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Review Article

Rural and remote cancer survivor supportive care services: a scoping review

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Abstract

Introduction: Improvements in survival, earlier diagnosis, and cancer treatment have increased the number of individuals living with and beyond cancer, frequently accompanied by late and long-term side effects. These cancer survivors require comprehensive supportive care to combat the resultant effects of the disease and its treatment, encompassing the medical, physical, psychological, and social support aimed at the prevention and management of the adverse effects of cancer and its treatment. Rural and remote survivors experience unique challenges that could be supported by supportive care services; however, their access to supportive care is often constrained by factors such as geographic distance and workforce shortages. This reduced access to supportive care

contributes to disparities in health outcomes for rural and remote survivors compared with their urban counterparts. This review aimed to identify and describe supportive care interventions for rural and remote cancer survivors, focusing on intervention types and measures of effectiveness, to establish the current evidence base.

Methods: Using Arksey and O'Malley's methodological framework, we conducted a scoping review, searching in MEDLINE, Embase, PsycInfo, and CINAHL databases from database inception to 14 June 2024. Eligibility criteria were defined by the Population, Concept, and Context framework and included studies describing supportive care services (Concept) for adult (≥18 years) rural and remote cancer survivors (Population) in developed countries during the post-treatment phase of survivorship (Context). Supportive care was defined as services aimed at preventing and managing cancer's adverse effects, focusing on rehabilitation, secondary cancer prevention, and survivorship. Identified records underwent de-duplication and were then screened independently at the title/abstract and full-text levels. Articles were included only if they were deemed eligible by two independent reviewers. Data were then charted to characterize the scope of the literature on supportive care services for rural and remote cancer survivors, including study characteristics, intervention components and type (eg support group, behavioural), and reported outcomes and measures utilized to assess efficacy.

Results: Thirty-seven studies published between November 1999 and September 2023 were included. Most studies were randomized controlled trials and non-experimental studies. Breast cancer survivors were overrepresented, constituting 54% of the study populations. Common supportive care interventions included support groups (*n*=9), behavioural interventions (*n*=9), and educational programs (*n*=7). Methods such as telehealth (54%) and internet-based delivery (19%) were frequently utilized, highlighting their potential to address distance barriers for rural and remote participants. The efficacy of interventions was assessed through both qualitative and quantitative approaches with many different methods of measurement, preventing standardization.

Conclusion: This review highlights the types of supportive care services described for rural and remote cancer survivors, and the methods used to evaluate their efficacy. The findings highlight priorities for future research, including expanding beyond breast cancer populations, evaluating digital health approaches in rural contexts, and developing coordinated, stakeholder-informed models of supportive care to improve survivorship outcomes.

Keywords

cancer, oncology, psychosocial, rural, supportive care.

Introduction

With the increase in survival and earlier diagnosis, as well as the advancement of treatments, for cancer the number of individuals living with and beyond cancer (hereafter referred to as cancer survivorship) has increased. Currently, more than 1.5 million cancer survivors are estimated in Canada[1]. Improved survival is often accompanied by late and long-term side effects from cancer and its treatments[2]. It is well established that cancer survivors require supportive care services to manage these side effects and to optimize their overall quality of life[3]. Supportive care services, as defined in this review, encompass the medical, physical, psychological, and social support aimed at the prevention and management of the adverse effects of cancer and its treatment[4]. These services include the management of physical and psychological symptoms and side effects across the continuum of the cancer journey from diagnosis to post-treatment care, thereby enhancing survivors' quality of life.

A major barrier to accessing supportive care is rurality[5]. According to Statistics Canada classifications, which define rural areas as those outside of Census Metropolitan Areas and Census Agglomerations, approximately six million Canadians reside in rural regions[6]. Rural and remote cancer survivors face unique challenges (such as social isolation, difficulties returning to work, and changes in relationships) that could be managed and addressed through supportive care services[7]. However, rurality often exacerbates barriers to accessing these services, resulting in disparities in physical and psychological outcomes[8]. Limited rural access to supportive care contributes to these inequities, widening the gap in health outcomes between rural and remote survivors and their urban counterparts[9]. Barriers to accessing care highlighted in the literature include geographical and professional isolation, financial constraints, and systemic inequities, all of which contribute to poorer health outcomes, higher mortality rates, and diminished quality of life for this population[10,11].

The scope of supportive care services for cancer survivors has been previously explored in low- and middle-income countries, as well as in contexts not defined by geographic location[12,13]; however, there is a significant gap in research addressing the availability of such services for rural and remote populations. Prior literature has predominantly focused on describing the supportive care needs and the barriers and facilitators to accessing such services[14,15]. To our knowledge, no research has been conducted to identify the current landscape of supportive care services for rural and remote cancer survivors through intervention mapping and identifying reported outcomes and measures. Establishing a baseline understanding of existing supportive care services is therefore necessary to inform future needs assessments and guide efforts to improve accessibility. To do so, a scoping review methodology was selected, as scoping reviews are well suited to exploratory research aimed at mapping a broad, emerging, and heterogeneous body of literature such as this. In contrast, systematic reviews address more narrowly defined questions and typically include critical appraisal of evidence for intervention efficacy[16].

The purpose of this scoping review was to widely examine the literature on supportive care services available to rural and remote cancer populations. Specifically, this study aimed to identify the types of services/interventions offered, the components of those interventions, and the outcomes and measures used to determine their efficacy. This review intends to fill a critical knowledge gap by providing a comprehensive overview of services, highlighting opportunities to improve the accessibility and effectiveness of supportive care for rural and remote cancer survivors.

Methods

We performed a scoping review in accordance with methodology described by Arksey and O'Malley[17] to broadly examine the literature on supportive care services available to rural and remote cancer survivors. This study aimed to identify the types of services and interventions studied, the components of those interventions, and the outcomes and measures used to determine their efficacy. We aimed to address the following main questions directly:

- What types of supportive care services (programs, interventions, community organizations) have been developed specific to rural and remote cancer survivors?
- What outcomes have been measured to determine the efficacy of these programs?

This scoping review was conducted in accordance with the PRISMA-ScR checklist (see Supplementary material I)[18].

Eligibility

Our literature search was guided by the elements of the Population, Concept, and Context framework.

Population (P)

Our population included adult (≥18 years) rural and remote cancer survivors who had completed primary cancer treatment (prescribed chemotherapy, radiation, and/or surgery). Patients receiving only ongoing hormone therapy were considered post-treatment for our purposes. Patients in terminal or end-of-life care were excluded. Studies with interventions geared toward healthcare providers or caregivers were excluded in this review but patient–caregiver dyads were included. Finally, studies describing preferences for service types, barriers/facilitators to services, or needs assessment of the rural/remote population were also excluded as our goal was to provide an overview of the types of services for this population.

