SYSTEMATIC REVIEW

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Preferences of cancer survivors for follow-up care: a systematic review of discrete choice experiments

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Abstract

Background The unmet post-treatment needs and issues of cancer survivors for follow-up care are still significant, matching appropriate and acceptable follow-up care to cancer survivors' preferences, may increase adherence of survivors to health programs and quality of life. There is a knowledge gap about how cancer survivors measured their choices between different aspects of follow-up care. As discrete choice experiments (DCE) have been widely used in patient preference elicitation, we reviewed DCE on follow-up care for cancer survivors.

Methods The electronic databases PubMed, The Cochrane Library, Embase, and Web of Science were searched, up to October 06, 2024. Original studies reporting preferences of cancer survivors for follow-up care elicited by DCE were eligible. Findings were presented using a narrative synthesis. Using two validated checklists to evaluate the quality of the included DCE studies.

Results A total of 3525 records were identified and 9 papers were included. The studies were conducted in the Netherlands, Australia, the United Kingdom (UK) and China with 123 to 722 participants evaluated preferences of cancer survivors for follow-up care. Most of included cancer survivors were after completed the main treatment. Several key attributes for cancer survivors' follow-up care were identified including healthcare provider, services offered, frequency of visits, contact mode, familiarity of healthcare provider with patients' medical history/continuity of care.

Conclusions The systematic review focusing on preferences of cancer survivors follow-up care and attributes identified in these studies, the results may inform healthcare providers should take cancer survivors preferences into account.

Keywords Discrete Choice Experiment, Cancer, Patient Preference, Follow-up, Systematic Review

Introduction

Cancer survival rates are considerably increasing in most countries because of technological advances in early detection and effective treatment [1]. The rise in cancer survivors has highlighted the needs and

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challenges regarding physical, psychological, and social well-being after treatment [2]. The term "cancer survivor" is generally used to refer to a cancer patient starting from the moment of diagnosis and throughout their life [3]. Cancer survivors have a wide range of physical and psychosocial effects after treatment. However, regardless of the cancer's location, survivors often have concerns about experiencing new or recurring cancers, enduring side effects from cancer and its treatment, as well as facing psychological and functional obstacles such as depression, fear of cancer recurrence, and difficulties accessing post-treatment support [1]. Cancer



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follow-up care has evolved to tackle these issues. Follow-up care entails delivering healthcare to patients once they have completed their treatment and the objectives of follow-up care involve offering emotional assistance during patients' transition back into family and work settings, as well as identifying any potential relapses or complications stemming from their illness or treatment [4]. Høeg, Beverley L et al. defined six elements that make up cancer follow-up strategies: why follow-up intervention, who leads the intervention, where does it take place, when are visits scheduled, what is delivered in each session, and how is care delivered [5]. Senanayake, S. et al. defined the follow-up care as a holistic care model for cancer survivors after completing their treatment and the model seeks to improve the overall quality of life of cancer survivors through incorporating different elements, such as monitoring for cancer reoccurrence and screening for secondary cancers, managing physical late effects from cancer and/or treatment, addressing psychosocial issues, promoting health, and managing coexisting conditions [6]. Traditional follow-up programs typically involve regular, specialist-led, in-person appointments in a hospital setting that are scheduled frequently. Traditional follow-up care includes clinical examination, blood tests or imaging procedures, and also more frequently incorporate elements of care, like educating patients, creating survivorship care plans, and providing support in addressing quality of life and psychosocial concerns, but the value of more sophisticated follow-up investigations remains uncertain [7, 8]. Cancer survivors often identify symptoms of recurrences on their own, in between scheduled appointments, and traditional hospital-based visits do not always address patients' supportive care needs adequately [9]. Other follow-up care models continue to be developed and implemented, for example, nurse-led follow-up, general practitioner-led follow-up in primary care, patient-initiated follow-up, shared care, supportive care services, and integrative modalities. However, there is still ongoing discussion about the best content and structure for follow-up care procedures. Furthermore, cancer survivors may face many challenges that can significantly hinder their ability to access and complete necessary treatment and follow-up care. Barriers such as difficulty accessing care, long-distance travel, increased medical costs, inadequate infrastructure, and lack of awareness can also prevent cancer survivors from receiving follow-up care [10, 11]. Failure to provide appropriate follow-up care could lead to undiagnosed cancer relapse and advancement, ultimately resulting in treatment ineffectiveness, decreased quality of life and reduced survival rates [12].

It is crucial to acknowledge the significance of patient preferences and to assess the suitability of emerging follow-up models for the increasing number of cancer survivors. Furthermore, understanding what patients require and desire can offer insights for clinical decision-making, ultimately enhancing patient satisfaction and adherence to health regimens [13]. In order to obtain insight into cancer survivors' preferences, discrete choice experiment (DCE) has been gaining popularity in recent years. DCE is a method for making choices that gives individuals various sets of options, each with different attributes and levels for them to choose from [14]. This choice modeling method helps to adapt healthcare services to cancer survivors' preferences and provides information on the acceptance of healthcare products and services and on future demand. Identifying potential attributes of followup care for cancer survivors is essential, and using a DCE provides a strong framework for assessing the relative importance of these attributes. This methodology allows for a nuanced understanding of how survivors prioritize different aspects of follow-up care, such as care models, thus guiding more personalized interventions and future studies in this crucial area. In additional, to develop effective follow-up care models that are acceptable to cancer survivors, it is crucial to focus on identifying the attributes of care models that they value most, particularly when resources are limited.

The main focus of many studies on cancer care has been on the treatment preferences of cancer survivors, [15] screening tests, [16, 17] and palliative care [18]. While DCE have been carried out in different clinical sectors, [19–21] there has been no comprehensive synthesis or evaluation of the current evidence in the field of follow-up care for cancer survivors. This study aimed to fill this gap by reviewing and comparing studies that use DCE to elicit preferences for follow-up care. It is crucial for future research on cancer survivor preferences to identify potential attributes of follow-up care.

