Economic Evaluation of Long-Term Survivorship Care for Cancer Patients in OECD Countries: A Systematic Review for Decision-Makers

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Abstract: Long-term cancer survivorship care is a crucial component of an efficient healthcare system. For numerous reasons, there has been an increase in the number of cancer survivors; therefore, healthcare decision-makers are tasked with balancing a finite budget with a strong demand for services. Decision-makers require clear and pragmatic interpretation of results to inform resource allocation decisions. For these reasons, the impact and importance of economic evidence are increasing. The aim of the current study was to conduct a systematic review of economic evaluations of long-term cancer survivorship care in Organization for Economic Co-operation and Development (OECD) member countries and to assess the usefulness of economic evidence for decision-makers. A systematic review of electronic databases, including MEDLINE, PubMed, PsycINFO and others, was conducted. The reporting quality of the included studies was appraised using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist. Each included study’s usefulness for decision-makers was assessed using an adapted version of a previously published approach. Overall, 3597 studies were screened, and of the 235 studies assessed for eligibility, 34 satisfied the pre-determined inclusion criteria. We found that the majority of the included studies had limited value for informing healthcare decision-making and conclude that this represents an ongoing issue in the field. We recommend that authors explicitly include a policy statement as part of their presentation of results.

Keywords: cancer; long-term survivorship; economic evaluation; health economics; systematic review; decision-making; health services

1. Introduction

Cancers of all types are a global health concern, and the worldwide impact of cancer is expected to continue to increase in the coming decades [1]. Long-term survivorship care for cancer patients is a crucial component of a well-functioning healthcare system, but the ongoing management of survivors comes at a cost. Improved treatment has accelerated progress against cancer and has driven a record drop in overall cancer mortality, leaving healthcare decision-makers to face multiple challenges [2–5]. Firstly, the current healthcare environment is characterized by finite budgets and high expectations of good health outcomes, where healthcare decision-makers are required to balance non-increasing budgets with an increased demand for services [6]. This is a challenge for decision-makers who find themselves with an increased number of cancer survivors who require ongoing, long-term support services. Secondly, healthcare decision-makers are required to quickly synthesize evidence from a range of competing disciplines regarding service provision, so the ease with which findings can be translated into practice, or at the very least pragmatically interpreted, is of significant importance to them [7]. Despite increased interest and reliance on economic evidence in healthcare, decision-makers need to understand the potential...
impact of acting on such evidence and how such actions might influence clinical outcomes and costs. Healthcare decision-makers require economic evidence to be high-quality, useful for informing resource allocation decisions, applicable to the real-world healthcare setting and easily translated into practice [8,9].

Systematic reviews of economic evaluations relating to long-term cancer survivorship exist, but they do not focus on the usefulness of reported evidence for decision-making. One review focuses on economic evaluations of follow-up cancer care treatment [9], while another was conducted to identify analyses that have been included in guidance on cancer follow-up by UK government agencies and aimed to assess the relevance to the UK setting [10]. The most recent review (2021) focused only on physical activity interventions for cancer survivors in developed countries [10]. The aim of our study was to conduct a systematic review of the available economic evaluations of long-term survivorship care for cancer patients in OECD countries. Our intention is to support healthcare decision-makers—clinicians, policymakers and budget allocators—by summarizing the best available evidence associated with the provision of long-term cancer survivorship care and assess included studies for both quality and usefulness from a health economics perspective. To our knowledge, this work has not been undertaken elsewhere, and our results add novel information to the evidence base.

2. Materials and Methods

This study followed the PRISMA statement [11] for processing and reporting systematic reviews (Tables A1 and A2, Appendix A). The aim of this process was to capture all relevant economic evaluations of long-term survivorship for cancer patients in OECD countries. A review protocol was developed in advance, with search methods and inclusion criteria specified (Table A3, Appendix B).