Concept (C)

We conceptually defined supportive care services as those involved in the prevention and management of the adverse effects of cancer and its treatment aiming to improve the quality of rehabilitation, secondary cancer prevention and survivorship. Interventions focusing on genetic counselling and genetic testing were excluded as being beyond the scope of supportive care.

Context (C)

We limited our scope to rural and remote patients in the post-treatment phase, having completed primary cancer treatment – as this distinct phase of the cancer trajectory requires specific medical management, role management, and emotional management skills. Additionally, all considered studies were conducted in developed countries as defined by the UN Human Development Index and the *World Economic Situation and Prospects 2024* report[19]. The time frame for published studies was not limited.

Information sources

We searched four electronic databases from their individual inception to 14 June 2024: CINAHL (EBSCOhost), MEDLINE (Ovid), PsycInfo, and Embase (Ovid). Our search strategy included MeSH terms and keywords related to supportive care in rural and remote cancer survivors. We also conducted a separate grey literature search on the phenomena of interest; however, we found no eligible records. This included a search of all relevant Health Technology Assessment Agencies databases, clinical practice guidelines databases, the behavioural change database Rx for Change (Canadian Agency for Drugs and Technologies in Health at the time of the searches), and nursing databases (Canadian Nurses Association and Registered Nurses' Association of Ontario) according to the Canadian Agency for Drugs and Technologies in Health guidelines.

Search strategy

The search was completed through the development of three main 'buckets' – a cancer bucket, a rural bucket, and the supportive care services bucket – including a comprehensive list of terms for each bucket. All search strategies were refined based on the search functionalities and terms available in each database, and an example of an initial search strategy is provided in Supplementary material II. All database strategies were developed in collaboration with and reviewed by a health science librarian. The reference lists of included articles were also manually searched for additional articles.

All identified records were uploaded into and managed using EndNote X9 (Clarivate Analytics [https://endnote.com]). The first author (AP) then followed the de-duplication strategy outlined by Bramer et al[20]. Unique records were uploaded to the Covidence systematic review software (Veritas Health Innovation [https://www.covidence.org]) for title/abstract and full-text article review.

Selection process

Following de-duplication, extracted articles underwent a two-phase screening process.

In the first phase, four reviewers (AP, WL, KS, and ML) independently screened titles and abstracts for inclusion based on initially drafted inclusion and exclusion criteria based on our study parameters, and was further finalized by the reviewers once familiarity with the literature was established. The final inclusion and exclusion criteria are outlined in Appendix I. Articles were included in the next phase if two reviewers agreed on their eligibility. Titles without an abstract were automatically included for full-text review.

In the second phase, the same reviewers independently assessed the full-text articles in duplicate. If it was decided that any full-text article was to be excluded at this stage, the reviewer assigned a reason for exclusion from a pre-determined list. Articles selected for final inclusion were agreed upon by at least two reviewers. Discrepancies at any phase, including conflicts of exclusion reasons, were resolved through discussion and consensus between at least two reviewers.

To ensure high-level agreement at both phases, a small-scale pilot was designed and distributed before screening. This pilot included 36 titles and abstracts and 5 full-text articles, which were reviewed by all involved reviewers, achieving an inter-rater agreement rate of 91.7%. To ensure reviewer agreement, a consensus had to be achieved for all titles/abstracts and articles among reviewers. Conflicts were once again resolved by discussion and consensus. One reviewer (AP) also reviewed the citation sections of included articles and determined potentially relevant additions based on

title. Full-text articles were sourced from these titles, reviewed independently by the reviewers and included if at least two reviewers agreed on inclusion.

Data abstraction

Data were abstracted from all included full-text articles independently and recorded in a form created in Microsoft Excel that the research team had used prior to this study. To obtain a scope of relevant literature on supportive care services for rural and remote cancer survivors, data extraction of relevant information included:

- study characteristics including author name(s) and study design
- population information including sample size, cancer type, time since completion of primary treatment, and the definition used to describe rural/remote
- study results including descriptions of the supportive care intervention, type of intervention (eg support group, behavioural) and the reported outcomes and measures utilized to measure efficacy.

Data were charted through narrative synthesis and descriptive presentation. We recorded all relevant contextual information to facilitate the first categorization of the studies according to the main type of intervention delivered (support group, educational, distress or uncertainty management, behavioural, behavioural plus, or 'other'). Next, the literature was organized according to the outcomes measured, with qualitative and quantitative outcomes considered separately. Outcomes were recorded based on the occurrence of each individual outcome or measure used. Some studies reported both qualitative and quantitative outcomes or measures, and these studies were categorized accordingly.

Ethics approval

This review does not contain any studies with human participants performed by any of the authors and therefore ethics approval was not required. This manuscript does not contain any individual's data in any form.

Results

As depicted in Figure 1, the initial search resulted in 5161 articles. Following the addition of articles found in reference sections, as well as the initial removal of duplicates, 5156 total titles and abstracts were screened, and 178 full-text articles were reviewed. From this, we included 37 studies (n=4574 total participants). For some studies, we found multiple manuscripts describing the same intervention[21-32] in which separate outcomes were reviewed and reported. For this review, these manuscripts were combined and detailed as a single study using the author's name and date associated with the most relevant publication with regards to rural and remote cancer survivors. In the article by Rohan et al[33], two interventions were described; however, only the patient navigation intervention was included in this review, as the Project ECHO intervention focused on healthcare providers and therefore did not meet the inclusion criteria.

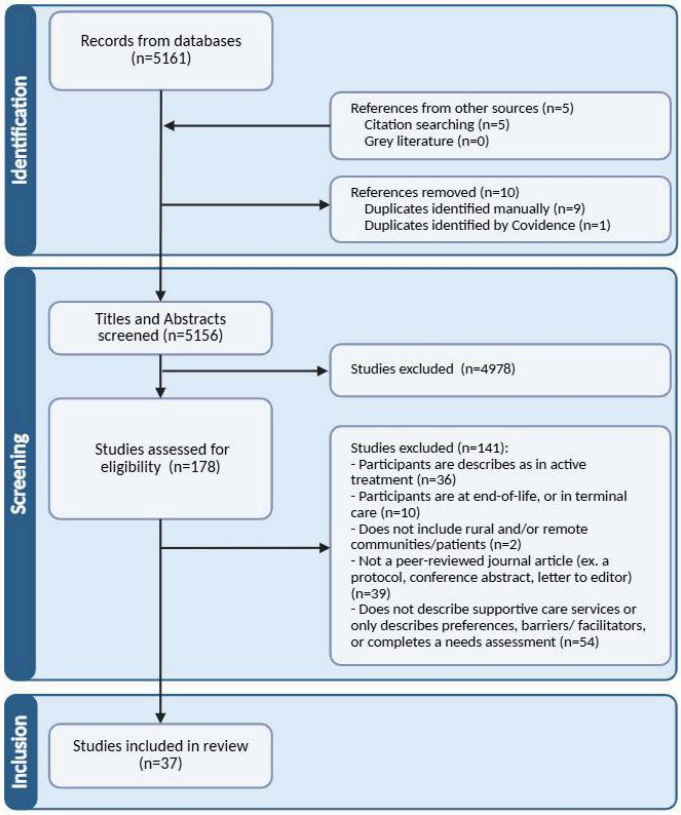

Figure 1: PRISMA diagram for the selection process of articles included in this review.