Methods

The systematic review adheres to the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses report (PRISMA) [22]. A protocol was registered with PROSPERO (Record ID = CRD42024496937).

Data sources, search strategy, and screening

A comprehensive search of 4 electronic databases spanning all years up to October 06, 2024 was performed. PubMed, The Cochrane Library, Embase, and Web of Science were queried, along with a manual examination of references in pertinent articles. The search criteria applied in PubMed were: ((("choice behavior" [MeSH Terms] OR "choice behavior*" [Title/ Abstract] OR "choice model*"[Title/Abstract] OR "choice experiment*"[Title/Abstract] OR "discrete choice*"[Title/Abstract] OR "conjoint analys*"[Title/ "paired comparison" [Title/Abstract] Abstract] OR OR "pairwise choice*"[Title/Abstract])) AND (Patient Preference[MeSH] Terms] preference*[Title/ OR Abstract]) AND ((((Neoplasms [MeSH Terms] OR (neoplas*) OR (cancer)) OR (carcinoma*)) OR (tumour*)) OR (onco*))).

Once the duplicate entries were deleted, two separate reviewers screened the titles and abstracts of all identified studies to eliminate ineligible articles. The eligibilities of the remaining publications were assessed by full-text examination by the same two independent reviewers. Any disagreements between the reviewers during the selection process were handled by consensus and discussion with a third researcher.

Study selection

Studies needed to meet specific criteria to be included:

- (1) Cancer survivors who have completed cancer treatment,
- (2) The research method employ DCE,
- (3) Studies specifically address follow-up care. The term "Follow-up care" in the context of this review only refers to any formal cancer-related care received after the completion of treatment, including specialist-led, face-to-face outpatient visits in a hospital setting, nurse-led follow-up, general practitioner-led follow-up in primary care, patient-initiated follow-up, shared care, supportive care services, and integrative modalities.

Studies were excluded if they were:

- (1) Reviews and meta-analysis. However, we also reviewed the reference lists of relevant meta-analyses and systematic reviews to identify any primary studies that may have been overlooked during our initial search.
- (2) Wrong publication type including case studies, notes, conference abstracts, commentaries, trial registry record, and letters.
- (3) Studies that focused solely on psychosocial or rehabilitation aspects, or studies that examined diagnostic components not incorporated into clinical cancer follow-up care.
- (4) Not a primary analysis of DCE. In the context of this review, the term "primary analysis" specifically refers to the initial application of the DCE aimed at eliciting preferences for key attributes of follow-up

care. Studies that incorporated DCE as a secondary analysis, or where the DCE was not the central focus of the research, were not included.

No limits were applied on publication date or language.

Data extraction and synthesis of results

A form for extracting data was created for this review. It included details like author, country, population, sample size, study type, age, follow-up time, and DCE characteristics. Two reviewers independently extracted this information, and any disagreements were resolved through consensus after double-checking the data. One reviewer extracted data and another checked the completeness and accuracy of the data.

Given the expected heterogeneity of the experiments and the descriptive measures of effects on participant preferences, the review analysis comprised a narrative synthesis of the studies' uncombined results.

Quality assessment

There is no standard method exists for quality assessment of preference studies, some checklists have been developed to provide guidance on good research practices for DCE. According to previous studies [23, 24], Two independent reviewers assessed the quality of the included studies using the PREFS checklist, which evaluates Purpose, Respondents, Explanation, Findings, and Significance [25] and the checklist from ISPOR (International Society For Pharmacoeconomics and Outcomes Research) [26]. The PREFS checklist comprises 5 items, with each item being evaluated using a binary score (0 or 1) and combined to determine the total score for each study. ISPOR checklist [26] includes ten main components and each component has three questions. If a study reported at least some aspect of its criteria, the question was assessed on a score of 1 and if it did not have a score of 0. And the last, summed up a final score for a study [23].

Results

Study selection

A total of 3525 records were retrieved by the search, from which 1982 duplicates were removed. Not relevant exclusions were 1954 records based on title and abstract, and 28 based on full-text reading. Finally, nine studies were included and analyzed, as shown in the review flow diagram (Fig. 1).

Study characteristics

The characteristics of the eligible studies are demonstrated in Table 1 [6, 8, 10, 27–32]. Research was carried out in the Netherlands [27, 30], Australia [6, 28, 32], the



Fig. 1 Flow diagram of the studies selection

United Kingdom (UK) [8, 29] and China [10, 31], sample sizes within the studies varied from 123 [6] to 722 [28] participants. Three studies used face-to-face survey to recruit and apply the questionnaire to cancer survivors [8, 10, 31], three studies applied questionnaires mailed [29, 30, 32] and the other two used online survey [6, 28], one applied telephone [27]. Patient response rate in different study were different from 8%–95%. Assess preferences by considering the characteristics of follow-up time (follow-up time refers to the post-treatment period during which patients were monitored for outcomes) for cancer survivors: after completion of primary treatment (surgery, radiotherapy and chemotherapy) or time since diagnosis (1–5 years). And overall, the disease age distribution was well represented by the respondents.

The characteristics of the hypothetical choice experiments used in the studies are described in Table 2. Kimman et al. [27] gave the participants sixteen decision-making scenarios with two follow-up care options, each consisting of five characteristics (attendance at educational group programme, frequency of visits, waiting time in minutes, contact mode, and healthcare provider) with varying levels, ranging from two to four. Bessen et al. [28] examined six sets of options for follow-up care, each including two alternatives and five attributes (clinician, frequency, location, method, and drop-in clinics) with three levels for each attribute. Damery et al. [8] presented to the patients nine sets of options with four characteristics (length of follow-up, frequency of follow-up visits, clinical investigations and choice of healthcare provider), with each characteristic having three options. Cancer patients were requested to pick both the best and worst options of each choice set. Murchie et al. [29] conducted a study with 16 decision-making tasks (32 scenarios in 2 sets) involving two follow-up care options and eight attributes (healthcare provider, continuity of care, contact mode and place, duration of appointments, frequency of appointments, length of follow-up, counselling, and additional services) with varying levels of two to four. Wong et al. [32] reported 8 choice tasks (128 choice sets into 16 blocks) including two choices for follow-up care and evaluated six attributes (expertise of health care professionals (HCPs), familiarity of doctors with patients' medical history, waiting time, accompaniment by family/friends, travel time and out-of-pocket costs) with three levels. Van et al. [30] presented 12 decision scenarios involving BCC follow-up options, including one choice of " no additional BCC follow-up", by

