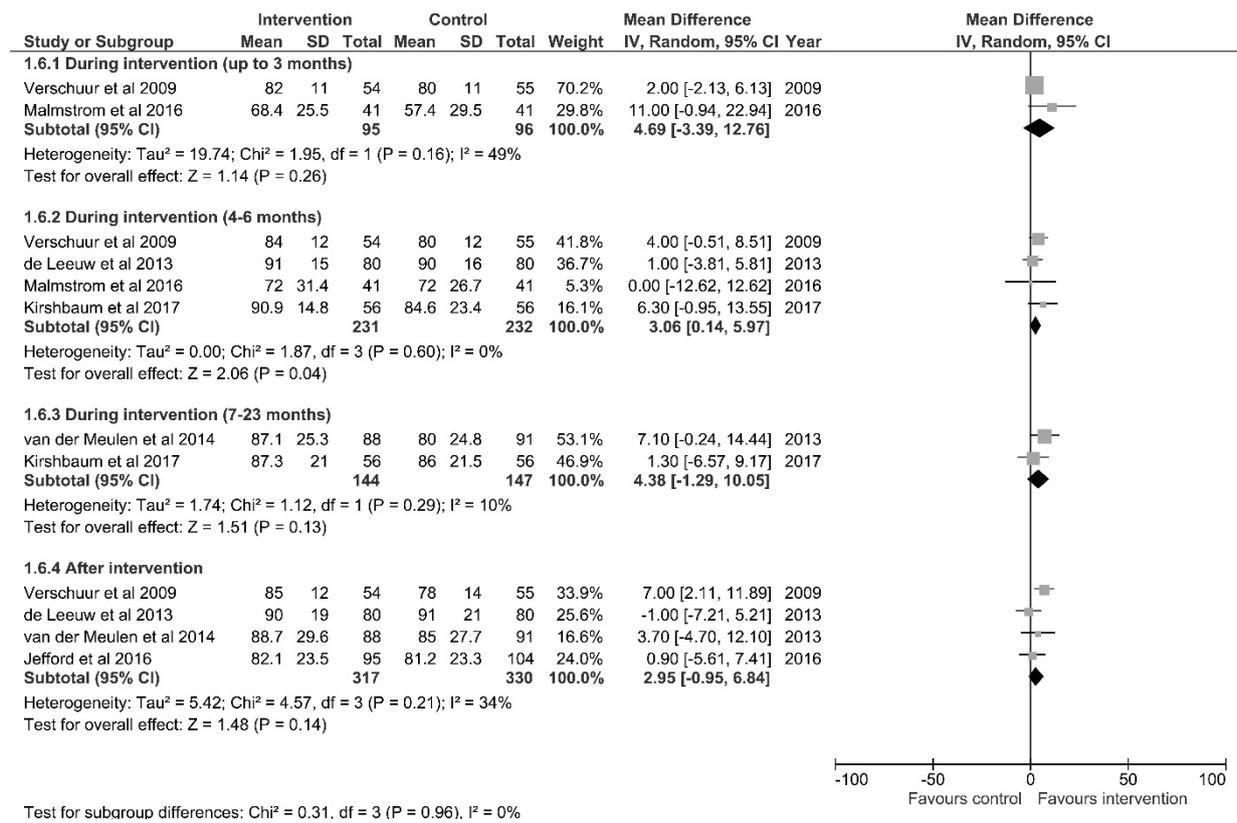
**Figure 2**

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Groups similar at baseline	Blinding of participants	Blinding of treatment personnel	Blinding of outcome assessment (detection bias)	Groups treated identically other than named intervention	Follow up completed	Participants analysed in allocated groups	Outcomes measured in the same way for all groups	Outcomes measured reliably	Appropriate statistical analysis used	Appropriate trial design	(NRICT) Clear cause and effect	(NRICT) Control group	(NRICT) Multiple measurements pre and post intervention
Aktas & Terzioglu 2015	?	?	+	?	-	?	+		?	+	+	+	+			
de Leeuw et al 2013			-				+	+		+	+	+		+	+	-
Hershman et al 2013	+	+	-	+	-	?	+	+	+	+		+	+			
Jefford et al 2016	+	?	+	-	-	?	+	+	+	+		+	+			
Kimman et al 2011	+	+	+	-	-	?	+	+	+	+		+	+			
Kirshbaum et al 2017	?	?	?	-	-	?	-	+	?	+		+	+			
Leahy et al 2013			?				?	+		+		+		+	+	-
Li et al 2016	+	+	+	-	-	?	?	+	+	+		+	+			
Malmstrom et al 2016	+	+	+	-	?	?	+	-	+	+		+	-			
McCorkle et al 2009	?	+	-	?	-	?	-	?	?	+		?	-			
Meneses et al 2007	+	+	+	?	?	?	?	+	+	+		+	+			
Sandgren & McCaul 2007	+	?	+	?	-	?	+	+	?	+		+	-			
van der Meulen et al 2014	+	+	+	+	-	?	+	+	+	+		+	+			
Verschuur et al 2009	+	+	+	?	-	?	+	+	+	+		+	+			
Young et al 2013	+	+	-	-	-	+	+	+	+	+		+	+			