2.1. Inclusion and Exclusion Criteria

This systematic review included studies meeting the following inclusion criteria: (1) reported original empirical research published in a peer-reviewed journal; (2) evaluated the economic impact and health outcomes associated with implementing long-term survivorship care for cancer patients who had initial cancer treatment(s)—any economic evaluation. This may include either model-based or non-model-based economic evaluations such as cost–utility analysis, cost-effectiveness analysis and costing analysis; and (3) the study was conducted in OECD countries. The most widely used definition of cancer survivorship is from the National Coalition for Cancer Survivorship and includes for each person the period ‘from the time of diagnosis, through the balance of his or her life, regardless of the ultimate cause of death’ [12]. Different stages of survivorship comprise acute (diagnosis to treatment), chronic (ongoing) and long-term/late survivorship (≥5 years post-diagnosis) [13]. The target population of this review is cancer patients of any age and gender who have received survivorship care for ≥5 years after initial cancer treatment. As we aimed to include economic evaluations from the payer’s perspective, costs related to follow-up care (e.g., direct and indirect medical costs, intervention costs and overhead costs) and any outcome (e.g., recurrence, detected relapse, quality-adjusted life years (QALYs) and life years (LYs)) are reviewed in this review. Studies were excluded if they evaluated follow-up care for hyperplasia/dysplasia or management of chemo/radiotherapy-induced symptoms. Scholarly reviews, letters to the editor, comments, news and conference abstracts were also excluded. In the few instances where the same data were reported across different publications, the most informative article was selected: for example, a study reporting the full set of cost-effectiveness results from a model comparing alternative follow-up schedules for women across four different risk profiles was selected [14] ahead of one providing results that only take into account age and adherence to mammography [15]. Final decisions regarding the inclusion or exclusion of studies were made based on a consensus between both reviewers (A.J. and D.B.). The full inclusion and exclusion criteria used for selection of the studies included in this review...
are shown in the protocol published in PROSPERO (ID: CRD42020218966) as well as in Appendix B.

2.2. Search Strategy

Five electronic databases, namely MEDLINE, PubMed, PsycINFO, National Health Service Economic Evaluation Databases and Health Technology Assessment Databases, were searched to identify studies conducting an economic evaluation of long-term survivorship care for cancer survivors in OECD countries. The following search terms were used: “economic evaluation*” or “economic analysis*” or “cost*” and “follow-up” or “survivorship care” or “long-term strategy” and cancer* or carcinoma* or neoplasm*. The search was restricted to the English language and by publication period between 1 January 2000 and 12 November 2020. The reference lists of included studies were searched for other relevant studies.

2.3. Data Extraction and Quality Assessment

After preliminary screening of the title and abstract, articles deemed relevant were retrieved for examination. Data extraction sheets were pilot tested and revised to include the data source, study design, period of publication, location, sample size, age group, type of cancer, intervention/comparator, type of economic evaluation, presence of sensitivity analysis and main results (Table A5, Appendix C).

The quality of each study was assessed using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) statement [16]. The 24-item checklist is a consolidation and update of previous reporting guidelines and consists of recommendations on reporting methods and findings for economic evaluations (Appendix D). It also provides an example to ensure more consistency and transparency when reporting results and can be used as a way of comparing studies. Each item in the checklist was scored as having either met the criteria in full (1), partially (0.5) or not at all (0) or as not being applicable (NA). Overall compliance with the checklist was assessed by calculating the proportion of the CHEERS criteria addressed by the study. Fully meeting the criteria would contribute 1 to the numerator while partially meeting the criteria would contribute 0.5 to the numerator. Any criteria that were not applicable to the study were excluded from the denominator. The quality assessment for each study is presented in Appendix D. While examining the analysis type and findings according to the CHEERS checklist is performed to assess the quality of reporting [17], checking the usefulness to decision-makers is arguably of greater importance [9]. Consequently, we used an adapted version of the approach that has been used in previous systematic reviews to assess a paper’s usefulness to decision-makers [8,9]. This approach assesses usefulness for decision-makers based on the reporting of effectiveness and cost outcomes and the uncertainty associated with such outcomes. We also searched for a clear statement regarding policy implications or directions that should be followed as a result of the study’s outcomes, culminating in an overall usefulness rating of “limited”, “moderate” or “strong”. These ratings can be seen in Table for Usefulness of reviewed studies to decision-making.