Studies and participant characteristics

A summary of the study and participant characteristics is provided in Table 1. We described supportive care services/interventions for rural and remote cancer survivors dating from 1999[34] to September 2023[35]. Of these 37 studies, a wide variety of study designs were identified: 12 were randomized control trials, 6 were descriptive studies, 7 were mixed-method studies, 4 were single-arm treatment studies, 3 were longitudinal studies, 3 were cross-

sectional studies, and 2 were cohort studies. The sample sizes ranged from 9 to 487 participants. Over half of the studies solely catered to rural female breast cancer survivors (*n*=20). Of the articles that specified post-treatment stage, time since completion of primary treatment ranged from a minimum of 6 weeks to a maximum of 4 years post-treatment. Only six studies specified their definition for rural or remote. Among these studies, two classification systems were used: Accessibility/Remoteness Index of Australia (*n*=3) and Rural–Urban Commuting Area Codes (*n*=3).

Table 1: Characteristics of studies included in this scoping review, by intervention type (*n*=37)[23,25,27,29,31,33-64]

Study, year	Method		Participants				Details	Mode of delivery	Outcomes measuring efficacy
	Location	Design	*n*	Rural/remote definition	Stage of post-treatment	Cancer type			
Support group (*n*=9)									
Collie, 2007[36]	US	NE	27	Designated 'frontier' area having >11 people per square mile	NR	Breast	Support group sessions with workbook journal supplement	Video-conference	Depression symptoms PTSD symptoms Self-efficacy for coping with cancer Emotional expression
Curran, 1999[34]	Canada	NE	54	Communities with populations of <5000 people	Varies among participants (<1 year, 3–5 years, and >5 years post-treatment)	Breast	Peer self-help support group sessions	Teleconference	Participant satisfaction
Doorenbos, 2010[37]	US	NE	50	Travel by road to the nearest in-person support group would take more than 24 hours	NR	Various	Support group meetings: group counselling, educational programming, psychological and social support	Video-conference	Satisfaction with telehealth Satisfaction of support group
Han, 2008[38]	US	NE	231	NR	NR	Breast	Comprehensive Health Enhancement Support System 'Living With Breast Cancer' program: messaging group with other survivors	Computer-mediated (online support group)	(P) Breast cancer-related concerns (QoL outcome) Emotional expression
O'Brien, 2008[39]	Australia	NE	21	NR	NR	Breast	Supportive-expressive group therapy	In-person and/or tele-conference	Changes in positive and negative mood dimensions Stress symptoms
Solberg, 2003[40]	Canada	NE	11	NR	NR	Breast	Social support group	Audio-conference	Breast cancer survivor experiences
Stephen, 2013[41]	Canada	MM	351 (195 rural)	Areas with <100,000 residents	NR	Various	CancerChatCanada: professionally led live-chat support group (text-only)	Online	Participation Satisfaction or benefit of professional-led live-chat online support group
Stephen, 2017[42]	Canada	RCT	105	NR	NR	Breast	Coping with Cancer educational handbook and relaxation CD; Online support group (chat group access and semi-structured sessions based on educational materials)	Mailed packet and online access	Feasibility Participant experiences (P) Illness disruption Mood Personal growth following cancer
Zeigler, 2004[43]	US	NE	10	NR	NR	Breast	Bimonthly support group, emotional/social support space to share experiences, education, vegetarian meal	In-person	Participant experiences
Educational interventions (*n*=7)									
Alsobrooks, 2010[44]	US	NE	87	NR	NR	Breast	Education about cancer treatment regarding emotional and exercise management	Workshop (in person)	Feasibility, acceptability, and efficacy of program
Duggan, 2023[45]	US	RCT	72	Populations <10,000	Completion within the past 5 years	Breast, lung, lymphoma, prostate, or colorectal	Personalized survivorship care plan and personalized educational session based on plan	Telephone	Health literacy Self-efficacy QoL
Gisiger-Camata, 2016[46]	US	NE	72	Counties selected based on health indicators and breast cancer disparities	NR	Breast	Reach Out educational program: lecture, question and answer, discussion, peer support, and supplementary handouts (self-management and distress focus)	In-person	Acceptability and helpfulness of the program

Meneses, 2009[31]	US	RCT	53	Living in a census tract with a population density <1000 persons per square mile (US Census Bureau) or a Florida Index of Treatment Accessibility score >4.0	NR	Breast	Breast cancer education intervention consisting of three psycho-educational support sessions and follow-up sessions with a supplementary education binder and audio-tapes	In-person (main educational sessions); telephone or in-person (follow-up)	Feasibility and acceptability (P) QoL: Overall QoL: four domains (physical, psychological, social, spiritual)
Meneses, 2020[47]	US	RCT	432	Living in one of 33 rural counties or in a rural pocket of the 34 urban counties with an IRA score equal to or greater than 4	Within 3 years of primary treatment completion	Breast	Education sessions and support phone calls and supplementary written material	Telephone and mail	Physical and mental health QoL Depressive and mood symptoms Social support
Risendal, 2014[48]	US	MM	244	NR – 'regional'	NR	Various	Educational workshops (self-management focus)	In-person	Participant satisfaction Feasibility of intervention
Schoenberger, 2016[49]	US	MM	364	IRA score	At least 6 months post-treatment	Breast	Educational intervention: one intake assessment, three education calls, one follow-up education call, and six support calls (physical, psychological, and psychosocial wellbeing, and healthy self-management focus)	Telephone-mediated	Participant satisfaction (quantitative) intervention perceptions, experiences, and perceived helpfulness
Distress/uncertainty management (*n*=4)									
Bernacchi, 2023[50]	US	NE	25	National Center for Health Statistics: small region requiring >45 minutes of travel from cancer centre	Completion within previous 6 months	Head and neck	Distress assessment and education on pain and distress management	Video-conference	Satisfaction of intervention (qualitative) and telehealth (quantitative)
DeGuzman, 2022[51]	US	QE	21	NR	6 weeks post-treatment	Head and neck	Nurse-led video visit: screening, symptom management, education, referrals	Video-conference	Symptom management
Germino, 2013[52]	US	RCT	313	NR	1–4 years post-treatment	Breast	Younger Breast Cancer Survivor Uncertainty Management Intervention: CD with management strategies and guide that addresses uncertainties	CD and guide booklet	Uncertainty and uncertainty management Breast cancer-specific concerns Positive psychological outcomes
Nápoles, 2020[53]	US	RCT	153	NR	NR (broad inclusion); *compañeras* were at least 3 years post-treatment	Breast	Nuevo Amanecer (NA-II):10-week stress management program for rural Latina breast cancer survivors. Training for rural/remote survivor interventionists (*compañeras*); *Compañera*-led weekly in-person modules (stress and emotion management, nutrition, physical activity, and healthy lifestyle education) in participants' first language (Spanish)	In-person: *compañeras* come to the homes of participants	(P) Breast-cancer-specific quality of life General distress symptoms (depressive symptoms, perceived stress, anxiety, somatization) Stress management skills
Behavioural interventions (*n*=7)									
Ester 2023[35]	Canada	RCT	205	NR	Post-treatment participants had completed treatment within the past 3 years	Various	App-based self-monitoring of physical activity levels and other relevant health data; additional and technical support for app use	Mobile/web browser available app	(P) Weekly self-reported moderate-to-vigorous physical activity Mild aerobic physical activity and resistance physical activity minutes App usability and satisfaction