Table 1 Study characteristics

Study	Country	Population	Sample size	Study type (response rate)	Age (years)	Follow-up time
Kimman et al. 2010 [27]	Netherlands	Breast Cancer	331	Telephone (59%)	58	The first year after treat- ment 14 months (range 4 to 24 months)
Bessen et al. 2014 [28]	Australia	Breast Cancer	722	Online or paper (86.4%)	40–60	After completion of pri- mary treatment (surgery, radiotherapy and chemo- therapy)
Damery et al. 2014 [8]	UK	Soft Tissue Sarcoma	132	Face-to-face survey (47%)	63	After primary treatment
Murchie et al. 2016 [29]	UK	Melanoma, Breast, Prostate or Colorectal Cancer	668	Questionnaires mailed (56.6%)	Under 40: 3.0% 41–50: 11.4% 51–60: 22.0% 61–70: 32.8% 71–80: 26.3% Over 81: 4.5%	Time since diagnosis: Under 1 year: 1.1% 1–2 years: 16.8% 2–5 years: 55.0% Over 5 years: 27.1%
Wong et al. 2016 [32]	Australia	Cancer	512	Questionnaires mailed (36%)	61	The mean time since cancer diagnosis was 34 months
Van et al. 2021 [30]	Netherlands	Basal Cell Carcinoma (BCC)	266	Questionnaires mailed (21%)	67.2	Presenting at the der- matologists with a lesion that was clinically suspi- cious of BCC or recent biopsy confirmed BCC
Li et al. 2022 [10]	China	Gastric Cancer	376	Face-to-face survey (85%)	18-40: 6.12% 40-49: 25.80% 50-59: 28.19% 60-69: 26.06% ≥ 70: 13.83	After completed the main treatment (surgery, radiotherapy, and chemo- therapy)
Geng et al. 2024 [31]	China	Breast Cancer, Prostate Cancer, Colorectal Cancer	422	Face-to-face survey (95%)	70.81	Recipient of any primary treatment, i.e. surgery, chemotherapy, or radio- therapy
Senanayake et al. 2024 [6]	Australia	Breast Cancer	123	Online survey (8%)	26–45: 13.5% 46–55: 25.4% 56–65: 31.7% 66–75: 25.4% 75 + : 4.0%	Completed treatment within the last five years

STS Soft Tissue Sarcoma, BCC Basal Cell Carcinoma

varying six attributes across two to four levels: standard post-treatment visit performed, in addition to oral information, extra information will be provided by, the additional follow-up visit(s) will be planned, the additional follow-up visit(s) will be conducted by, the duration of the additional follow-up visit(s) will be, and Part of skin to be checked during the additional follow-up visits. Li et al. [10] employed nine choice tasks (comprising 36 choice sets in 4 blocks) including one option to opt-out and two alternatives for followup care, which were characterized by six attributes (thoroughness of follow-up contents, provider, cost, method, continuity, and supplementary services) each having two to three levels. Geng et al. [31] used eight decision-making scenarios (16 choice sets in 2 blocks) with two choices for follow-up care, featuring five characteristics (follow-up providers, continuity of care, personalized follow-up care plan, communication outside clinic visits, additional self-management support) with two to four variations for each. Senanayake et al. [6] employed ten decision-making scenarios, comprising 20 choice sets divided into two blocks, each offering two options for follow-up care. The scenarios included five characteristics: the care team providing cancer follow-up care, allied health and supportive care, survivorship care plans, travel requirements for follow-up appointments, and out-of-pocket costs to the patient per appointment, with each characteristic featuring two to three variations. In terms of attribute categories, all studies included healthcare provider (a), while eight studies mentioned services offered (g). Five studies addressed frequency of visits (b), contact mode (d), and the familiarity of healthcare providers with patients' medical history/continuity of care (k).

Study	Attributes Selection Process	N alternatives	N attributes	Attributes and levels	Categories of attributes	Blocks	N tasks/ patient	Design and profile generation	Estimation method	Preference Heterogeneity (Yes/No)
Kimman et al. 2010 [27]	Literature review, local policy initia- tives and expert opinion	7	5 (2-4levels)	 Attendance at educational group programme: Yes, No 2) Frequency of visits: Every 3 months, Every 4 months, Every 6 months, Every 12 months, Every 5 Maiting time in min- utes:5,30,60,90 A) Contact mode: Face-to-face, Telephone S) Healthcare provider: Medical specialist, Breast care nurse/nurse Breast care nurse and medical specialist 	a, b, d, e, g	7	9	Fractional factorial design(main effects): orthogonal (NLOGIT 3.0 software package)	Mixed logit model	Yes
Bessen et al. 2014 [28]	Literature review, expert consultation	7	5 (3 levels)	 Clinician: Breast Physician, General Practitioner, Breast Cancer Nurse Trequency: every 6, 9 T 2) Frequency: every 6, 9 or 12 months J Location: Hospital Clinic, General Practice, Local Breast Cancer Follow-up Clinic Method: Face-to-face, Tel- ephone, Alternate between face- to-face Drop-in clinics: Treatment side effects, Psychosocial support, Secondary prevention 	a, b, c, d, g	m	Q	Fractional factorial design(main effects)	Mixed logit model	Yes
2014 [8]	Literature review, clinical guidelines	7	4 (3 levels)	 Length of follow-up: 5 years,10 years,life long Frequency of follow-up: Once every 3 months, Once every months, Once every 12 months Preferred clinical investigations; Preferred clinical investigations; Clinical examination and X-ray, Clinical examination and intensive investigations Healthcare provider: General practitioner, Specialist hospital nurse, Specialist hospital 	a, b, g, m	Υ	σ	Fractional fac- torial design; orthogonal	Best-worst scaling analy- sis; Conditional multinomial logistic regres- sion	Q