3. Results

A total of 4404 articles were identified in the electronic database search, of which 807 were duplicates. The titles and abstracts of 3597 unduplicated references were reviewed and a further 3369 articles were excluded. Seventeen records were identified from additional sources. Reports were not retrieved for 10 studies. Of the 235 studies assessed for eligibility, 34 satisfied the pre-determined inclusion criteria (Figure 1).
3.1. Overview of Included Studies

Table 1 provides an overview of the descriptive information of the 34 included studies. Studies from the UK and USA were the most common, and almost half the studies retrospectively analyzed cost and effectiveness data. The majority of the studies evaluated survivorship care for colorectal and breast cancer survivors. Twenty out of the 34 included studies were published before 2013, which is when the CHEERS checklist became available [16].

Table 1. Descriptive information of included studies.

| Descriptive Variable                              | Number of Studies |
|--------------------------------------------------|-------------------|
| Study design                                     |                   |
| Retrospective data audit                         | 13                |
| Markov model                                     | 9                 |
| Other models                                     | 6                 |
| Randomized control trial                         | 1                 |
| Decision tree model                              | 1                 |
| Discrete event simulation model                  | 1                 |
| Mixed: decision tree + Markov model              | 1                 |
| Quasi-experimental pre/post-study                | 2                 |
| Study Location                                   |                   |
| UK                                               | 6                 |
| USA                                              | 5                 |
| Germany                                          | 4                 |
| Australia                                        | 4                 |
| Canada                                           | 4                 |
| Italy                                            | 3 *               |
| Netherlands                                      | 3                 |
| Sweden                                           | 1                 |

Figure 1. PRISMA flow diagram showing the process of study selection for inclusion in the systematic review.
Table 1. Cont.

| Descriptive Variable            | Number of Studies |
|--------------------------------|-------------------|
| France                         | 1                 |
| Finland                        | 1                 |
| Ireland                        | 1                 |
| Spain                          | 1                 |
| Switzerland                    | 1 *               |

| Type of cancer                  |                   |
|--------------------------------|-------------------|
| Colorectal                      | 7                 |
| Breast                         | 6                 |
| Cutaneous melanoma             | 3                 |
| Cervical                       | 3                 |
| Head and neck                  | 2                 |
| Hodgkin's disease              | 2                 |
| Testicular cancer              | 2                 |
| Prostate                       | 1                 |
| Hematological malignancy       | 1                 |
| Bladder                        | 1                 |
| Lung                           | 1                 |
| Ovarian                        | 1                 |
| Renal                          | 1                 |
| Thyroid                        | 1                 |
| Uterine                        | 1                 |
| Not mentioned (childhood cancer)| 1               |

| Publication year (CHEERS checklist became available after 2013) | |
|---------------------------------------------------------------|---|
| Before 2013                                                   | 20 |
| After 2013                                                    | 14 |

* One study collected data from participants from both countries, total number exceeds 34; CHEERS —Consolidated Health Economic Evaluation Reporting Standards.

The study characteristics of all included studies are summarized in Appendix C. Most studies (n = 12) were cost-effectiveness analyses (CEAs), followed by costing-only studies and cost–consequence analyses (CCAs) (n = 11), cost–utility analyses (CUAs, n = 9) and cost minimization analyses (CMAs, n = 2). The outcome measures used in these studies varied according to the study type and design. Ten of the 18 studies that used decision analytic models reported outcomes using incremental cost-effectiveness ratios (ICERs)—calculated by dividing the difference in cost between two alternatives for survivorship care by the difference in their effectiveness. Other studies reported cost per QALY gained, cost per cancer recurrence or change in costs and outcomes separately rather than in a ratio.

3.2. Studies of Long-Term Survivorship Care by Cancer Type

For descriptive purposes, the studies were divided into eight groups depending on the disease condition of interest. These eight groups were colorectal cancer, breast cancer, skin cancer, cervical cancer, head and neck cancer, Hodgkin’s disease, testicular cancer and other cancers.