Fazzino, 2016[54]	US	NE	210	NR	Average 3.3 years post-treatment (range 1–60 months)	Breast	Group-based weight-loss intervention: tailored meal/dietary recommendations, physical activity goals; weekly accountability group conference calls	Group conference call	Anthropomorphic Participant experiences in the program
Frensham, 2018[27]	Australia	RCT	91	ARIA	NR	Various	STRIDE website: daily step log (personalized step targets), an online forum for participants to share experiences and provide peer support, a virtual noticeboard allowed for event advertisement, nutrition information	Online website	Daily step count Mediators of physical activity change
Gell, 2022[55]	US	RCT	39	Rural community, as indicated by ZIP code in RUCA code areas designated as 4–10	NR	Various	Professionally led, Enhance Fitness 1-hour classes: guided warm up, aerobic exercise, strength training, balance exercise, and flexibility exercise	Video-conference (Zoom- mediated class sessions)	Feasibility Physical function Self-efficacy for exercise Physical performance
Gray, 2019[29]	US	RCT	641	RUCA codes	NR	Various	Reach-out to ENhancE Wellness home-based, diet and exercise behavioural intervention: physical activity and health eating promotion	Mailed print materials (initial workbook and newsletters) Eight telephone prompts telephone counseling	Health-related QoL: (P) physical functioning • overall physical QoL • overall mental QoL Physical activity Diet Anthropomorphic
Price, 2021[56]	Canada	MM	9	Areas with <35,000 inhabitants, based on Canadian statistical definitions	Average 4.6 years post-treatment	Leukemia, lymphoma, thyroid cancer, testicular cancer	One-on-one sessions facilitated by a health coach: education and promotion of behaviour-change techniques to facilitate physical activity participation, fruits and vegetable consumption, and other healthy lifestyle behaviours	Teleconference	Feasibility Acceptability Physical activity participation Fruits and vegetables consumption
Porter, 2021[57]	US	MM	12	Characterized by lower socioeconomic status and limited access to healthcare services	Average 13.8 months post-treatment (range 1–40 months)	Breast, prostate, skin, colon, cervical cancer, large B-cell lymphoma	weSurvive behavioral intervention: group classes and group and individualized telehealth calls – improvement of health behaviors and creation of SMART (specific, measurable, attainable, relevant, time-based) goals based on diet and/or physical activity behaviours	In-person and teleconference	Feasibility Cancer beliefs and knowledge Self-efficacy Physical activity and diet QoL Social support Feasibility and acceptability
Behavioural intervention plus another intervention type (*n*=2)									
Befort, 2012[23]	US	QE	35	RUCA codes	>3 months post treatment	Breast	Behavioural plus support group: weight control support group – education and monitoring materials	Telehealth: conference call technology	Anthropomorphic Diet Physical activity Serum biomarkers QoL: physical symptoms, fatigue, depression symptoms, body images and relationships
McCarthy, 2018[58]	US	QE	18	Rural or frontier Colorado counties, as designated by the US Health Resources and Services Administration	NR	Breast	Behavioural plus educational: Cognitive behaviour therapy intervention for insomnia including educational component and personalized sleep schedules	Video-conference	Feasibility and efficacy (P) Sleep parameters (P) Insomnia severity (P) Knowledge/beliefs about sleep QoL Physical function Fatigue Anxiety Depression Menopause symptoms
Other (*n*=8)									

Angell, 2003[59]	US	RCT	100	NR	3 months post-diagnosis or 3 months post-treatment	Breast	Workbook journal with educational resources and journal space	Physical mailed packet	(P) PTSD symptoms (P) Mood disturbance Cancer-specific coping capacity
Cadet, 2022[60]	Australia	MM	36	NR	NR	NR	Complementary touch therapies (includes remedial massage, lymphatic massage, reflexology)	Community Cancer Center Services	Qualitative survivor experiences
Fennell, 2017[61]	Australia	NE	111	ARIA	NR	Various	Interactive website developed in partnership with rural survivors: tips for travelling for treatment, cognitive behaviour therapy, therapy-based emotional self-help material, distress screening tool, health and support services directory, relevant emergency numbers, and a space for users and survivors to share their experiences	Developed website	Website acceptability Perceived impact
Freeman, 2008[25]	US	NE	34	Alaska Regional Hospital Cancer Center	6 weeks to 1 year post-treatment	Breast	Envision the Rhythms of Life imagery stress reduction program: education and practice identifying stressful/negative passive imagery and replacing them with positive/emotionally supportive ones	In-person classes	Biomarker (salivary cortisol) Physical/emotional and spiritual wellbeing Psychological distress
Gunn, 2022[62]	Australia	NE	32	ARIA	Storytellers average 21.77 months post-treatment; Viewers average 55.28 months post-treatment	Various	YouTube videos by rural cancer survivors for rural cancer survivors: sharing experiences and health-related information	Publicly available YouTube channel and uploaded videos	Participant experiences (highlights, challenges, perceptions, feedback, and gains)
Henry, 2010[63]	US	RCT	97	Outside a Standard Metropolitan Statistical Area; populations >50,000 RUCA code (USDA ERS) of their county was 6–9	4 weeks post-radiation treatment	Breast	Expressive writing	Remotely via mailed packet	Retention and qualitative reactions to writing Physical symptom severity Depressive symptomology Mood
Rohan, 2022[33]	US	MM	164	2013 RUCA codes (USDA ERS) with populations ranging from 10% to 65% residing in non-metropolitan counties	NR	NR	Patient navigation for rural cancer survivors utilizing hub-and-spoke technology	Video-conference	Implementation and reach
Watanabe, 2013[64]	Canada	MM	44	NR	NR	Various	Palliative care consultations virtual clinic – 90-minute visits	Video-conference	Feasibility Symptom palliation Patient satisfaction

ARIA, Accessibility/Remoteness Index of Australia. IRA, Index of Research Access. MM, mixed methods. NE, non-experimental. NR, not reported. (P), primary outcomes. PTSD, post-traumatic stress disorder. QE, quasi-experimental. QoL, quality of life. RCT, randomized controlled trial. RUCA, Rural–Urban Commuting Area. USDA ERS, United States Department of Agriculture Economic Research Service.