 Table 2
 Discrete choice experiment characteristics

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Study	Attributes Selection Process	N alternatives	N attributes	Attributes and levels	Categories of attributes	Blocks	N tasks/ patient	Design and profile generation	Estimation method	Preference Heterogeneity (Yes/No)
Murchie et al. 2016 [29]	Literature review, semi- structured qualitative interviews	7	8 (2-4 levels)	 Health care provider: Consult, Registrar/trainee doctor, General practitioner, Specialist nurse Continuity of care: Yes, NO Contact mode and place: Face- to-face at hospital, Face-to-face at general practice, Telephone, Videoconferencing/ web cam/ Skype Duration of appoint- ments: min, 10 min,20 min,30 min Frequency of appointments:3 monthly,6 monthly,9 monthly,12 monthly,6 monthly,9 monthly,12 monthly Length of follow- up:1 year,5 years,10 years 7) Counselling, Group counselling, Family counselling, additional services. No additional services. No additional services. No additional services. No additional services, Personalized information pack about cancer, treatment and late effects, Advice on complementary medicine, Dietary advice 	a, b, c, d, f, g, K, m	32 choice sets in 2 blocks	2	Fractional fac- torial design; orthogonal	Binary ran- dom-effects logit model	Xes

Table 2 (continued)

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Study	Attributes Selection Process	N alternatives	N attributes	Attributes and levels	Categories of attributes	Blocks N tasks/ patien	Design and profile t generation	Estimation method	Preference Heterogeneity (Yes/No)
2016 [32]	Literature review, semi- structured qualitative interviews	~	6 (3 levels)	Expertise of health care profes- sionals (HCPs): Medical specialist in a cancer center, Medical special- ist in a general hospital setting, Nurse practitioner or general practitioner with support/advice from a medical specialist-phone, email, or video conference, such as telemedicine; Familiarity of doctors with patients' medical history: The doctor has access to your medical notes and knows you well, The doctor has necess to your medical notes but does not know you, The doctor has no access to your medical notes with you overnight frequired, Family/Friends can accompany you to the appointments but are unable to stay with you over- night if required, Family/Friends can accompany you to the appointments but are unable to stay with you over- night if required, Family/Friends can accompany you to the appointments but are unable to stay with you over- night if required, Family/Friends can accompany you to the appointments but are unable to accompany you you to the appointments but are unable to accompany you	a, c, e, h, i, j, k	128 choice sets 8 into 16 blocks	Fractional fac- torial design; D-efficiency	Mixed logit model	Ke

Table 2 (continued)

Table 2 (cont	inued)									
Study	Attributes Selection Process	N alternatives	N attributes	Attributes and levels	Categories of attributes	Blocks	N tasks/ patient	Design and profile generation	Estimation method	Preference Heterogeneity (Yes/No)
Van et al. 2021 [30]	Literature review, inter- views with der- matologists	m	6 (2-4 levels)	Standard post-treatment visit performed: Not by same person as treatment provider, By the same person as treatment provider 2) In addition to oral information, extra information will be provided by: E-health, Personalized Letter, General hand-out, General website 3) The additional follow-up visit(s) will be planned: 1 year after treat- ment, 1 and 2 years after treat- ment, 1 and 2 years after treat- ment, 6 and 12 months after treat- ment, 6 and 12 months after treat- ment, 6 and 2 years after treat- ment, 1 and 2 years after treat- ment, 6 and 12 months after treat- treat- ment, 10 min, 10 min be: 5 min, 10 min, 15 min	a, b, f, k, g	~	12	Fractional fac- torial design; D-efficiency (software Ngene) Ngene)	Latent Class Analysis (LCA); Multinomial logit model	Kes (
Li et al. 2022 [10]	Literature review, semi- structured qualitative interviews	2 (opt-out)	6 (2–3 levels)	Thoroughness of follow-up contents: Very thorough, General thorough Provider: Specialist doctor, Primary care physician, Specialist nurse Cost(¥):100, 300, 500 Method: Face-to-face, Telephone or WeChat, Alternate between face to-face and telephone/WeChat Continuity: Yes, NO Supplementary services: Treatment of complications, Psychosocial sup- port, Health behavior suggestions	a, d, g, h, k, l	36 choice sets in 4 blocks	0	Fractional fac- torial design; D-efficiency (software Ngene)	Mixed logit model	Yes

Table 2 (con	itinued)									
Study	Attributes Selection Process	N alternatives	N attributes	Attributes and levels	Categories of attributes	Blocks	N tasks/ patient	Design and profile generation	Estimation method	Preference Heterogeneity (Yes/No)
Geng et al. 2024 [31]	Literature review, semi- structured qualitative interviews	7	5 (2-4 levels)	Follow-up providers: Specialist, Primary healthcare practitioner who is linked with your oncologist and is provided with your treat- ment information; Continuity of care: Seeing the same healthcare provider every time you attend follow-up, Seeing whoever is available; Personalized follow-up care plan: Personalized follow-up care plan: Personali	a, d, g, k	16 choice sets in 2 blocks	ω	Fractional fac- torial design; D-efficiency	Mixed logit model; Latent Class Analysis (LCA)	Kes