3.2.1. Colorectal Cancer

Seven studies assessed the cost-effectiveness of long-term survivorship care in patients previously treated for colorectal cancer. Three were retrospective data analyses [18–20] and the remaining four were model-based [21–24]. Staib et al. [20] estimated the cost per recurrence detected through the existing intensive follow-up strategy in the German setting, which was estimated to be EUR 6000 from a hospital perspective. Bleeker et al. [18] compared the value and effectiveness of different diagnostic tools used to identify potentially treatable recurrences among Dutch patients. They concluded that carcinoembryonic antigen testing (CeA), chest radiography and routine physician visits appear less cost-effective than ultrasonography, computed tomography (CT) and colonoscopy, which can identify
most recurrences at a lower health system cost. However, no sensitivity analysis was conducted to test the robustness of the outcomes of these two studies. Borie et al. [21] built a Markov model to compare standard and simplified follow-up examinations for patients after curative colorectal cancer resection in France and found that the ICER for standard versus simplified follow-up would be EUR 3114, substantially lower than the current threshold of acceptability in France (EUR 105,656/QALY) [25]. Renehan et al. [24] developed a model to compare an intensive follow-up strategy with a conventional strategy for colorectal cancer survivors of 5 years or more from the UK NHS perspective. They found that the cost per life year gained was GBP 3402—substantially lower than the NHS threshold for cost-effectiveness, which is GBP 30,000. In another UK study, Macafee et al. [22] used retrospective data for a five-year projection comparing an intensive follow-up strategy with a standard follow-up strategy, concluding that an intensive follow-up would cost an additional GBP 15.4 million over 5 years, with a cost per additional resectable recurrence of GBP 18,077. An Italian study compared several combinations of diagnostic tests for follow-up of patients after curative resection of colorectal cancer [19]. The combination of physical examination, rigid sigmoidoscopy, thorax–abdominal CT and CeA testing was found to be the most cost-effective strategy to monitor stage III and IV colorectal cancer, while physical examination, colonoscopy, thorax–abdominal CT and CeA testing were found to be the most cost-effective methods to monitor stages I and II of colon cancer.

Finally, in a more recent UK study, Mant et al. [23] conducted a randomized control trial (RCT) and built a pre-trial economic model to compare different follow-up strategies from the UK NHS perspective. They found that the incremental cost per patient, compared with the less intensive care, ranged from GBP 40,131 with CeA testing to GBP 43,392 with hospital-based imaging to GBP 85,151 with CeA testing and CT combined.

3.2.2. Breast Cancer

Six studies assessed the cost-effectiveness of long-term survivorship care in patients previously treated for breast cancer: one was an RCT, two assessed retrospective audit data and the remaining two were model-based studies. In an Australian study, Grogan et al. [26] retrospectively assessed the costs and effectiveness of several follow-up schedules for women diagnosed with stage I or II breast cancer. They found that three-monthly visits for 4 years and yearly visits in the fifth year cost AUD 1097 per woman. This was a more cost-effective option compared to monthly visits for 5 years, which was more expensive at AUD 3870 per patient. Kokko et al. [27] conducted an RCT to compare four follow-up schedules which differed in visit frequency and in the intensity of diagnostic examination. The total cost of follow-up per recurrence was EUR 4983 lower in the least intensive strategy than in the most intensive follow-up strategy. This amount, EUR 4983 per recurrence, could be saved if visits were only every sixth months and diagnostic tests were taken only when clinically indicated compared to quarterly visits and routine diagnostic tests. Robertson et al. [28] built a Markov model, finding that the most cost-effective strategy in the UK setting was surveillance with mammography alone, provided every 12 months. The incremental cost-effectiveness ratio (ICER) for this strategy compared to no surveillance was GBP 4727 per QALY gained. Lu et al. [29] built a simulation model in the Netherlands to compare the cost-effectiveness of the current guideline-based follow-up with three less intensive follow-up strategies. They found that the current guideline-based strategy was the most expensive and the less intensive programs did not decrease the detection rate of small tumors. They concluded that a reduction in hospital follow-up time by shifting to the National Screening Program or the use of general practitioners and the exclusion of physical examination after 2 years of follow-up was the most cost-effective option, with an estimated cost of EUR 62,100 to increase the detection of small tumors by 1%. However, a sensitivity analysis was not conducted to test the robustness of the outcome of these three strategies. An Australian study used a discrete event simulation model to analyze three alternative mammographic follow-up schedules for postmenopausal women who had treatment for primary breast cancer [14]. After conducting a probabilistic sensitivity analysis, the authors
concluded that for most postmenopausal women, annual mammographic follow-up may not be cost-effective, and for women with excellent tumor prognosis, two-yearly follow-up mammograms are most likely to be cost-effective, regardless of age.