Description of supportive care services for rural and remote cancer survivors

The identified rural/remote cancer survivor supportive care interventions were diverse in type of services and mode of delivery. Intervention categories were developed inductively through iterative review of intervention characteristics across studies. Of the 37 studies, 9 support group interventions, 7 educational workshop/session interventions, and 9 behavioural (and behavioural plus) interventions were identified, constituting the majority of the services described in the included studies, as depicted in Figure 2. Additionally, four distress/uncertainty management interventions were identified, with the rest of the interventions being categorized as 'other' including services such as an expressive writing intervention, an imagery program, and a patient navigation intervention.

Telehealth emerged as the predominant delivery mode (n=20), reflecting its potential to overcome geographic barriers experienced by rural cancer survivors. This includes audio-conference and videoconference technologies to bridge distance-related gaps, ensuring access and scalability for supportive care.

The studies included in-person intervention components (*n*=10), online website/app components (*n*=7), and supplementary physical workbook/CD materials (*n*=7).

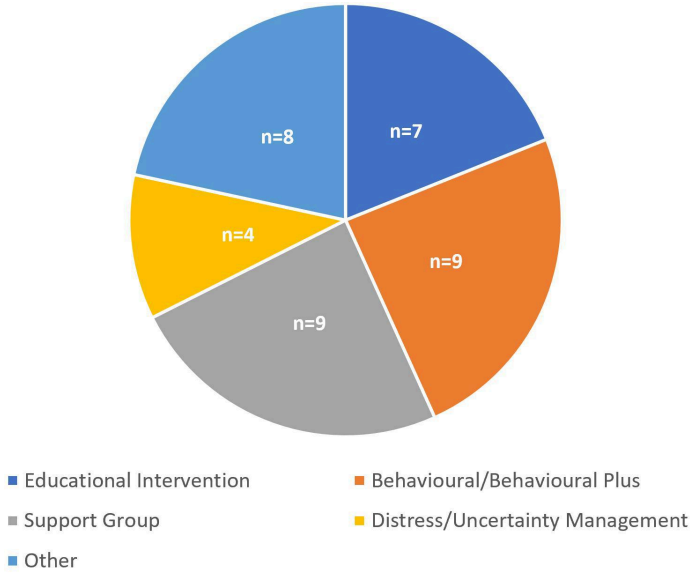

Figure 2: Distribution of intervention types among studies included in this review.

Description of outcomes and measures

Some interventions captured both qualitative and quantitative outcomes (*n*=14), while some measured only qualitative outcomes (*n*=10), and others measured only quantitative outcomes (*n*=13). Thus, it was identified that the best method to describe the measures of efficacy of the interventions for this review would be to describe the qualitative and quantitative outcomes and measures separately, as shown in Table 2 and Table 3, respectively.

Table 2: Qualitative outcomes and measures[25,31,33,34,37,40-44,46,48-50,54-58,60-64]

Outcome	Study	Measure
Program evaluation (feasibility, acceptability, and efficacy) *n*=14	Alsobrooks, 2010[44]	Attendance, evidence of increased knowledge and new skills, self-reported behaviour changes
	Fennell, 2017[61]	Website acceptability questionnaire: relevance, necessity, helpfulness, likelihood of returning to the website and recommending it to others, impressions, suggestions for improvement, and whether users felt their situation was understood by those who wrote the website's content
	Gell, 2022[55]	Identification of referral sources, measurement completion, recruitment, and retention
	Gisiger-Camata, 2016[46]	Acceptability and helpfulness, preferences for future survivorship programs
	Henry, 2010[63]	Retention and reactions to writing
	McCarthy, 2018[58]	Recruitment, availability and acceptability of technology, and initial outcomes of treatment
	Meneses, 2009[31]	Enrolment and retention
	Price, 2021[56]	Feasibility: recruitment, enrolment, adherence, retention, and attrition rates
		Acceptability: participants' thoughts, feelings, and opinions regarding the intervention
	Porter, 2021[57]	Retention, acceptability, demand, practicality, and implementation
	Risendal, 2014[48]	Course quality, course facilitation, course logistics, group composition
	Rohan, 2022[33]	Number of unique survivors navigated, types of survivors navigated, and barriers addressed
	Stephen, 2013[41]	Enrolment and attendance
	Stephen, 2017[42]	Recruitment, rural outreach, comfort with computers and information websites, reasons and motivations for participating, and assessment completion
	Watanabe, 2013[64]	Characteristics of referral, clinical, and consultation. Also cost savings to patient comparing the virtual clinic compared to costs associated with travel to close cancer centre (Cross Cancer Institute)

Participant experiences/ satisfaction *n*=13	Bernacchi, 2023[50]	Pre- and post-intervention interview questions designed to capture participants' perspectives about the nurse–patient relationship experience over a videoconferencing visit
	Cadet, 2022[60]	Patient experiences with pain management, fatigue improvement, benefit given experiences with nausea, positive feelings, benefit given depression diagnosis, benefit given anxiety diagnosis, and impact on emotional wellbeing, upon receiving touch therapy treatment
	Curran, 1999[34]	Satisfaction with overall experience, program delivery (ie teleconference) and program structure
	Doorenbos, 2010[37]	Satisfaction with support group (telehealth, group meetings, topics, and any desired future topics) and determination of information needs
	Fazzino, 2016[54]	Participant experiences with the group-based intervention, weight loss, diet, and physical activity goals Thematic analysis completed
	Freeman, 2008[25]	Participant experience and descriptions of imagery practices and assessed themes (based on focus groups led by interviewers). Thematic analysis by Kreuger method using the long-table approach
	Gunn, 2022[62]	Participant experiences (highlights, challenges, perceptions, feedback, and gains). Thematic analysis using Braun and Clarke's method
	Risendal, 2014[48]	Participant satisfaction with course content, leaders and group process. Collected via open-ended post-program survey questions
	Schoenberger, 2016[45]	Participant satisfaction and overall impressions based on participants' expectations, perceived helpfulness, usefulness, and sufficiency of different intervention components. Collected via Evaluation Survey (12 qualitative questions)
	Solberg, 2003[40]	Participant experiences in the audio-conferencing supported program. Collected via semi-structured interviews
	Stephen, 2013[41]	Participant satisfaction / perceived benefit in a professional-led live-chat online support group, collected by interviews followed by directed qualitative content analysis based on communication through technology, contribution of professional facilitator, and overall psychosocial benefit
	Stephen, 2017[42]	Participant subjective experiences in an online support group. Collected via semi-structured interview questions
	Zeigler, 2004[43]	Participant experiences in the support group collected via interview forms reflecting the Roy Adaptation Model of Nursing