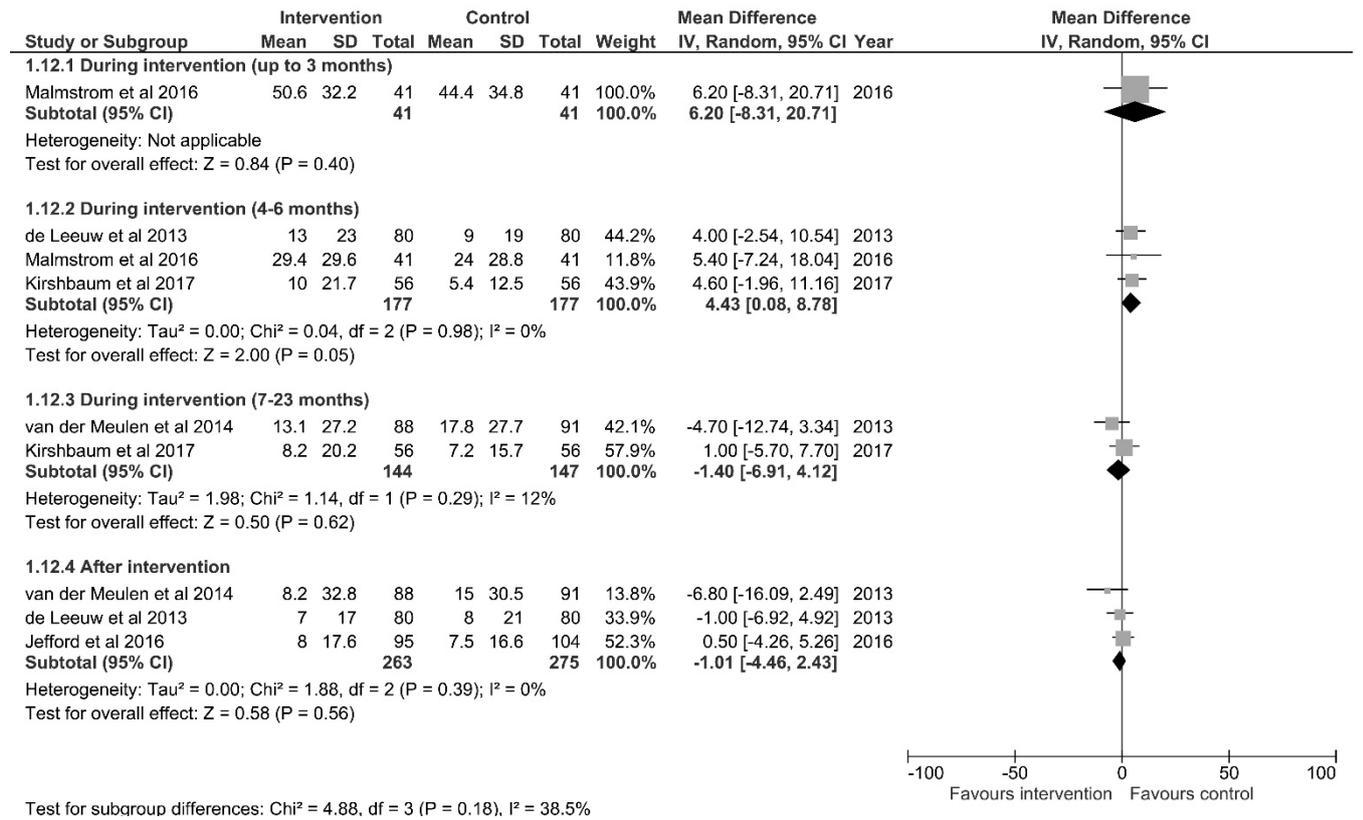
**Figure 3**



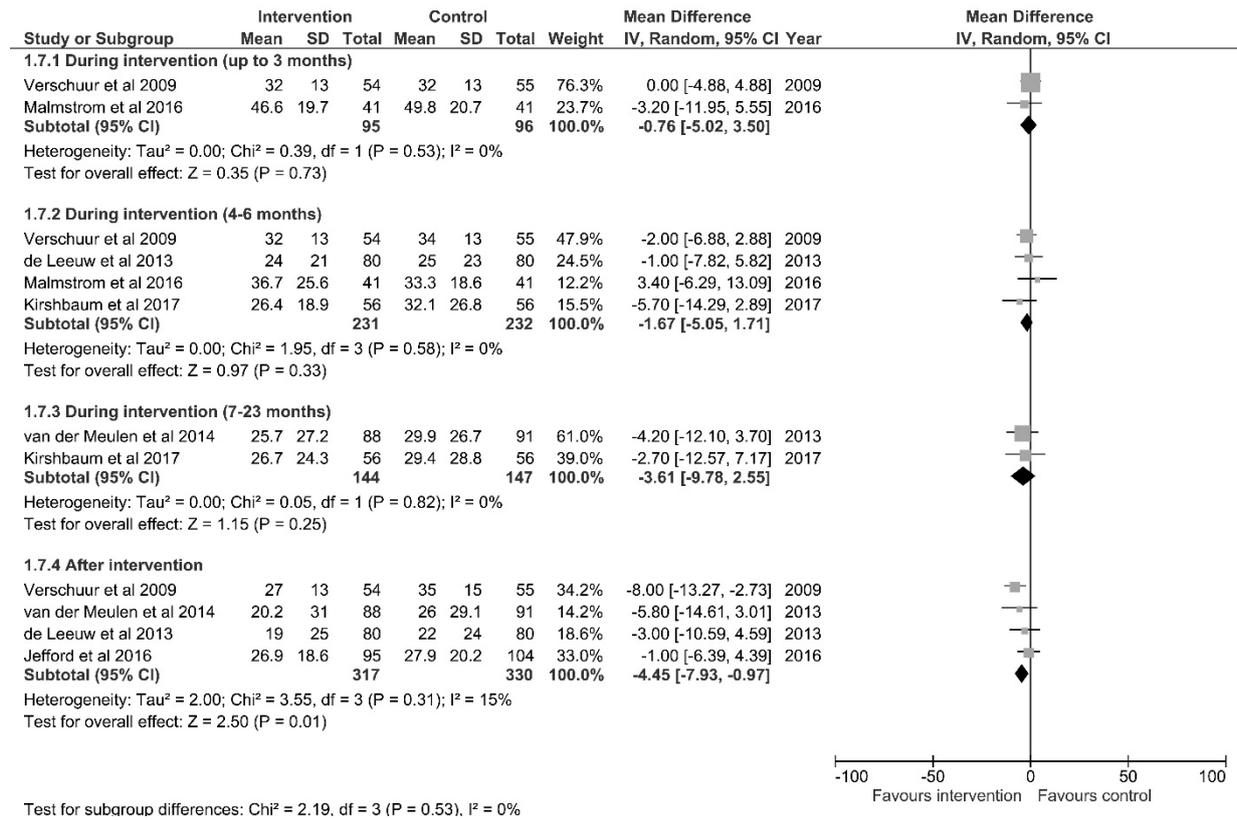
**Figure 4**



**Figure 5**



**Figure 6**



## Supplement

Supplement 1 Data extracted from included publications which described nurse-led models of cancer survivorship care

Author, year, location Need to add citations when final	Study design	Cancer type, treatment, sample size (consent rate (CR) %)	Key components of nurse's role/ intervention timeframe and description	Potential benefits of the MoC	Potential deficits of the MoC	Outcome measures	Results	Level of evidence
Aktas & Terzioglu, 2015 [40], Turkey	Randomized case control study	Ovarian, endometrial and cervical (stage 1-3); surg., +/- chemo., +/- RT; n(C)=35, n(I)=35 (CR=NP)	No details of nurse's qualification or experience provided. From surgical admission to 12 weeks discharge monitoring. Pre/postoperative care and discharge teaching (DT) in line with the Nursing Care Plans. Home care visits of 60-90 minutes in 1 <sup>st</sup> and 12 <sup>th</sup> week post-discharge (wound care, drug and pain management, resolving of physical, psychological and social problems, nutrition, medication management).	Home service prevented and addressed patient's problems, including sexuality.	Support does not appear to be provided for financial, occupational or insurance related needs.	Home Visit Monitoring Form (49 items); Quality of Life Scale/Cancer Survivors (QOL-CS)	<ul style="list-style-type: none"> <li>• Intervention group had lower "loss of sexual attractiveness" and "deficient/defective feeling" about body image (p&lt;0.05).</li> <li>• Intervention group had higher QoL, and higher physical, social, psychological and spiritual well-being (p&lt;0.05).</li> <li>• Physical problems in the intervention group were observed to be half of control patients: abdominal distension, immobilization, insomnia and fatigue (p&lt;0.05).</li> <li>• Fatigue was the most important problem affecting physical health in both groups.</li> <li>• Family stress and sexuality were the most important problems affecting the social well-being in both groups.</li> </ul>	II or IV
De Leeuw et. al., 2013 [41], Netherlands	Controlled before and after study	Head and neck (stage I-IV, primary diagnosis); +/- surg., +/- chemo. or +/- RT; n(C)=80, n(I)=80 (CR=94.1)	Oncology RNs with mean 11 years' experience (6-20) in head and neck oncology. Trained for intervention (8 hours) with 3-monthly clinical supervision meetings. During first	Improved QoL outcomes for patients. Potentially modifiable for other cancer populations.	At 12 months, there was a negative impact of intervention on health-care orientation,	EORTC Quality of Life Questionnaire (QLQ-C30); EORTC Head & Neck Module	<ul style="list-style-type: none"> <li>• The intervention group demonstrated significantly poorer adjustment at baseline in the following sub-domains of the PAIS-SR: health-care orientation, social environment and total adjustment (p&lt;0.05). At 6 months, there were no differences between the groups. At 12 months, the intervention group had poorer adjustment in health-care orientation (p&lt;0.02).</li> <li>• Change in baseline PAIS-SR was compared between groups and for the domain of social environment, the</li> </ul>	III