3.2.3. Skin Cancer

Three studies assessed the cost-effectiveness of long-term survivorship care in patients previously treated for cutaneous melanoma—one of which retrospectively analyzed data, while the remaining two were model-based studies. Hengge et al. [30] built a Markov model for locoregional recurrence and metastatic recurrence and compared the current intense follow-up strategy with a revised or reduced guideline. The authors found that savings for the 5-year program would total EUR 506,280, and the cost for staging per QALY accounted for EUR 63,252 for the more intense schedule as opposed to EUR 42,433 for the revised, new schedule. The primary outcome of this study was presented as cost per QALY, which enabled direct comparison with other studies. Leiter et al. [31] analyzed retrospective audit data and reported that physical examination was the most effective method, detecting 50% of recurrences, and gave patients a better quality of life. From the perspective of the payer, a risk-adapted surveillance strategy for stages I to II—including thorough history, physical examination and lymph node sonography but omitting CR, blood work and abdomen sonography—seems appropriate and cost-effective. The cost-effectiveness of different radiological examinations was assessed by Podlipnik et al. [32]. Podlipnik et al. [32] built a decision tree model programmed to model a 5-year period and reported that CT scan was cost-effective in the first 4 years (cost-effectiveness ratio ranged between EUR 4710 and 14,437/patient with metastasis) and brain MRI was cost-effective during the first year (cost-effectiveness ratio of EUR 14,090/patient with metastasis). These results were supported by one-way sensitivity analysis.

3.2.4. Cervical Cancer

Three studies assessed the cost-effectiveness of long-term survivorship care in patients previously treated for cervical cancer—two assessed retrospective audit data and one was model-based. An Italian study [33] retrospectively analyzed data on a simplified follow-up diagnostic approach as well as a standard follow-up procedure and reported that a simplified diagnostic approach, which included squamous cell carcinoma (SCC) assay and gynecologic examination, can detect a high rate of recurrence, with a favorable cost-effectiveness outcome. The remaining two studies were conducted in the UK. Baena-Cañada et al. [34] assessed the costs, health-related quality of life and patient satisfaction results of follow-up strategies in primary care compared with specialist-led care, reporting that the costs of follow-up in primary care were lower than those in specialist-led care, with no difference recorded in health-related quality of life (HRQoL). No sensitivity analysis was conducted. As a model-based economic evaluation, Auguste et al. [35] used effectiveness data from a systematic review [36] supplemented with data from other sources to run a model over 5 years. With PSA, the researchers concluded that the use of positron emission tomography/computed tomography (PET/CT) in the diagnosis of recurrent or persistent cervical cancer in a secondary care setting is not cost-effective from the NHS perspective.

3.2.5. Head and Neck Cancer

Two studies assessed the cost-effectiveness of long-term survivorship care in patients previously treated for head and neck cancer. Shah et al. [37] conducted a retrospective cohort analysis comparing standard follow-up—which consisted of routine clinical follow-up every 3 months for 2 years, every four months in the third year and every six months in the fourth and fifth years—with reduced follow-up—which consisted of routine clinical follow-up every six months. They found that the hospital cost savings per patient from reduced review were AUD 5012 over five years, while there was no difference in the time to detection of recurrence or proportion of radically treatable recurrences. Meregaglia et al. [38] provided strong evidence on the cost-effectiveness of the use of intensive radiological
assessment in routine surveillance after treatment for head and neck cancer compared to a more minimal option—symptom-driven surveillance. They reported that routine surveillance with the intensive program would be cost-effective, which was supported by two-way sensitivity analysis. More than two-thirds of the Monte Carlo simulations were below the willingness-to-pay threshold of EUR 40,000, indicating that the intervention was cost-effective.

3.2.6. Hodgkin’s Disease

Two economic evaluations of long-term survivorship care strategies for patients previously treated for Hodgkin’s disease were found. A retrospective review of patients treated for Hodgkin’s disease in Canada was performed to evaluate the utility of the components of a follow-up strategy [39]. Dryver et al. [39] concluded that most true relapses are clinically symptomatic, and routine CT is an expensive and inefficient mode of routine follow-up. Supporting these findings were the results from an American study that found that the use of CT in routine follow-up for patients diagnosed at any stage of disease was less effective and more costly than non-CT modalities [40].