Table 3: Quantitative outcomes and measures[22,23,25,27,29,31,35,36,38,39,42,45,47-58,61,63,64]

Outcomes	Study	Measure
Psychosocial outcomes		
Quality of life *n*=8	Duggan, 2023[45]	Patient-Reported Outcome Measurement System 10
	Freeman, 2008[25]	Functional Assessment of Cancer Therapy – Breast: physical, social, emotional, functional, and disease-specific wellbeing* Functional Assessment of Chronic Illness Therapy-SP: spiritual wellbeing*
	McCarthy, 2018[58]	European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire – Core 30*
	Meneses, 2009[31]	Quality of Life–Breast Cancer Survivors Tool: overall QoL* Quality of Life–Breast Cancer Survivors Tool: four domains (physical, psychological*, social, and spiritual)
	Meneses, 2020[47]	Quality of Life–Breast Cancer Survivors Tool
	Nápoles, 2020[53]	Functional Assessment of Cancer Therapy – Breast
	Porter, 2021[57]	Quality of Life Patient/Cancer Survivor Version
	Stephen, 2017[42]	Disruption of life by disease and treatment: Illness Intrusiveness Rating Scale
Depressive symptoms *n*=6	Befort, 2012[23]	Patient Health Questionnaire 9*
	Collie, 2007[36]	Center for Epidemiologic Studies Depression Scale*
	Henry, 2010[63]	Center for Epidemiologic Studies Depression Scale*
	McCarthy, 2018[58]	Hospital Depression and Anxiety Scale
	Meneses, 2020[47]	Center for Epidemiologic Studies Depression Scale
	Nápoles, 2020[53]	Patient Health Questionnaire 8
Mood *n*=5	Angell, 2003[59]	Profile of Mood States
	Henry, 2010[63]	Profile of Mood States*
	Meneses, 2020[47]	Profile of Mood States
	O'Brien, 2008[39]	Derogatis Affects Balance Scale: changes in mood dimensions*
	Stephen, 2017[42]	Profile of Mood States
PTSD *n*=2	Angell, 2003[59]	PTSD Checklist–Specific Version
	Collie, 2007[36]	PTSD Checklist–Specific Version
Self-efficacy *n*=5	Collie, 2007[36]	Cancer Behaviour Inventory
	Duggan, 2023[45]	General Self-Efficacy Scale*
	Gell, 2022[55]	Self-Efficacy to Regulate Exercise Survey
	Germino, 2013[52]	Self Efficacy for Breast Cancer Scale*
	Porter, 2021[57]	Single-item questions (self-efficacy to change dietary or physical activity behaviors)
Emotional *n*=2	Collie, 2007[36]	Courtauld Emotional Control Scale
	Han, 2008[38]	Analysis of positive and negative dimensions in sent online messages using the Linguistics Inquiry and Word Count 2001 computerized text analysis program (interaction between writing positive and negative emotion words*)

Anxiety *n*=3	Freeman, 2008[25]	Brief Symptom Inventory*
	McCarthy, 2018[58]	Hospital Depression and Anxiety Scale
	Nápoles, 2020[53]	Brief Symptom Inventory
Stress *n*=2	Nápoles, 2020[53]	Perceived Stress Scale
	O'Brien, 2008[39]	Impact of Events Scale: intrusive and avoidant symptoms as a result of a stressful event
Breast-cancer-specific concerns *n*=2	Germino, 2013[52]	Concerns About Recurrence Scale: fears of recurrence Impact of Events Scale: intrusive thoughts
	Han, 2008[38]	Eight-item breast-cancer-related concerns index
Body image *n*=1	Befort, 2012[23]	32-Item Body Image and Relationships Scale: strength and health, social barriers, appearance and sexuality*
Perceived impact *n*=1	Fennel, 2017[61]	Readiness to Change Ruler*
Beliefs about cancer *n*=1	Porter, 2021[57]	Health Information National Trends Survey (two questions)
Physical health outcomes		
Symptom management/strategies *n*=8	Angell, 2003[59]	Mental Adjustment to Cancer Scale
	Befort, 2012[24]	Breast cancer prevention trial symptoms: cognitive symptoms, joint pain*, hot flashes
	DeGuzman, 2022[30]	Short Form Survivor Unmet Needs Survey
	Germino, 2013[42]	Self-Control Schedule: uncertainty management – cognitive reframing and problem-solving* Cancer Survivor Knowledge Scale: uncertainty management – knowledge* Disclosure Scale: uncertainty management – self-disclosure Sources of Information Checklist: uncertainty management – sources for helpfulness of information* Mischel Uncertainty in Illness Scale – Survivor Version: uncertainty management – uncertainty Positive and Negative Affect Scale: positive psychological outcome – affect (negative mood in African American survivors*) Growth Through Uncertainty Scale: positive psychological outcome – personal growth
	Henry, 2010[48]	18-item physical symptom survey (eg fatigue, nausea, hot flashes, itchiness*)
	Nápoles, 2020[53]	Stress Management Skills: Measure of Current Status Part A (MOCS-A)
	Stephen, 2017[61]	Personal Growth following cancer: Post-traumatic Growth Inventory (PTGI)
	Watanabe, 2013[63]	Symptom Palliation: Edmonton Symptom Assessment System*
Anthropomorphic measures *n*=3	Befort, 2012[23]	BMI, waist circumference*
	Fazzino, 2016[54]	BMI, % weight loss
	Gray, 2019[29]	BMI
Sleep/fatigue *n*=3	Befort, 2012[23]	Brief Fatigue Inventory: fatigue, interference with activity, mood*, walking, work, relationships, life enjoyment
	Germino, 2013[52]	Insomnia Severity Index Piper Fatigue Scale
	McCarthy, 2018[58]	Consensus Sleep Diary assessment tool*: – sleep efficiency – sleep latency – wake after sleep onset – total sleep time – number of awakenings Insomnia Severity Index Dysfunctional Beliefs and Attitudes about Sleep 16 Piper Fatigue Scale *
Biomarkers *n*=2	Befort, 2012[23]	Serum biomarkers: insulin, leptin, adiponectin in blood
	Freeman, 2008[25]	Salivary cortisol
Menopause *n*=1	McCarthy, 2018[58]	Menopause Rating Scale: menopause symptoms
Behavioural and lifestyle outcomes		
Diet *n*=4	Befort, 2012[23]	Daily kcals, % kcals from fat, daily fruits and vegetables servings*
	Gray, 2019[29]	Nutrition Data System for Research software: dietary fruits and vegetables and saturated fat) intake*
	Price, 2021[56]	Behavioral Risk Factor Surveillance System – Fruit and Vegetable Questionnaire: fruits and vegetables consumption
	Porter, 2021[57]	National Cancer Institute Multifactor Screener: dietary (fruits and vegetables and saturated fat) intake