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			<p>year post-treatment. Six 30 minute face-to-face follow-up consultations with nurse, following a standardised protocol, in parallel and preceding medical routine visits. Included a needs assessment based on the bio-psycho-social model.</p>	<p>Most important survivorship QoL needs addressed. Followed a bio-psycho-social model.</p>	<p>possibly due to increased healthcare awareness. Support does not appear to be provided for occupation or insurance related needs. Supplement ary to usual care, and therefore requires greater resources for implementation.</p>	<p>(QLQ-H&amp;N35); Psychosocial Adjustment to Illness Scale—Self Report (PAIS-SR);</p>	<p>intervention group had significant worse scores at baseline (<math>p&lt;0.05</math>) but a 7.8-point (95 % CI=2.3, 13.2, <math>p&lt;0.01</math>) and 6.7-point (95 % CI=1.3, 12.2, <math>p&lt;0.02</math>) larger improvement than the control group at 6 and 12 months, respectively.</p> <ul style="list-style-type: none"> <li>• Clinically relevant changes in PAIS-SR (<math>\geq 1</math> S.D.): equal numbers of patients in both groups had improved by at least 1 standard deviation at 6 and 12 months; at 6 months, more patients had deteriorated in the intervention group than in the comparison group, the largest difference was in the social environment domain, with twice as many deteriorated patients in the intervention group as in the comparison group (27 vs. 13 patients, respectively); at 12 months, the number of deteriorated patients was approximately equal between groups.</li> <li>• For EORTC scales, baseline mean scores were significantly worse (<math>p&lt;0.05</math>) for the intervention group. At 6 and 12 months, the mean scores were not significantly different between groups and changes from baseline at each time point were significantly larger for the intervention group for global health status/QOL, 3 of 5 functional scales, 6 of the 9 generic symptom scales, and 9 of 18 specific head and neck scales.</li> <li>• Clinically relevant changes in EORTC scales (<math>\geq 10</math> points) for at least 10 more patients in the intervention group compared with the control group was observed for: global health status/QOL, 3 of the 5 functional scales, 3 of the 9 generic symptom scales, and for 11 of the 18 specific head and neck scales. The largest difference between groups, favouring the intervention group, was for fatigue at 6 months and for pain and social eating at 12 months.</li> </ul>	
Hershman et. al.,	Single-blinded	Breast (stage 0–III); surg., +/- chemo. or	Nurse practitioners. After adjuvant therapy completed,	Important survivorship QoL needs	Intervention used more health care	Physical and functional	<ul style="list-style-type: none"> <li>• Control group had a higher score on the physical health awareness scale (more health awareness) of the IOC</li> </ul>	II

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2013 [42], USA	randomized trial	+/-RT, +/- HT; n(C)=60, n(I)=66 (CR=44.5)	patients were given NCI publication <i>Facing Forward</i> and met with nurse and a nutritionist for 1 hour to receive personalised TS, surveillance recommendations, discuss risk of late effects and toxicities, and screening and lifestyle recommendations. Visit content followed treatment summaries guidelines by American Society of Clinical Oncology.	addressed. Personalised TS provided.	resources and was associated with increased costs. Publication may require revision in the future to address any changes in evidence.	well-being sub-scales of the Functional Assessment of Cancer Therapy (FACT); Center for Epidemiologic Studies Depression (CES-D) scale; 3-item health literacy assessment; Memorial Symptoms Assessment Scale (MMAS); Impact of Cancer (IOC) scale; Functional Assessment of Chronic Illness Therapy Treatment Satisfaction Patient-Satisfaction	(p=0.04) at baseline but groups were not significantly different at 3 and 6 months. <ul style="list-style-type: none"> <li>At 3 months, the intervention group scored significantly lower (less worry) on the health worry (p=0.01) and health worry subscale (p=0.02) of the ASC however, the difference did not persist at 6 months. The health worry subscale increased (more worry) significantly in the control group and decreased significantly in the intervention group (p = 0.05).</li> <li>At 3 months, the intervention group scored significantly lower on the existential negative outlook scale on the IOC compared with the control group (p=0.04) however, the change from baseline was not significant between groups.</li> <li>Patients with higher physical awareness had higher health worry (p = 0.008).</li> <li>A multivariable exploratory linear regression analysis controlling for age, stage, ethnicity, education, marital status, employment, income, and health literacy confirmed the relationship between the intervention and less health worry (p=0.04).</li> <li>No difference in total scores or subscale scores between the control and intervention groups on the FACIT-TS-PS, FACT (physical/ functional), or CES-D scores.</li> </ul>	

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						(FACIT-TS-PS); Assessment of Survivor Concerns (ASC)		
Jefford et. al., 2016 [30], Australia	Multisite, multistate, RCT	Colon or rectal (stage I-III); surg., +/- chemo., +/-RT; n(C)=110, n(I)=107 (CR=57.6)	No details of nurse's qualification or experience provided. Trained in all aspects of the protocol. Care started up to 6 months after the end of treatment. SurvivorCare intervention consisted of: an information package; personalised SCP; an individualised 1 hour nurse-led face-to-face end of treatment session to respond to immediate and pertinent concerns, discuss SCP, common issues and healthy lifestyle; and telephone follow-up at 1, 3, and 7 weeks after initial session.	Patients more satisfied with post-treatment care provided. Personalised SCP provided. Majority of important survivorship QoL needs addressed.	Six month timeframe for intervention delivery; patient variation not addressed by analysis. Patient resources provided may require revision in the future to address any changes in evidence. Support does not appear to be provided for financial or insurance related needs. Supplement	Brief Symptom Inventory 18 (BSI-18); The Cancer Survivors' Unmet Needs measure (CaSUN); EORTC Quality of Life Questionnaire (QLQ-C30); EORTC Colorectal Cancer module (EORTC QLQ CR-29); perceptions of post-treatment care.	<ul style="list-style-type: none"> <li>• The primary outcome, psychological distress at 2 months post baseline, was not significantly different between groups.</li> <li>• There were no significant differences between groups for: psychological distress (6 months); cancer survivor unmet needs sub-scales (2 and 6 months); and symptoms and functioning QoL sub-scales (2 and 6 months).</li> <li>• Intervention group participants were more satisfied with care provided than usual care participants, with statistical differences between groups on the majority of items. Median scores for most items were the same, but interquartile ranges indicated that more intervention participants "agreed" or "strongly agreed" with item content than did usual-care participants.</li> <li>• Overall, levels of distress were low and QOL was generally quite good.</li> </ul>	II

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					ary to usual care, and therefore requires greater resources for implementation.			
Kimman et. al., 2011 [43]; Kimman et. al., 2011 [44], Netherlands	Multicentre pragmatic RCT with a 2 x 2 factorial design (nurse-led vs hospital follow-up and educational group program or not)	Breast (stage I-III); surg., +/- chemo., +/- RT, +/- HT; n(C)=149, n(I)=150 and n(EGP)=149, n(NoEGP)=150 (CR=36.3)	Breast care nurse specifically trained for the study. Started within 6 weeks after end of final treatment (excluding HT). One semi-structured telephone interview which included screening for physical and psychological symptoms, treatment side-effects and hormonal therapy compliance. Additional appointment with BCN at hospital if required. An additional study component, an educational group program (EGP)	High patient satisfaction. Cost effective and potential overall cost difference compared with standard care.	Support does not appear to be provided for financial, occupational or insurance related needs. Group program may be inconvenient for patients to attend.	EORTC Quality of Life Questionnaire (QLQ-C30); anxiety (State-Trait Anxiety Inventory (STAI)); perceived feelings of control (Mastery Scale); patient records and cost diaries for number of visits to hospital, telephone contacts with medical	<ul style="list-style-type: none"> <li>• Nurse-led group patients had on average 2.4 telephone contacts with the BCN and 3.4 visits to the hospital, of which one hospital visit conformed to protocol and 2.4 were additional visits. Hospital group patients had on average 5.9 visits to the hospital, of which four visits conformed to protocol and 1.9 were additional visits. The mean number of general practitioner visits did not differ between groups.</li> <li>• Mean health related QoL scores were not significantly different between nurse-led and hospital follow-up groups at 12 months. The 95% confidence interval for the estimated difference (positive difference favours nurse-led follow-up) between mean HRQoL scores at 12 months after treatment was -1.93 – 4.64.</li> <li>• HRQoL significantly improved over time (p=0.01), but without significant differences in slope of improvement between both follow-up groups (p = 0.41).</li> <li>• There was no significant difference in health related QoL between follow-up with or without EGP. The 95% confidence interval for the estimated difference (positive difference favours EGP) between mean health related QoL scores at 12 months was -3.59–3.00. There was no significant difference in slope of improvement between follow-up groups.</li> </ul>	II