Study	Attributes Selection Process	N alternatives	N attributes	Attributes and levels	Categories of attributes	Blocks	N tasks/ patient	Design and profile generation	Estimation method	Preference Heterogeneity (Yes/No)
Senanayake et al. 2024 [6]	Literature review, focus groups inter- views, expert consultation, quantitative structured prioritization exercise	7	5(2–3 levels)	Care team providing cancer follow-up care: Medical specialists and breast cancer nurse, Medical specialists, breast cancer nurse and General Practitioner; Allied health (e.g. exercise and die- tetics) and supportive care; allied health plus 10 psychology, 15 allied health plus 10 psychology, 15 allied health plus 10 psychology; 15 allied health plus 10 psychology; Survivorship care plan. No survivor- ship care plan. Survivorship care plan is developed and shared with the health care team and the patient; Travel to follow-up appointment/s: No travel (telhealth), Travel up to 50 km for every follow-up appointment, Travel for more than 50 km for every follow appointment; 0ut-of-pocket costs to the patient per appointment; 50, \$100, \$200	a, g, h, i	20 choice sets in 2 blocks	0	Fractional fac- torial design; (software Ngene)	Latent Class Analysis (LCA)	Yes
Services Offered (E-health, Person advice, Suppleme	including: Survivor alised Letter, Gener entary services, Add	rship care plan (detai ral hand-out, Genera ditional self-manage	iled document o I website); Educa ement support	utlining all care arrangements), Allied he ational group programme, Personalised i	alth and supportiv nformation pack a	e care, Counselling bout cancer, treatm	, Clinical inv nent and late	estigations, Extra in e effects, Advice on	iformation will be p complementary m	orovided by nedicine, Dietary

Table 2 (continued)

NR Not Reported, NA Not applicable, HCP Health care professional, LCA Latent Class Analysis

a Healthcare Provider, b Frequency of Visits, c Location of Care, d Contact Mode, e Waiting Time, f Duration of Appointments, g Services Offered, h Costs, i Travel Times, j Social support, k Familiarity of healthcare provider with patients' medical history/Continuity of care I Thoroughness of follow-up contents, m Length of follow-up

(l) (Fig. 2). In selecting attributes for a DCE, the majority of studies predominantly utilized literature reviews, and five studies also combine with semi-structured qualitative interviews, three studies combine with expert opinion, while other studies incorporated focus groups interviews, local policy initiatives and quantitative structured prioritisation exercise. Regarding the experimental design, the fractional factorial type was used for all studies. Five studies utilized D-efficiency in generating choice sets [6, 10, 30-32], three studies employed orthogonal arrays [8, 27, 29], while one study didn't mention the method [28]. Four studies utilized mixed logit model for statistical analysis [10, 27, 28, 32], while one study each used conditional multinomial logistic regression and Best-worst scaling analysis [8], multinomial logit model and latent class analysis [30], binary random-effects logit model [29], mixed logit model and latent class analysis [31], and latent class analysis [6]. Preference heterogeneity was reported in eight studies [6, 10, 27-32], except one study [8].

Quality assessment

Table 3 presents the assessment of quality utilizing the PREFS and ISPOR checklist [25, 26]. Each study scored a four out of five on the PREFS checklist and obtained quality scores ranging from 27 to 29 out of 30 on the ISPOR checklist. All studies reported on the purpose, explanation, findings and significance of the study; whereas, none of the studies reported an assessment of differences between respondents and non-responders. In terms of the ISPOR checklist, the majority of items were thoroughly explained, but the item concerning the construction of tasks was frequently missing (aside from one study [10], which did not include an opt-out or statusquo alternative) and three studies [6, 27, 32] inadequately justified their sampling strategies. One study failed to undertake pilot test [8]. All studies limited discussion on alternative designs considered.

Preference results

The preferences results are presented in Table 4. Kimman et al. [27] suggested that the healthcare provider and contact mode were the primary factors in follow-up care for



Categories of attributes

Fig. 2 Categories of attributes

Study	Kimman et al. 2010 [<mark>27</mark>]	Bessen et al. 2014 [<mark>28</mark>]	Damery et al. 2014 [8]	Murchie et al. 2016 [<mark>29</mark>]	Van et al. 2021 [<mark>30</mark>]	Wong et al. 2016 [<mark>32</mark>]	Li et al. 2022 [<mark>10</mark>]	Geng et al. 2024 [<mark>31</mark>]	Senanayake et al. 2024 [6]	Tota
PREFS checklist										
Purpose	-	1	-	-	-	1	,	1	L	1009
Respondents	0	0	0	0	0	0	0	0	0	%0
Explanation	—	1	-	1	<i>(</i>	-	-	Ę	Ļ	1009
Findings	—	1	-	-	—	1	,	—	_	100%
Significance	-	1	-	1	<i>(</i>	1	-	_	_	1009
Total score	4	4	4	4	4	4	4	4	4	80%
ISPOR checklist										
Research question	£	m	c	c	ſ	m	ε	c	c	1009
Attributes and levels	£	m	c	c	ſ	ſ	ſ	c	£	1009
Construction of tasks	2	2	2	2	2	2	ſ	2	2	70%
Experimental design	2	2	2	2	2	2	2	2	2	67%
Preference elicitation	ſ	m	S	S	c	m	ſ	Э	ſ	1009
Instrument design	ſ	m	2	S	c	m	ſ	Э	ſ	6%
Data collection plan	2	m	c	c	c	2	ſ	S	2	89%
Statistical analyses	ſ	c	c	S	c	m	ſ	S	ſ	1009
Results and conclusions	ſ	c	c	c	ſ	ſ	ſ	c	£	1009
Study presentation	c	c	c	c	c	m	ſ	ſ	c	1009
Total score	27	28	27	28	28	77	29	28	27	92%