Physical activity/function *n*=8	Befort, 2012[23]	kcal/week, min/week, Minnesota Physical Activity Questionnaire, and metabolic equivalent of task value*
	Ester, 2023[35]	Modified Godin Leisure Time Exercise Questionnaire: MVPA minutes per week (participants in both the intervention and waitlist control groups maintained significant increases in MVPA at 24 weeks)*
	Frensham, 2018[27]	Daily step count (steps/day)* Physical Activity Maintenance Assessment based on changed in motivation and self-efficacy: mediators of physical activity change
	Gell, 2022[55]	Patient Reported Outcome Measurement System – Physical Function: physical function* Physical performance: Zoom-mediated tests: balance test and sit to stand tests; activPAL4 accelerometer to assess physical activity and sedentary behaviour (mean daily MVPA and light intensity physical activity)*
	Gray, 2019[29]	Health Related Quality of Life – (P) Physical Functioning: Medical Outcomes Study Short Form 36 (rural survivors reported significantly more favourable mean changes in physical functioning*) 41-item Community Health Activities Model program for Seniors: physical activity
	Meneses, 2020[47]	SF-26 Health Survey: physical and mental health
	Price, 2021[56]	International Physical Activity Questionnaire – Short Form: physical activity participation
	Porter, 2021[57]	Stanford Leisure-Time Activity Categorical Item and modified Godin Leisure Time Exercise Questionnaire: physical activity for 150 min/week
Satisfaction *n*=4	Bernacchi, 2023[50]	21-item Telemedicine Satisfaction and Usefulness Questionnaire: telehealth satisfaction
	Ester, 2023[35]	Mobile App Usability Questionnaire including ease of use, interface and satisfaction, usefulness: Zamplo mobile app usability/satisfaction
	Risendal, 2014[48]	Closed-ended post-program survey questions: participant satisfaction with course content, leaders and group process
	Schoenberger, 2016[49]	Six-item quantitative statements in Evaluation Survey: participant satisfaction

* Significant outcome(s).
MVPA, moderate-to-vigorous activity. PTSD, post-traumatic stress disorder.

As they were designated together, the most common outcomes collected in these studies were qualitative evaluations of participant satisfaction and intervention experience (*n*=13) collected using semi-structured interviews and/or qualitative, open-ended evaluation surveys. Qualitative evaluation of program feasibility, acceptability, and efficacy (*n*=14) using measures such as participant recruitment, enrolment, adherence, and retention as depicted in Table 2 were common.

As highlighted in Figure 3, the most frequently assessed quantitative outcomes were quality of life (*n*=8), depressive symptoms (*n*=6), symptom management (*n*=8), and physical activity/function (*n*=8). As shown in Table 3, there was much heterogeneity observed in both the outcomes assessed and the measures used across studies. Among the 27 studies reporting quantitative outcomes, approximately 64 broad quantitative measures were identified. Consequently, although many studies evaluated similar outcome domains (psychosocial outcomes, physical health outcomes, and behavioural/lifestyle outcomes), a wide range of instruments were employed across and within these domains, limiting comparability across interventions.

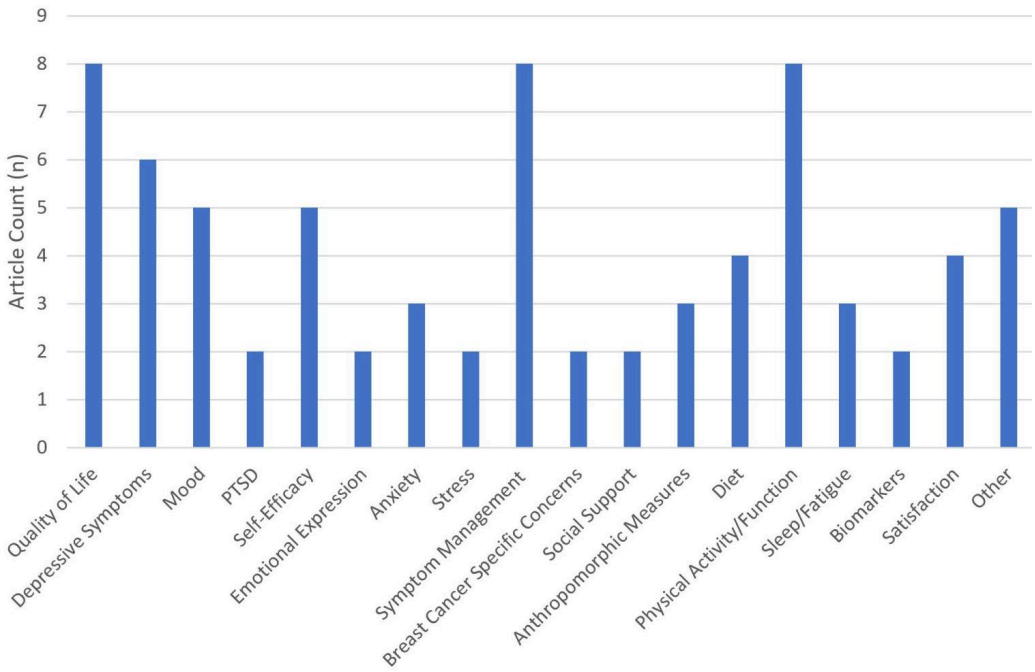

Figure 3: Distribution of quantitative outcomes utilized to measure efficacy among studies included in this review.

Discussion

We conducted a scoping review of supportive care services for rural and remote cancer survivors to determine the types of interventions that have been described in the literature and how the outcomes of such interventions have been measured. To our knowledge, this is the first review to summarize the types and outcomes of supportive care service interventions for rural and remote populations. Our review highlights several important findings and notable gaps in this area.

Our review revealed the majority of studies (54%) focused exclusively on female breast cancer patients[21-25,31,32,34,36,38-40,42-44,46,47,49,52-54,58,59,63]. While this highlights the significant attention given to a large subgroup of cancer survivors, it emphasizes the need for interventions that address the diverse experiences and needs of all cancer survivors, regardless of cancer type and gender. Other systematic reviews of various types of supportive care interventions, delivery methods, or geographic regions (eg self-management, digitally supported, low- and middle-income countries) have demonstrated that there is a disproportionate number of supportive care interventions delivered to breast cancer patients[12,14,65]. Broadening the scope of supportive care services is essential to ensure equitable access to interventions that reflect the varied challenges faced by different survivor populations in all settings, including rural and remote. This inclusivity is critical for developing comprehensive, patient-centred care strategies to address the full spectrum of survivorship.