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			presented by the BCN and a psychologist consisted of 2 interactive 2.5 hour group sessions for patients +/- their partner within 3 months post-treatment.			specialists and breast care nurses, and GP visits using. Economic measures - EQ-5D Health-Related Quality of Life Questionnaire; quality-adjusted life year (QALY); societal perspective measure of costs including health care and non-health care related costs.	<ul style="list-style-type: none"> <li>• There was no significant interaction effect between EGP and nurse-led telephone follow-up with respect to health related QoL.</li> <li>• <i>Economic evaluation</i></li> <li>• Hospital follow-up plus EGP yielded most quality-adjusted life years (QALY), but was also the most costly follow-up strategy of the study.</li> <li>• Hospital follow-up plus EGP was not considered to be cost-effective; nurse-led telephone follow-up plus EGP was the preferred follow-up strategy and was conducive to cost reductions.</li> <li>• However, for patients with high levels of anxiety after treatment, hospital follow-up plus EGP was the preferred strategy in terms of cost effectiveness.</li> <li>• The detailed cost analysis showed that health care costs were lower if some first year hospital follow-up visits were replaced by nurse-led telephone follow-up. This was mostly due to reduced costs for visits, concomitant laboratory tests and other diagnostics.</li> <li>• Mean cost differences from the societal perspective between nurse-led telephone follow-up plus EGP and current clinical practice (hospital follow-up), were €448 for 1 year per breast cancer patient.</li> </ul>	
Kirshbaum et. al., 2017 [45], UK	RCT	Breast (stage 1 or 2, low-risk); surg., +/- RT; n(C)=56, n(I)=56 (CR=NP)	Breast care nurse role extended to advanced practitioner. Started after surg. and before adjuvant RT and open access follow-up continued for 5	Improved support and education provided in both groups. Clinicians supported the	Program may be inconvenient for patients to attend and may require revision in	EORTC Quality of Life Questionnaire (QLQ-C30); EORTC Breast	<ul style="list-style-type: none"> <li>• An age factor, but not a group factor, remained in the model which best described: depression and anxiety sub-scales (HADS); body image, future perspective, sexual functioning, systemic therapy side effects, breast symptoms and arm symptoms sub-scales (QLQ- BR23); and physical functioning, role functioning, emotional functioning, cognitive functioning and social functioning sub-scales (QLQ- C30).</li> </ul>	II

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			years. Patients attended a psycho-educational self-management programme "Living with Breast Cancer" of 4 half day sessions and provided with a resource pack. Open access to the breast surgical services telephone helpline run by breast cancer nurses. No routine follow-up; annual mammography provided with results by post and patients can return to clinic immediately without GP referral.	intervention as an acceptable substitution of care. Reduced demand on clinic time and potentially improved efficiencies. Patients can attend clinic anytime without GP referral, reducing delay.	the future to address any changes in evidence. Open access telephone help-line requires scheduled staffing to maintain coverage.	Cancer Module (QLQ-BR23), excluding 'upset by hair loss' domain; Hospital Anxiety and Depression Scale (HADS)	<ul style="list-style-type: none"> <li>Both age and group, plus their interaction, were found to significantly improve goodness-of-fit in a model which best describes the QLQ- C30 sub- scales: fatigue, nausea and vomiting, pain, dyspnoea, insomnia, appetite loss, constipation, diarrhoea and financial difficulties.</li> <li>Age was statistically significant with respect to the QLQ- BR23 sub- scales sexual functioning, future perspective and systematic therapy side effects; and the QLQ- C30 sub- scale physical functioning. An increase in age of 1 year was associated with an estimated: reduction of 1.01 points on the sexual functioning sub- scale; 0.66 points increase on the future perspective sub- scale; 0.68 points reduction on the systematic therapy side effects sub- scale and a 0.42 points reduction on the physical functioning sub- scale.</li> <li>The group as a main effect was not statistically significant with respect to any sub- scale in which the age-group interaction was not included in the final model. The age-group interaction was statistically significant with respect to the QLQ-C30 diarrhoea sub- scale.</li> <li>For all sub-scales except the nausea and vomiting and diarrhoea sub- scales (QLQ- C30) which had very low i.e. high functionality scores, the majority of model variance calculated using the variance partition coefficient occurred at the patient level, with relatively low variation in scores obtained from the same patient at different times.</li> <li>Patient age was a far more important predictor of sub- scale scores than the assigned group. Among younger patients, those in the control group had higher functionality, whereas among older patients, those in the intervention group had higher functionality.</li> </ul>	
Leahy et al., 2013	Controlled before and after study	Prostate (primary diagnosis,	Specialist, uro-oncology CNC with 10 years' experience.	Patients reported	Time needed for multi-	Satisfaction with Consultation	<ul style="list-style-type: none"> <li>102 patients were low-intermediate risk (51 medical follow-up and 51 nurse-led follow-up) and 67 were high risk (32 medical follow-up and 35 nurse-led follow-up).</li> </ul>	III

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[46], Australia		PSA $\leq$ 20, Gleason score $\leq$ 7, stage $\leq$ 2c); RT, +/- surg., +/- HT; n(C)=83, n(I)=86 (CR=NP)	After the first medical follow-up appointment at 6 weeks post RT completion, monthly nurse follow up continued for 6 months. Telephone consultations followed evidence-based algorithms; patients were asked questions about well-being, urinary and bowel function, potency, fatigue and sexual health. Personalised evidence-based advice provided and ongoing follow-up plan documented. CNC referred back to GP or consultant if required.	higher satisfaction.	disciplinary development of evidence based algorithms. Support does not appear to be provided for financial, occupational or insurance related needs.	Scale; Distress Thermometer; Expanded Prostate Cancer Index Composite (EPIC).	<ul style="list-style-type: none"> <li>• Low-intermediate risk patients who received nurse-led care appeared to report higher satisfaction than low-intermediate risk medical follow-up patients (p=0.051). This was not statistically significant in a multivariate linear regression which controlled for cohort effect. Therefore, men with low risk disease, followed up by nurse-led telephone service, were as satisfied with their care as the equivalent group receiving conventional medical follow up.</li> <li>• 11% of low-intermediate risk men who received nurse-led care and 10% of low-intermediate risk men who received medical follow-up were distressed (<math>\geq</math>5/10 on distress thermometer) (not significantly different, including when cohort effect controlled in linear regression).</li> <li>• There were no statistical significant differences between the risk groups across both cohorts on any of the EPIC scales.</li> <li>• Men in the low-moderate risk groups reported impact of urinary, bowel and hormonal function similar to that published in other studies. Sexual domain scores were much lower in this sample than other studies.</li> <li>• Regardless of risk group, the majority of men had good or very good bladder function and minimal urinary incontinence, bowel dysfunction and sexual dysfunction.</li> <li>• The high-risk groups demonstrated more marked sexual dysfunction and more symptoms in the hormone domain.</li> </ul>	
Li et. al., 2016 [47], China	RCT	Cervical (stage IA-IIA); surg.; n(C)=107, n(I)=119; (CR=92.6)	Specialist nurse. Starting from 7 days post-surgery and continued for 6 months. Home-based, nurse-led health promotion (NLHP-HB) program	The intervention improved most QoL needs measured.	The QoL functional subscale was adversely affected by the intervention.	Functional Assessment of Cancer Therapy for Cervical Cancer (FACT-Cx)-Chinese	<ul style="list-style-type: none"> <li>• The intervention group at 6 months follow-up compared with baseline (within groups) had significantly increased QoL (p&lt;0.001), cohesion (p&lt;0.001), adaptability (p&lt;0.001) and female sexual function index (p&lt;0.001). The control group experienced a significant decrease in the female sexual function index over the same period (p&lt;0.001).</li> <li>• The following QoL subscales were significantly increased (within groups) in the intervention group at 6 months follow-</li> </ul>	II