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Study	Main results	Irade Ott/W IP	subgroup results
Kimman et al. 2010 [27]	The healthcare provider and contact mode were the most important characteristics of follow-up to patients; The medical specialist was the most preferred to per- form the follow-up; Face-to-face contact was strongly preferred to tel- ephone contact; (4) Follow-up visits every three months were preferred over visits every 4, 6, or 12 months	Ř	Heterogeneity in preference between patients was strong; Age, education, and previous experience with follow-up characteristics influenced preferences, but treatment modality did not
Bessen et al. 2014 [28]	The most preferred scenario is a face-to-face local breast cancer follow-up clinic held every 6 months and led by a Breast Physician	М	(1)Beyond the first 2 years from diagnosis, in the absence of a specialist led follow-up, women prefer to have their routine breast cancer follow-up by a Breast Physician (or a Breast Cancer Nurse) in a dedicated local breast cancer clinic, rather than with their local General Practitioner (2) Drop-in clinics for the management of treat- ment related side effects and to provide advice to both develop and maintain good health are also highly valued by breast cancer survivors
Damery et al. 2014 [8]	Patients typically preferred appointments routinely consisting of clinical examination and chest X-ray, and for follow up to remain in secondary care rather than general practice; The preferred scenario across the patient cohort would be 6-monthly follow-up for five years, in which a hospi-tal doctor carries out a clinical examination and X-ray	Å	As the hypothetical risk of recurrence increased, the number of patients who would prefer a more inten- sive follow-up regime also increased
Murchie et al. 2016 [29]	Cancer survivors preferred continuous, face-to-face consultant-led follow-up; Cancer survivors appeared willing to accept follow-up from specialist nurses, registrars or general practitioner provided that they are compensated by increased continuity of care, dietary advice and one-to-one counselling; Longer appointments were valued Telephone and web-based follow-up and group coun- selling, were not considered desirable	Ą	Colorectal cancer survivors and melanoma would see any alternative provider for greater continuity; Breast cancer survivors wished to see a registrar or spe- cialist nurse; Prostate cancer survivors wished to see a general practitioner
Wong et al. 2016 [32]	The most important attributes were expertise and familiarity of doctors with patients' medical history, distance traveled was least likely to influence patient preferences; Ranking of attribute importance: Expertise of the health care professional (HCP) > familiarity of the doctor with their medical history > waiting time for appointments > availability of social support > travel times to appointments	WTP: \$680 (95% Cl, 470–891) for an appointment with a spe- cialist; \$571 (95% Cl, 388–754) for doctors familiar with their history; \$422 (95% Cl, 262–582) for shorter waiting times; \$399 (95% Cl, 249–549) to be accompanied by family/ friends; \$301 (95% Cl, 162–441) for shorter traveling times	Male patients had a stronger preference for accompani- ment by family/friends; The expertise of health care professionals (HCPs) was the most important attribute for patients regardless of geographic remoteness

 Table 4
 Preferences results

(continued)	
Table 4	

Study	Main results	Trade Off/WTP	Subgroup results
Van et al. 2021 [30]	If the post-treatment visit was performed by the same person as treatment provider and a hand-out was provided to patients containing personalized information, the acceptance of having no additional follow-up visits (i.e. following the guidelines) would increase from 55 to 77% by patients	The choice probability of 'No BCC follow-up according to guideline' was 55% if the standard post-treatment visit would not be performed by the same person as the treatment provider and if patients would receive a general hand-out compared to 'Current intensive BCC follow-up. This choice probability of 'No BCC follow-up according to guideline' increased from 55% up to 77%, if the standard post-treatment visit would be per- formed by the same person as treatment provider and if patients were offered a personalized handout as additional information	Female patients and older dermatologists, are less willing to accept the guidelines and prefer additional follow-up visits
Li et al. 2022 [10]	Achieving very thorough follow-up contents was the most valued attribute level; Specialist doctors are the most preferred providers fol- lowed by specialist nurses	WTP: 1423.2837 CNY (95% CI 546.57363–2299.9937) for very thorough follow-up contents; 793.10676 CNY (95% CI 359.09048–1227.123) for fol- low-up by specialist doctors; 648.3079 CNY (95% CI 384.33175–912.28405) for fol- low-up by specialist nurses; 229.76437 CNY (95% CI 64.447727–395.08101) for the face-to-face follow-up	MA
Geng et al. 2024 [31]	Older cancer patients stated a preference for follow-up by specialists over primary healthcare (PHC) providers; (2) Ranking of attribute importance: Specialist- led follow-up with remote contact (including both counseling and regular calls) > continuity of care and the availability of a personalized follow-up plan > additional service	Ą	The most important attribute for breast cancer patients was the type of follow-up provider, and a stronger prefer- ence for medication instructions; Remote contact services were prioritized by patients with prostate and colorectal cancer; Colorectal cancer patients had a higher utility for psy- chological support; Patients who reported chronic disease and live in the city were more likely to prefer additional services for medica- tion instructions
Senanayake et al. 2024 [6]	Age and quality of life status are associated with patient preference for types and attributes of breast cancer follow-up care; Breast cancer with older age and lower quality of life (class 1): remained neutral regarding the team's composition but concerned about the out-of-pocket costs preconsultation; Breast cancer younger women with higher qual- ity of life (class 2): preferred a care team comprising specialists, nurses and general practitioners (GPs) and emphasised the importance of shared survivorship care plans	WTP: AUD \$57 for a care team consisting of medical special- ists, breast cancer nurses and general practitioners; AUD \$132 for a survivorship care plan developed by the healthcare team; AUD \$221 for a survivorship plan when they were also involved in its development; AUD \$68 to avoid travelling, thus utilising telehealth services	Å