Furthermore, by employing a broad definition of supportive care services, our scoping review captured a diverse range of interventions and outcome measures, offering insight into the research landscape of supportive care for rural and remote cancer survivors. The high variability in intervention content highlights the multifaceted nature of supportive care. Among the studies, behavioural (n=9) and support group interventions (n=9) were common, often enhanced with educational tools such as workbooks, websites, or applications. Thus altogether, more than 60% of the studies included an educational component aimed at addressing cancer management and supportive care including the seven educational workshops/educational session specific interventions. The frequent inclusion of educational and informational components in supportive care interventions aligns with described educational needs of cancer survivors in the literature[15,66].

In their ambition statements on the future of supportive cancer in cancer, Chan et al[67] underscored the importance of self-management, behavioural support, and education as core elements of comprehensive supportive care. These were identified as key because they fit within a broader vision of supportive cancer care that emphasizes coordinated, resource-stratified, and person-centred approaches to guide research, education, services, and policies worldwide[67]. Thus, it is reassuring that many studies included in this review highlight these important elements. Chan et al[67] also highlighted the need for individualization of supportive care and involvement of patient partners and health and policy leaders when developing and implementing interventions. In rural and remote settings, workforce shortages and resource limitations may influence the feasibility, scalability, and sustainability of these interventions, underscoring the need for coordinated investment and collaboration among all stakeholders[68]. The range of intervention types identified in this review, including behavioural interventions, support groups, and educational interventions, reflects an ongoing effort to tailor care to the diverse needs and preferences of rural and remote cancer survivors. This individualization, as evidenced by the variability in intervention design and delivery, highlights the necessity of flexible and context-specific approaches. Thus, future efforts should prioritize evidence-based and rural-specific care models, collaboration with patient partners and communities, and coordinated policies that support and evaluate effective rural supportive care development.

To ensure equitable access to supportive care in rural and remote communities, innovation in delivery of such care is necessary. To overcome distance barriers for rural and remote survivors, approximately 54% of studies utilized telehealth (audio-conference, videoconference, teleconference) modes of delivery with other modes of delivery including internet means by websites or developed applications (19%). In other reviews, various types of digital health supportive care interventions have been shown to improve a variety of patient-reported outcomes including patient-reported symptoms, levels of fatigue and pain, quality of life, functional capacity and depression levels[13]. In addition, rural patients have been seen to value this type of support; however, social and behavioural determinants of technology access and proficiency must be considered[69]. Ultimately, while some challenges may still exist with respect to connectivity, it is likely many of these challenges will be resolved with further research in understanding engagement. Thus, future research should investigate the role of digital health interventions to support rural and remote populations using rigorous methods, theoretical approaches, and using established patient engagement principles.

Overall, a wide range of outcomes were measured using both qualitative and quantitative approaches. Similar variability has been noted in the broader supportive care literature, where the absence of standardized outcome measures limits comparability across interventions and reduces opportunities for evidence synthesis[70]. The commonly utilized qualitative feasibility (n=14) and patient satisfaction (n=13) outcomes were likely utilized to determine if interventions could be realistically implemented given the unique challenges for rural and remote survivors and describe how the needs and preferences of the target population were met. Commonly measured outcomes included quality of life (n=8), symptom management (n=8), and physical activity or function (n=8), with many studies demonstrating statistically significant changes to the outcomes that were measured. Studies focused on breast cancer often included tumour-specific outcomes including breast-cancer-related concerns or breast-cancer-specific quality of life measures. Using tumour-specific rather than generic measures has been recommended to more accurately capture the outcomes that matter to patients, or most specifically impact their lives[70]. When broadening interventions to other cancer populations in the rural and remote setting, researchers should ensure that outcomes specific to the population being studied are used[71]. Future rural and remote supportive care research would benefit from the development of a core outcome set to improve consistency and comparability across studies. Given that these interventions are designed to address the barriers to supportive care access that rural and remote survivors face, core outcomes could focus on intervention acceptability and access-related outcomes to better evaluate whether these barriers are being effectively addressed for

rural survivors. Standardized outcomes could improve evidence synthesis while still allowing the inclusion of cancer-specific measures relevant to the populations being studied.

Strengths and limitations

This review's greatest strength is found in its novelty. To our knowledge, this is the first review to broadly map the types of supportive care interventions conducted for the rural and remote cancer population, establishing an important baseline for future rural and remote cancer supportive care research. Furthermore, in outlining the heterogeneity of outcomes measured we provided novel suggestions for the design of future interventions and studies. Additionally, this study was completed with methodological rigour including the compliance with PRISMA-ScR checklist and duplicate screenings.

However, the review faced several limitations that should be considered in the interpretation of its findings. Systematically, there was a lack of pre-registration or pre-published protocol to ensure methodological transparency in this study. Due to the broad focus of the review to obtain a broad view of assessed interventions, conducting a detailed analysis was not feasible. Additionally, the potential for missed literature cannot be overlooked, given reviewer bias, the existence of unpublished data, and the exclusion of non-significant studies.

Conclusion

This review describes the types of supportive care interventions documented in the literature for rural and remote cancer survivors, along with the outcomes and measures used to assess their efficacy. In doing so, we highlight critical gaps in the current body of research and underscore the need for equitable, evidence-based interventions tailored to this population. Future research should focus on diversifying studies to include all cancer populations beyond breast cancer and exploring the role of innovative digital health solutions in rural populations to improve equity and accessibility of supportive care. In the development of these studies, researchers should prioritize evidence-based, rural-specific care models that prioritize the coordination and collaboration of patient partners and stakeholders. Finally, given the variability in outcomes and measures identified across studies in this review, future research should prioritize the use of standardized rural-specific outcomes and employ rigorous methodologies to strengthen the evidence base and better address the unique needs of these underserved communities.

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Conflicts of interest

The authors have no conflicts of interest

AI disclosure statement

The authors declare that no generative AI technologies were used in the production of any part or aspect of this research.

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Appendix I: Study inclusion and exclusion criteria

Inclusion criteria:

1. Peer-reviewed journal article published in English
2. Focuses on or includes cancer patients/'survivors'
3. Focuses on or includes participants that are in post-treatment phase (not in active treatment)
4. Describes supportive care services (see definition below)
5. Focuses on or includes rural or remote patients
6. Focuses on or includes adults (≥18 years)
7. Study conducted in a developed country

Exclusion criteria:

1. Duplicate of another title/abstract
2. Not published in English
3. Not a peer-reviewed journal article (ex. a protocol, conference abstract, letter to editor)
4. Not related to cancer
5. Does not describe supportive care services or only describes preferences for, barriers/facilitators to, or completes a needs assessment.
6. Does not include rural and/or remote communities/patients
7. Participants are at end-of-life, or in terminal care
8. Participants are described as in active treatment
9. Participants are under 18 years of age
10. Study only takes place in non-developed countries

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