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			<p>consisted of multi-disciplinary family care team led by specialist nurse; physiological pelvic floor rehabilitation; yoga program; improved social support through education of family and friends and connection with patient mentors; fortnightly telephone follow-up and home visits every 2-3 months.</p>		<p>Intervention may be economically and practically difficult to implement. Support does not appear to be provided for financial, occupational or insurance related needs. Supplementary to usual care, and therefore requires greater resources for implementation.</p>	<p>version; Chinese translation of the Female Sexual Function Index (FSFI); Adaptability and Cohesion Scale, Second Edition (FACES-II).</p>	<p>up compared with baseline: social/familial (p=0.031), emotional (p&lt;0.001) and cervical cancer (p&lt;0.001).</p> <ul style="list-style-type: none"> <li>• Change scores (follow-up minus baseline) at 6 months were significantly different between groups with a greater positive change in the intervention group for the following: overall QoL (p&lt;0.001) and emotional (p&lt;0.001), social (p&lt;0.001) and cervical (p&lt;0.001) subscales; cohesion (p&lt;0.001) and adaptability (p&lt;0.001) subscales of family function (p&lt;0.001); and female sexual function index (p&lt;0.001). The QoL functional subscale change score was negative in the intervention group at 6 months and was significantly different between groups (p=0.009).</li> <li>• There was no significant change in the control group in the proportion of family function change scores from baseline to follow-up categorised as extreme low, extreme high, balanced, and middle-range. There was a significant change in the intervention group with an increased proportion of extreme high and balanced types at follow-up and decreased middle-range types.</li> </ul>	
Malmstrom et. al., 2016 [48], Sweden	RCT	Oesophagus or cardia (C15, C16.0); surg.; n(C)=41, n(I)=41 (CR=68.3)	Nurse specialised in postoperative oesophageal cancer care. Started at discharge until 6 months after discharge. In addition	Improved patients' experience of received information.	No improvements to QoL and adverse effect on dyspnoea. Support	EORTC Quality of Life Questionnaire (QLQ-C30); Oesophagus,	<ul style="list-style-type: none"> <li>• The intervention group had significantly worse dyspnoea symptoms (QLQ-C30) during 6 months follow-up (p=0.041). There were no other significant differences between groups for functional or symptom QoL scales or diagnosis-specific QoL scales.</li> <li>• At discharge, the intervention group scored significantly higher on the 'received information about treatment' and the</li> </ul>	II

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			to discharge information from nutritionist and physiotherapist and scheduled follow-up with surgeon, a nurse-led telephone supportive care program provided. Pre-discharge meeting with nurse for patients' questions and concerns, and patients provided with oral/written information on self-care and life after surgery and a follow-up plan. Proactive nurse telephone follow-up depending on individual patient needs (average 16 calls).		does not appear to be provided for occupation or insurance related needs. Supplementary to usual care, and therefore requires greater resources for implementation.	Oesophago-gastric junction or stomach cancer quality of life module (QLQ-OG25); Perception of cancer information provided (QLQ-INFO25); patient diaries for health care provider contacts; public and private health system registry of health care contacts.	<p>'written information' scale.</p> <ul style="list-style-type: none"> <li>• During 6 months follow-up, the intervention group was significantly more satisfied than the control group concerning information about 'things to do to help yourself' (p&lt;0.001), written information (p&lt;0.001) and the global information score (p&lt;0.001).</li> <li>• During the 6 months follow-up, the control group was significantly more likely to 'wish to receive more info' (p&lt;0.001) and at baseline, 'wish to have received less info' (p&lt;0.007).</li> <li>• During 6 months follow-up, there were no significant differences in the number of health care contacts (hospital care register), private health care contacts (private care register) and surgery related contacts between the groups. There were no significant differences between groups in diary recorded contacts in the first 2 or first 4 weeks.</li> <li>• During the follow-up period (6 months), tumour recurrence occurred in 24.4% of the intervention group and 22.0% of the control group.</li> </ul>	
McCorkle et. al., 2009 [49]; McCorkle et al.,	Single-blind RCT	Ovarian cancer (primary diagnosis, stage I-IV); surg.,	Oncology APN and, for highly distressed patients, Psychiatric Consultation-Liaison Nurse (PCLN)(APN in mental health	Lessened patient uncertainty and, with PCLN added,	Support does not appear to be provided for financial, occupational	Short-Form Health Survey (SF-12); Symptom Distress	<ul style="list-style-type: none"> <li>• 73% of patients were newly diagnosed and 27% had recurrent disease.</li> <li>• At baseline, the nursing intervention group reported significantly poorer QoL in relation to depressive symptoms (CES-D), uncertainty (MUIS), and mental health (SF-12).</li> </ul>	II

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2011 [50], USA		chemo.; n(C)=60, n(I)=63 (CR=53.0).	nursing). Post-surgery contact consisted of 2 contacts per week for 1 month then 2 per month up to 6 months by home and clinic visits and telephone calls. APN care activities included: post-surgery stabilization; ADL maintenance; symptom management for chemotherapy side effects; counselling and support; community referrals; and teaching self-management skills. Distressed patients received 1-2 additional contacts by PCLN for psychiatric evaluation, identification of resources and referrals, and collaborative treatment plan developed.	improved some dimensions of QoL.	or insurance related needs. Patient resource manual may require revision in the future to address any changes in evidence.	Scale (SDS); Center for Epidemiological Studies Depression Scale (CES-D); uncertainty measured by the ambiguity subscale of the Mishel Uncertainty in Illness Scale (MUIS); Distress Thermometer (DT).	<p>However, baseline scores for both groups were adjusted in further model testing.</p> <ul style="list-style-type: none"> <li>• In all models, QoL improved over time for the total sample (all <math>p &lt; 0.0001</math>), except for the SF-12 mental subscale.</li> <li>• The rate of improvement in uncertainty was significantly greater for the nursing intervention only (<math>p = 0.0006</math>). However, the attention control group appeared to perform better over time in depressive symptoms (CES-D; <math>p = 0.003</math>), symptom distress (SDS; <math>p = 0.0021</math>), and the physical QoL subscale (SF-12; <math>p = 0.0019</math>).</li> <li>• Treating the PCLN component as a higher dose of the intervention showed there was a significantly better improvement in uncertainty (MUIS; <math>p &lt; 0.0001</math>) and the mental QoL subscale (Sf-12; <math>p = 0.0023</math>), and less improvement over time for depressive symptoms (CES-D; <math>p = 0.0033</math>).</li> <li>• Treating the PCLN as a separate component found that it significantly increased the rate of improvement over time for uncertainty (<math>p = 0.0181</math>), symptom distress (<math>p &lt; 0.0001</math>), and mental (<math>p &lt; 0.0001</math>) and physical QoL (<math>p &lt; 0.0001</math>). There was no significant effect of the PCLN on depressive symptoms over time.</li> </ul> <p><i>Healthcare Utilization</i></p> <ul style="list-style-type: none"> <li>• Patients who received the nursing intervention had fewer primary care visits in 6 months after surgery (<math>2.75 \pm 2.03</math> vs <math>3.59 \pm 4.66</math>). Regression analysis confirmed patients who received the nursing intervention had significantly less primary care visits (<math>\beta = -0.59 \pm 0.16</math>, <math>p = 0.003</math>).</li> </ul>	