cancer survivors. The medical expert was the top choice for carrying out the follow-up. Face-to-face contact was strongly preferred to telephone contact. Visits every three months were favored over visits every four, six, or 12 months for follow-up. Heterogeneity in preference between patients was strong. Preferences were influenced by age, education, and prior experience with follow-up characteristics. Bessen et al. [28] showed that the most preferred scenario is face-to-face local breast cancer follow-up clinic held every 6 months and conducted by Breast doctors. Damery et al. [8] reported the nature of investigations undertaken during follow-up was the most important aspect of post-surgical care. Patients typically preferred appointments routinely consisting of clinical examination and chest X-ray, and for follow-up to remain in secondary care instead of general care. Murchie et al. [29] demonstrated that cancer patients favor having a face-to-face consultation with a physician for their cancer follow-up. Wong et al. [32] reported that Doctors' expertise and familiarity with patients' medical history were the most crucial attributes, while the distance traveled had the least impact on patient preferences. In addition, cancer survivors were willing to pay \$680 (95% CI, 470–891) for an appointment with a specialist, \$571 (95% CI, 388–754) for doctors familiar with their history and \$301 (95% CI, 162-441) for shorter traveling times. Van et al. [30] found that providing a hand-out with personalized information to patients during the post-treatment visit, conducted by the same treatment provider, resulted in an increase in acceptance of forgoing additional follow-up visits from 55 to 77%. Li et al. [10] found that specialist doctors were the top choice for healthcare providers among gastric cancer patients, with specialist nurses as the next preferred option. Additionally, patients were willing to pay extra for these levels of specialization. Respondents were willing to pay 1423.2837 CNY (95% CI 546.57363-2299.9937) for very thorough follow-up contents, 793.10676 CNY (95% CI 359.09048-1227.123) for follow-up by specialist doctors, and 648.3079 CNY (95% CI 384.33175-912.28405) for follow-up by specialist nurses. Geng et al. [31] showed that older cancer survivors expressed a desire for receiving follow-up care from specialists instead of primary healthcare (PHC) providers and Specialist-led follow-up with remote communication is ranked highest, followed by continuity of care and a customized follow-up plan, and then additional services. The type of follow-up provider and a stronger preference for medication instructions were identified as the key factors for breast cancer survivors, prostate and colorectal cancer survivors gave priority to remote contact services, colorectal cancer survivors showed a greater need for psychological support. Senanayake et al. [6] reported that patient preferences for types and attributes of breast cancer follow-up care are linked to their age and quality of life status. Breast cancer survivor in older age and lower quality of life (class 1) showed no preference for the composition of the team but had worries about the out-of-pocket expenses for each consultation, whereas breast cancer survivor in younger and higher quality of life (class 2) favored a care team consisting of specialists, nurses, and general practitioners (GPs) and highlighted the significance of shared survivorship care plans. Breast cancer survivors were willing to pay AUD \$221 for a survivorship plan in which they also participated in creating and paid AUD \$132 for a survivorship care plan created by the medical team.

# Discussion

# **Cancer survivors preferences**

The use of DCE methodology in health economics is often utilized to gather preferences for healthcare products and services, offering valuable preference data that can lead to more accurate outcome measurements in economic evaluations. Our review concentrates on cancer survivors' preferences for follow-up care characteristhrough tics identified DCE, excluding other methodologies, given the wide range of preferences in healthcare and the effect of variations in stated preference evaluation on result analysis. Despite the overall increase of DCE application in healthcare, only nine articles were found, indicating a relative lack of evidence in this certain context. This review discussed seven different types of cancers, including breast, sarcoma of soft tissue, melanoma, basal cell carcinoma, prostate, colorectal, and gastric cancers. Most studies in our review concentrate on post-treatment cancer care, such as monitoring longterm and late effects, and considering the effects of cancer diagnosis and treatment on quality of life. Because of the potential effects of cancer and its treatment on the body for months to years after treatment, while there are established guidelines, such as the ASCO breast cancer survivorship care guidelines [33], regarding the frequency and duration of follow-up appointments, it is important to recognize that the optimal follow-up care may vary significantly based on the individual needs of cancer survivors. Some institutes also advised that cancer survivors who finished primary treatment should receive a thorough, understandable, and brief plan for post-treatment care [34]. Effective follow-up care can help ease survivors' concerns regarding potential cancer recurrence or metastasis, and allow them to address any concerns about the physical or emotional effects of initial treatment [8]. Our findings showed that healthcare provider, services offered, frequency of visits, contact mode, familiarity of healthcare provider with patients' medical history/continuity of care were the key attributes of

follow-up care for cancer survivors. Specialist doctors are the most preferred healthcare providers for cancer survivors followed by specialist nurses. Cancer survivors recognized specialist doctors as the main individuals responsible for their cancer treatment until the disease advanced to a later stage and required palliative care [35]. Some cancer survivors believed that general practitioners lacked specialized knowledge of treatment side effects and their management [36]. Li et al. [10] thought that though cancer survivors prefer specialist doctors as their follow-up providers, specialist nurses are considered the optimal caregivers for follow-up care. Specialist nurses with specialized skills playing a more significant role can enhance healthcare delivery and reduce costs. An increasing number of documents have exposed a range of intricate practical, physical, psychological, and emotional needs for cancer survivors [37] and meeting these needs better may be the reason why cancer survivors are willing to spend more money to obtain multiple services such as survivorship care plan, extra information and additional support. In addition, some studies suggested that care continuity was sufficient compensation for most cancer survivors [38, 39], and they preferred that each follow-up care is provided by the same person. Some cancer survivors were upset by the absence of consistent care during the follow-up period [40] and stated that they formed a connection with their oncologist while going through the diagnosis and treatment process, but later felt abandoned during a period of frequent turnover of oncologists because of registrar participation [41]. Cancer is a longterm chronic disease with a risk of recurrence and various symptoms so that frequency of visits of cancer survivors is also another important attribute of follow-up care. Most cancer survivors preferred 6-monthly clinic visits and the length of follow-up was five years after primary treatment. Normally, solid tumors require followup for at least 5 years. The majority of guidelines do not recommend how often diagnostic or clinical evaluations should be done, but they suggest undergoing imaging, blood tests, and clinical evaluations every 3-6 months in the initial years post-surgery [42, 43]. A meta-analysis revealed that intensive follow-up after surgery for colorectal and breast cancer has little impact on survival [44]. Therefore, high quality research is essential to assess how effective intensive follow-up is for cancer survivors. It's important to incorporate survival rates and other important factors like quality of life and cost-effectiveness in order to maximize the benefits. In terms of contact model, face-to-face contact was much preferred to telephone contact, at the same time, cancer survivors also concerned the travel time and location of care. But the distance traveled was least likely to influence patient preferences [32], some cancer survivors were willing to pay AUD \$68 to avoid travelling, thus employed telehealth services. Nevertheless, providing follow-up care at the individual level could potentially lead to higher costs due to the loss of cost efficiencies, resulting in increased utilization of healthcare services beyond the hospital setting [27]. Some studies also focus on the cost attributes, which could relate to the high deductibles patients have to pay within the countries investigated [24]. It is difficult to compare costs across countries with different health insurance systems and across diverse populations, due to differences in reimbursement schemes and ability to pay. In general, our review of preference research has uncovered numerous characteristics that impact the post-treatment care of cancer survivors. Identifying patient traits that can forecast preferences for follow-up would be helpful for implementing adaptable follow-up. Differences in preferences among respondents may be further clarified by factors such as age, gender, education, previous experience with follow-up characteristics, perceived quality of life post-treatment, and cancer type. Younger age was related to a greater need for information during follow-up and women would prefer involvement of specialist nurses involved in their follow-up care instead of their general practitioner [27]. It has been shown that individuals find it easier to share emotional concerns with a nurse [27]. Costs may have a greater impact on older women with breast cancer, especially considering their limited income. Primarily female patients favored extra low-value BCC follow-up appointments carried out by a dermatologist. On the other hand, mostly male patients favored not having further follow-up, and if it was necessary, they wanted their general practitioner to be the one to do it. This could be explained by the out-ofpocket costs and perceived disease severity, due to they perceived their BCC as a not severe type of cancer [30]. Future research could evaluate such individualized follow-up in terms of satisfaction sociological characteristics, cancer type and its economic impact. Follow up care is an issue of balancing multiple goals, including maximizing patient survival, quality of life, psychological outcomes, and physical function. And the preference of cancer survivors for follow-up care varies over time, and time factors should be considered when formulating follow-up strategies [45]. Future studies could explore different stage follow-up preferences in cancer survivors. Few studies have investigated the preferences of healthcare providers and family caregivers in follow-up care for cancer survivors, with most focusing solely on the preferences of the patients themselves. Therefore, more investigation is required on the varied stakeholders' preferences and framing of attributes and levels included in future DCE focusing on cancer survivors follow-up care.