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Meneses et. al., 2007 [52]; Meneses et.al., 2009 [51], USA	Single-blind RCT	Breast cancer (stage O-II, <1 year post diagnosis); surg., +/- chemo., +/- RT, +/- HT; n(C)=131, n(I)=125 (CR=77.0); n(rural-C)=26, n(rural-I)=27 (CR(rural)=76.8).	Oncology nurses trained in breast cancer survivorship, QoL, and education and support. Started Breast Cancer Education Intervention (BCEI) within 1 year of diagnosis and at least 1 month of treatment completion (excluding HT) and followed-up for 6 months. Three 60-90 minute individual face-to-face education and support sessions on: physical, emotional and personal changes after treatment; health maintenance; relationships; work and financial concerns; healthy lifestyle behaviours; cancer surveillance adherence; psychological distress; and spiritual effects of treatment. Written and	Intervention improved patient QoL. Important survivorship QoL needs addressed by intervention. Oncology nurse provides support and access to resources after treatment ends.	Patient resource binder may require revision in the future to address any changes in evidence. Face-to-face consults may be inconvenient to some patients in terms of travel and time.	Quality of Life-Breast Cancer Survivors Tool; FITA (Florida Index of Treatment Accessibility)	<ul style="list-style-type: none"> <li>• Overall QoL in the control group was significantly improved from baseline to 6 months (p=0.016), between 3 and 6 months (p=0.004) but was not improved from baseline to 3 months (p=0.522). Overall QoL in the intervention group was significantly improved from baseline at 3 (p&lt;0.001) and at 6 months (p&lt;0.001). The intervention group, compared with the control group, had a significantly better improvement from baseline in overall QoL at 3 months (p&lt;0.001) and at 6 months (p&lt;0.001).</li> <li>• No significant interaction terms were found between the intervention and other covariates, including time, in Generalised Estimating Equation (GEE) models.</li> <li>• GEE analysis showed significant differences in overall QOL and psychological (p=0.0083) and social well-being (p=0.0083) domains between groups. There were no significant differences in physical or spiritual well-being between groups.</li> </ul> <p><i>Rural Analysis</i></p> <ul style="list-style-type: none"> <li>• There was a significant improvement in mean overall QOL score in the BCEI intervention group compared with the wait-control arm over time, adjusting for baseline. The adjusted difference in mean overall QoL scores between experimental and control arms from 3 months to 6 months was estimated at -0.429 (SE, 0.18; p=0.013).</li> <li>• Significant improvement in mean psychological QOL score in the BCEI intervention group compared with the wait-control arm over time, adjusting for baseline. The adjusted difference in mean psychological QoL scores between experimental and control arms from 3 months to 6 months was estimated at -0.545 (SE, 0.26; p=0.048).</li> <li>• The beneficial effect of the BCEI intervention on overall QOL and psychological QOL score was maintained over time; there was no significant change in scores between 3 and 6 months.</li> </ul>	II

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			audiotaped materials supplemented sessions. Monthly follow-up sessions for 6 months by telephone (3x) and face-to-face (2x).					
Polinder et. al., 2009 [53]; Verschuur et. al., 2009 [58], Netherlands	Randomised controlled trial	Oesophageal or gastric cardia (stage 0-IV; surg., +/- chemo., +/- RT; n(C)=55, n(I)=54 (CR=90.8)	Specialist nurse with >10 years' experience in oncological care. Trained in diagnosis and treatment of oesophageal and gastric cardia cancer, problems after oesophageal resection, medical-legal issues and aspects of follow-up. Three weeks after hospital discharge following intentionally curative surgery, one visit at the outpatient clinic occurred then nurse-led follow-up home visits were scheduled at 6 weeks, and 3, 6, 9 and 12 months after recruitment. Patients assessed for	Intervention appeared to be cheaper and likely to be more cost-effective, particularly early in the timeframe; follow-up and intramural care were areas with largest savings. Patients and carers more satisfied with the various aspects of the intervention. Reduced	Support does not appear to be provided for financial, occupational (although most of sample were retired) or insurance related needs.	Quality of Life (EuroQol-5D); EORTC Quality of Life Questionnaire (QLQ-C30); oesophageal cancer module (EORTC QLQ-OES18); Overall self-rated health measured by Visual Analogue Scale (EQ-VAS).	<ul style="list-style-type: none"> <li>• Standard follow-up care visits were significantly shorter than visits in the nurse-led follow-up group (11 versus 43 minutes; p&lt;0.01).</li> <li>• The nurse referred 39% of patients to the outpatient clinic for medical evaluation of specific symptoms and medical problems.</li> <li>• A similar proportion of patients in both groups developed loco regional tumour and/or metastases at 1 year survival (p=0.50).</li> <li>• Mean body weight of patients of the standard follow-up group significantly deteriorated during the first year after surgery (p=0.04); whereas mean body weight in the nurse-led follow-up group remained stable or slightly increased (p=0.19).</li> <li>• No significant differences were found in dysphagia scores between the two groups; similar proportions in each group experienced dysphagia (score 2-4) which required one or more dilations of a benign anastomotic stricture.</li> <li>• No significant differences in other physical problems between groups.</li> <li>• Improvement for all patients in health status (EQ-5D Index, p&lt;0.001) and self-rated health on a vertical visual analogue scale (EQ-VAS, p&lt;0.001).</li> <li>• A significant improvement was found in the dysphagia, eating, and indigestion scale scores (QLQ-OES18), and the</li> </ul>	II

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			experienced problems and symptoms, body weight and the ability to eat and/or swallow.	length of hospital stay. Patients more likely to utilise general practitioner.			<p>fatigue, physical, role, cognitive and social functioning scales, and in global health (QLQ-C30).</p> <ul style="list-style-type: none"> <li>• No significant differences in mean QoL (QLQ-C30) and oesophageal cancer-specific QoL (QLQ-OES18) scale scores between groups over time.</li> <li>• Spouses of patients in the nurse-led follow-up group were significantly more satisfied with the follow-up visits than those in the standard follow-up group (p=0.03); mean patient satisfaction was higher in the nurse-led group compared with the standard care group but the difference between groups was not significant (p=0.14).</li> <li>• Patients and spouses in the standard follow-up group more often indicated that visits did not fulfil their expectations (p=0.04 and p=0.03, respectively) in terms of a systematic follow-up schedule with diagnostic tests and/or procedures for the early detection of recurrent malignancy.</li> <li>• Patients and spouses of the nurse-led follow-up group more frequently received advice regarding disease management (p=0.04 and p=0.03, respectively).</li> <li>• Spouses of the nurse-led follow-up group were more satisfied they had an opportunity to ask questions (p=0.06).</li> </ul> <p><i>Economic analysis</i></p> <ul style="list-style-type: none"> <li>• Cost of nurse-led follow-up visits were significantly less than standard follow-up (€234 vs €503, p&lt;0.001).</li> <li>• Significantly more patients in the nurse-led follow-up group attended all 5 follow-up visits compared with standard follow-up (82% versus 60% respectively, p=0.02)</li> <li>• Mean hospital stay was significantly longer for standard follow-up care (17.8 days versus 8.9 days, p=0.07).</li> <li>• Intramural care costs were the highest cost in both follow-up types but were not significantly different between types. Costs were similar between follow-up types for diagnostic procedures, additional treatments and extramural care.</li> </ul>	

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							<ul style="list-style-type: none"> <li>• Total costs were lower for nurse-led care compared with standard follow-up care (€2592 versus €3798) but due to large variation were not statistically different (p=0.11).</li> <li>• Disregarding QoL effects, there was a 91% probability that nurse-led follow-up was cost-effective compared with standard follow-up.</li> <li>• At 4 months, there was a 98% probability that nurse-led follow-up was cost effective compared with standard follow-up at €500 per point improvement in EQ-VAS (based on a mean improvement of 14 versus 9 points for the nurse-led and standard care groups respectively).</li> <li>• At 13 months EQ-VAS scores had reduced slightly in the nurse-led follow-up group and had remained stable in the standard follow-up group (mean improvement 11 versus 9 points, respectively) therefore, there was a probability of 76% probability that nurse-led follow-up was cost effective compared with standard follow-up at €4000 or more for a one point gain on the EQ-VAS.</li> </ul>	
Sandgren & McCaul, 2007 [54], USA	RCT (3 groups)	Breast (stages I—III); surg., +/- chemo., +/- RT, +/- HT; n(C)=49, n(health education)=76, n(emotional expression)=89 (CR=74.1).	Oncology certified nurses. Five weekly 30-min phone calls starting during adjuvant treatment, with a 6th, follow-up call made approximately 3 months later. Nurse provided either emotional expression therapy or health education on topics including: understanding of	Almost all patients felt that phone therapy was more convenient attending the clinic.	Support does not appear to be provided for financial, occupational or insurance related needs.	Functional Assessment of Cancer Therapy Scale - General (FACT-G); reactions to breast cancer; Profile of Mood States (POMS); avoidance subscale	<ul style="list-style-type: none"> <li>• At 13 months follow-up, significantly more health education participants compared with emotional expression participants agreed they would have liked to see their nurse in the past 4-5 months (48% versus 32%, p=0.035).</li> <li>• There were differences between the experimental groups in terms of therapy process: health education sessions were a few minutes longer than emotional expression sessions; the content of sessions 2-5 differed, for example, significantly more health education patients discussed treatment side effects (p&lt;0.04) and significantly more emotional expression patients discussed fears concerning recurrence (p&lt;0.07); and overall, more emotional expression participants expressed emotionality whereas the groups did not differ on expression of confusion, fatigue or energy level.</li> </ul>	II

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			breast cancer; managing post-surgical changes; understanding treatment; managing side effects and fatigue; health lifestyle; and follow-up review.			from the Coping Response Indices-Revised; perceived stress; self-efficacy measured using two subscales from the Cancer Behaviour Inventory (CBI); efficacy for affect regulation; intrusion subscale of the Revised Impact of Events Scale (RIES); social Constraint Scale.	<ul style="list-style-type: none"> <li>• There was a significant effect of time (3x2 ANOVAS) between post-test and 13 months follow-up for total QoL and the emotional well-being sub-scale (FACT-G), and additional breast cancer specific concerns for all women. There were no significant effects of experimental group on outcome nor any interaction effects between experimental group and time; all groups improved over the 13 month period in terms of QoL.</li> <li>• Significant time effects (3x2 ANOVAS) for overall mood, and for depression, anger, and fatigue subscales (POMS) for all women. No significant effects of experimental group on outcome nor any interaction effects between group and time; all groups improved over the 13 month period in terms of overall mood.</li> <li>• Significant time effects (3x2 ANOVAS) for avoidant coping and perceived stress with all women demonstrating improvement from post-test to 13 month follow-up. Health education participants reported significantly less perceived stress than women in the emotional expression or control groups (p=0.05).No significant between groups effects in relation to avoidant coping nor time-group interaction effects for either coping or perceived stress.</li> <li>• Significant time effects (3x2 ANOVAS) for all participants' confidence in their knowledge to prevent lymphedema (p=0.005). Significantly more health education participants reported more ways to deal with lymphedema (p=0.004). There were no other significant time or experimental group effects nor were there any interaction effects.</li> <li>• Significant improvements over time (3x2 ANOVAS) for all participants in intrusive thoughts (p&lt;0.001), control over cancer (p=0.033) and social constraints (p=0.013). No significant between group or interaction effects.</li> <li>• No significant moderators (age, education or cancer stage) on outcome measures (overall QoL, mood, perceived</li> </ul>	

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							<p>stress, and avoidant coping) by experimental group (ANCOVAS). Across the sample, age produced a main effect for avoidant coping with younger women engaging in more avoidance over time (<math>p=0.02</math>).</p> <ul style="list-style-type: none"> <li>Carers' perceptions of the patient's QoL were significantly correlated with participants' responses (<math>r&gt;0.40</math>) and carers perceived greater emotional distress for the patient than reported by the patient themselves (<math>p=0.008</math>).</li> </ul>	
van der Meulen et. al., 2013 [57]; van der Meulen et. al., 2014 [55]; van der Meulen et. al., 2015 [56], Netherlands	RCT	Squamous cell carcinoma of the oral cavity, oropharynx, hypopharynx, or larynx (primary diagnosis, stage I–II cancer); +/- surg., +/- chemo., +/- RT; $n(C)=91$ , $n(I)=88$ (CR=62.5)	Experienced oncology nurses working at the oral maxillofacial and the otorhinolaryngology department. Trained by 2 psychologists and investigator for intervention and 1-day of standardised intervention delivery training. In parallel with 2-monthly medical check-ups starting 6 weeks after treatment completion, six counselling sessions of 45–60 minutes for 1 year. Nurse counselling and after intervention (NUCAI) consists of : evaluating current	The intervention improved depressive symptoms, aspects of QoL and some physical symptoms, and some effects were sustained to 2 years. Combining the intervention with medical appointment attendance is convenient to patients.	The intervention worsened coughing and did not have an effect on some symptoms which were problematic to patients: sexuality, dry mouth and sticky saliva. Nursing resource manual may require revision in the future to address any changes in evidence.	Quality of Life Questionnaire (QLQ-C30); EORTC Head & Neck Module (QLQ-H&N35); Center for Epidemiologic Studies-Depression (CES-D) scale; Hospital Anxiety and Depression Scale (HADS); shortened Dutch version of the Coping	<p><i>One year effect</i></p> <ul style="list-style-type: none"> <li>At 12 months post treatment, intention to treat analysis revealed a significant decrease in depression (CES-D) in the intervention group compared with control. In the depressive subgroup of patients (CES-D <math>\geq 12</math>), the intervention group had a significant decrease in depressive symptoms at 12 months (<math>p&lt;0.05</math>). When between group differences were adjusted for baseline education level in this subgroup, depressive symptoms decreased significantly in the intervention group at 12 months from 19.0 (S.D.=7.3) to 13.8 (S.D.=10.1) but increased in the control from 21.0 (S.D.=8.3) to 22.0 (S.D.=12.6).</li> <li>Compared with the control group, the intervention group had significantly better reduction in physical symptoms from baseline for: pain, swallowing and opening mouth (<math>p&lt;0.05</math>). Symptoms of dry mouth (not significant) and coughing (<math>p&lt;0.05</math>) were increased in the intervention group. In the depressive subgroup of patients (CES-D <math>\geq 12</math>), the intervention group had a significantly better reduction in physical symptoms of opening mouth (<math>p&lt;0.05</math>).</li> <li>Depressive symptoms were significantly correlated with all head and neck cancer related symptoms at baseline and 12 months. Also, depressive symptoms were significantly correlated with changes from baseline to 12 months after treatment for all symptoms except for dry mouth.</li> </ul>	II