### Implications for clinical practice

Given the rapidly increasing population of cancer survivors, healthcare systems are facing mounting pressure to optimize follow-up interventions that effectively address the physical, psychological, and functional needs of these individuals, while simultaneously maintaining economic viability. In addition, there is disagreement on the best follow-up method, causing significant differences in clinical practices globally. The traditional specialist-led face to face care model is unsustainable, leading to calls for new approaches to address the needs of cancer survivors. The outcomes of this review propose various options for implementing innovation in the follow-up care for cancer survivors. Numerous trials have investigated alternate models of care, including models led by general practitioners, care shared between specialist doctors and general practitioners, and care led by nurses. These alternate models appear to be at least as effective as specialist-led care and are applicable to many cancer survivors. Choosing the most appropriate care model for each survivor depends on patient-level factors (such as risk of longerterm effects, late effects, patient preference, and capacity to self-manage), local services, and health-care policy [46]. Furthermore, clinical pathways have begun to be adopted by many oncology practices as a mechanism to streamline care, increase efficiency, improve quality of care, and reduce costs. The clinical pathway is a structured and evidence-based approach for delivering cancer treatment, which outlines the journey for cancer survivors and healthcare providers from diagnosis through treatment, follow-up care, and end-of-life support [47].

### Limitations of the review

Our review also has some limitations. Exploring patient preferences in DCE does not consider external validity and the follow-up care of cancer survivors are complex, so these findings may not be applicable to different contexts. The studies included had good quality assessments, however, none of them included reports on the distinctions between responders and non-responders and limited discussion on alternative designs considered. The views of non-responders and those who provided invalid response may be different from responders, future research should attempt to access these views to avoid nonresponse bias. In the majority of cases, participants frequently had to select from two or three followup care options, leading to potential bias in the analysis results [48], only one study offered opt-out choices to respondents in DCE [10]. Utilizing the opt-out choice enables participants to refrain from picking any options in the selection range [26], if researchers are assessing for potential product requirements, including the opt-out choice can be beneficial and essential. However, including an opt-out choice may not be suitable for certain health care research inquiries, as it could significantly impact the experimental design and hinder researchers' ability to gauge the underlying preference framework [26]. Therefore, the inclusion of the opt-out options in future DCE should focus on the research question.

### Conclusion

Overall, several aspects of DCE were evaluated in the follow-up care of cancer survivors. DCE is a suitable preference method that provides important preference information beneficial for patient-centered care. The attributes outlined in this review could improve healthcare providers' comprehension of vital aspects of forthcoming follow-up care. Furthermore, when considering management strategies, the findings of this review could contribute to a more comprehensive insight into important topics for discussion, which is crucial in providing necessary support for cancer survivors in need of followup care.

# Abbreviations

DCE	Discrete Choice Experiment
NA	Not Applicable
NR	Not Reported
WTP	Willingness To Pay
STS	Soft Tissue Sarcoma
BCC	Basal Cell Carcinoma
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analy-
	ses report
MeSH	Medical Subject Headings
HCP	Health care professional
PREFS	Purpose, Respondents, Explanation, Findings, and Significance
ISPOR	International Society For Pharmacoeconomics and Outcomes
	Research
PHC	Primary Healthcare

# Supplementary Information

The online version contains supplementary material available at https://doi. org/10.1186/s12913-024-12000-0.

Supplementary Material 1. Supplementary Material 2.

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Conceptualization: Rongyu Hua. Data curation: Guanmian Liang, Fangying Yang. Formal analysis: Guanmian Liang, Rongyu Hua. Funding acquisition: Huanying Fu, Guanmian Liang. Methodology: Rongyu Hua, Huanying Fu, Guanmian Liang, Fangying Yang. Project administration: Fangying Yang. Resources: Rongyu Hua. Software: Rongyu Hua. Writing—original draft: Rongyu Hua, Guanmian Liang. Writing -review & editing: Rongyu Hua, Huanying Fu, Guanmian Liang, Fangying Yang.

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### Data availability

All the findings from the available data have been published in this manuscript.

# Declarations

**Ethics approval and consent to participate** Not applicable.

### **Consent for publication**

Not applicable.

### **Competing interests**

The authors declare no competing interests.

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