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			<p>mental status; discussing current problems; systematically asking about physical problems and functioning in six life domains; providing the Adjustment to Fear, Threat or Expectation of Recurrence (AFTER) intervention, if indicated; providing general medical assistance and advice, if indicated; and referring patients to psychological aftercare, if indicated. NUCAI is problem focussed and patient-led.</p>		<p>Supplementary to usual care, and therefore requires greater resource implementation.</p>	<p>Inventory for Stressful Situations (CISS); short version of the Social Support List - Interactions (SSL 12-I).</p>	<p><i>Two-year effect</i></p> <ul style="list-style-type: none"> <li>• Between group differences 12 months after treatment demonstrated a significant improvement (referenced to baseline) in the intervention group for the following QLQ-C30 items: physical and emotional functioning and diminished pain (<math>p &lt; 0.05</math>). Significant between group differences in favour of the intervention group at 18 months were found for global QoL, role and emotional functioning and pain (<math>p &lt; 0.05</math>). At 24 months, the intervention group's emotional functioning and fatigue were significantly better compared with the control group (<math>p &lt; 0.05</math>).</li> <li>• Between group differences for QLQ H&amp;N35 items at 12 months demonstrated a significant improvement (referenced to baseline) in the intervention group compared with the control for: pain, swallowing, social contact and mouth opening (<math>p &lt; 0.05</math>); these significant effects were sustained to 18 months, apart from social contact which was not significantly different. At 12 months, the intervention group reported significantly more problems with coughing (<math>p &lt; 0.05</math>) than the control group. At 24 months, there were no between group differences in any head and neck cancer related symptoms.</li> <li>• Depressive symptoms (CES-D) were significantly diminished (<math>p &lt; 0.05</math>) at 12 and 18 months in the intervention group compared with the control. At 24 months, depressive symptoms in the intervention group were lower, but were not significantly different compared with the control.</li> </ul> <p><i>Moderators of psychosocial effects</i></p> <ul style="list-style-type: none"> <li>• At 12 months, linear regression analysis identified the following moderators of the effect of the intervention in the full-case analysis (<math>n = 146</math>; completed baseline and 12 month assessments): marital status (<math>b = -6.75</math>, <math>p = 0.04</math>), global QoL (<math>b = -0.14</math>, <math>p = 0.03</math>), emotional functioning</li> </ul>	

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							<p>(<math>b=-0.14</math>, <math>p=0.02</math>), and social functioning (<math>b=-0.13</math>, <math>p=0.04</math>).</p> <ul style="list-style-type: none"> <li>• Post-hoc between group comparisons (<math>n=146</math>) found a significant difference in favour of: married or de facto patients compared with single patients (<math>b=-4.25</math>, <math>p=0.01</math>); and patients with low (-1 S.D.) baseline global QoL (<math>b=-5.65</math>, <math>p=0.01</math>), emotional functioning (<math>b=-5.99</math>, <math>p=0.00</math>), and social functioning (<math>b=-5.41</math>, <math>p=0.01</math>) compared with patients with mean or high (+1 S.D.) baseline scores. That is, patients who were married/de facto, and patients with low baseline scores on global QoL, emotional functioning, and social functioning responded better to the intervention than patients with high scores and who were single.</li> <li>• In the intention-to-treat analyses (<math>n=179</math>; baseline and 3 months completed, 12 month data imputed), emotional functioning (<math>b=-0.14</math>, <math>p=0.02</math>) and social functioning (<math>b=-0.15</math>, <math>p=0.03</math>) were identified as moderators.</li> </ul>	
Young et al., 2013 [59], Australia	RCT	Colorectal (Dukes stage A-D, primary diagnosis); surg., +/- chemo., +/- RT; $n(C)=369$ , $n(I)=387$ (CR=NP).	Experienced RNs/nurse care coordinators who received training and ongoing debriefing by nurse, psychology and medical researchers. Following discharge from hospital and supplementary to usual care, CONNECT intervention consisted of telephone calls on	Intervention is feasible and acceptable to patients. Intervention began soon after hospital discharge, when needs are high. Slight reduction in unplanned health	Supplementary to usual care, and therefore requires greater resources for implementation. Support does not appear to be provided for financial, occupational or insurance	Supportive Care Needs Survey (SCNS); Distress Thermometer tools; Functional Assessment of Cancer Therapy-Colorectal (FACT-C) quality of life instrument;	<p><i>Randomised controlled trial</i></p> <ul style="list-style-type: none"> <li>• No significant differences between groups at 3 or 6 months in: overall experience of cancer care coordination score, global assessment of care coordination or quality of care; unmet needs (SCNS-SF34); distress; overall QoL or any subscales (FACT-C); unplanned readmissions; emergency room presentations and proportion of Dukes C colon cancer patients receiving adjuvant chemotherapy.</li> <li>• Median scores (SCNS-SF34) were not significantly different between groups for health system and information needs and patient care and support needs at 3 and 6 months.</li> <li>• In terms of the nurse intervention, the majority of intervention patients very much agreed: the nurse was caring and understanding; the assistance was satisfactory; understandable and helpful information was provided; the nurse understood their needs and concerns; and they had</li> </ul>	II

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			<p>days 3 and 10 and then at 1, 3 and 6 months. CONNECT aims to improve patients' ability to navigate the health system for clinical and supportive care, provide information and emotional support, and improve patients' cancer-related QOL. Each call structured using a standardised checklist that covers six areas of potential need: common physical, psychosocial, information, supportive care, and rehabilitation/follow-up needs. Needs addressed using detailed, standardized clinical protocols according to the nature and severity of the need and level of clinical risk posed.</p>	<p>service utilisation (emergency presentations and unplanned re-admissions).</p>	<p>related needs.</p>	<p>cancer care coordination (total and communication and navigation subscales); Supportive Care Needs Survey Short Form (SCNS-SF34).</p>	<p>improved confidence to self-manage health. Few patients (&lt;11%) very much agreed that the nurse did not have a thorough understanding of their medical conditions or did not know about support services.</p> <ul style="list-style-type: none"> <li>Interviews with intervention patients (n=29) identified three groups of patients: patients who felt that the intervention did not influence their recovery as their local health care team provided information and support; a group who felt they did not need the intervention because their recovery was straightforward and uneventful; and a third group who had acute concerns and perceived the intervention was an important service that assisted them in their postoperative recovery.</li> </ul>	

Abbreviations used: activities of daily living (ADL), Advanced Practice Nurse (APN), chemotherapy (chemo.), confidence interval (CI), Clinical Nurse Coordinator (CNC), consent rate (CR), control (C), educational group program (EGP), European Organization of Research and Treatment of Cancer (EORTC), Generalised Estimating Equation

(GEE), general practitioner (GP), hormone therapy (HT), intervention (I), not provided (NP), Quality of Life Questionnaire (QLQ), Quality of Life (QoL), RCT (RCT), registered nurse (RN), response rate (RR), radiation therapy (RT), survivorship care plan (SCP), standard deviation (S.D.), treatment summary (TS), surgery (surg.)