3.2.7. Testicular Cancer

Two economic evaluations of long-term survivorship care strategies for patients previously treated for testicular cancer were found. Clasen et al. [41] analyzed the value of routine post-treatment follow-up strategies for patients with seminoma after radiotherapy and reported that abdominal sonography had the highest cost-efficiency among all technical follow-up investigations in the German setting. Charytonowicz et al. [42] built a Markov model to simulate the impact of the miRNA test on testicular germ cell tumor (TGCT) aftercare costs and found that applying this model to the US healthcare system by replacing CT scans with the miRNA test has the potential to save up to USD 69 million per year in aftercare expenses related to TGCT treatment, with exact savings depending on the adoption rate and test price.

3.2.8. Others

Nine additional records on long-term survivorship care strategies for other cancer types were found—five assessed retrospective audit data and four studies used a decision analytic model. In a Canadian study, Gilbert et al. [43] assessed the costs and effectiveness of follow-up surveillance after limited-stage non-small cell lung cancer resection and found that the cost per recurrence detected by a thoracic surgeon is higher than that from using a family physician. The costs of two surveillance strategies in patients after radical nephrectomy for localized primary renal cell carcinoma (RCC) were evaluated in a Canadian retrospective cohort study [44]. Dion et al. [44] concluded that the new Canadian Urological Association surveillance strategy in RCC follow-up was appropriate and cost-effective in comparison with older follow-up strategies. In an American study, Rettenmaier et al. [45] reviewed the surveillance of uterine cancers and found that the CA-125 assay appeared to be the most cost-effective method in following patients with epithelial uterine malignancies compared to serial imaging, vaginal cytology and imaging in the follow-up of uterine cancer. Additionally, the CA-125 assay appeared to be the most cost-effective method in following patients with ovarian cancer and/or primary peritoneal cancer (PPC) compared to CT imaging, vaginal cytology and imaging in the long-term follow-up strategy [46]. Imran et al. [47] compared outcomes and costs for low-risk thyroid cancer patients followed by multidisciplinary clinics in tertiary clinics versus those discharged at 24 months for follow-up in the primary care setting in Canada and reported that the rates of recurrence were similar in both groups, while both healthcare costs and travel costs related to primary care were lower than those in tertiary care. The researchers of these five studies conducted retrospective data analyses without a sensitivity analysis.

Dansk et al. [48] built a mixed model to assess the economic impact of using hexam-inolevulinate hydrochloride-guided blue-light flexible cystoscopy (HAL BLFC) compared
with using white-light flexible cystoscopy (WLFC) alone in the follow-up strategy for patients after successful initial transurethral resection of bladder cancer to detect recurrence in Sweden. The authors concluded that HAL BLFC allowed more outpatient treatment, improved recurrence detection, reduced transurethral resection of bladder tumors and reduced cystectomies, bed days and operating room time with minimal cost impact across all risk groups. A Markov model was built to investigate the cost of three different follow-up strategies for prostate cancer patients treated with curative intent in the Irish setting [49]. Pearce et al. [49] conducted a cost minimization analysis, and the results were supported by a one-way sensitivity analysis and PSA. They found that the current Irish practice was the least cost-efficient option for prostate cancer follow-up care, while the implementation of alternative models of care such as the NICE guidelines would lead to significant cost savings in the Irish healthcare system. An economic model from Australia compared the implementation of a dietary modification counselling service and individually tailored community-based physical activity programs to a scenario where no lifestyle program is implemented for the survivors of hematological malignancy treated with hematopoietic stem cell transplantation [50]. The authors concluded that the intervention is more likely to be cost-effective for people who were overweight/obese at the baseline. In the USA, a microsimulation model was built to estimate the long-term health and economic outcomes associated with recommended routine cardiography screening for survivors of childhood cancer treated with anthracycline chemotherapy or chest-directed radiotherapy [51]. Childhood cancer survivors who are treated with anthracycline chemotherapy or radiotherapy are at increased risk of developing cardiomyopathy [52]. Ehrhardt et al. [51] found that given the USD 100,000 per QALY gained threshold for cost-effectiveness, screening at 2-, 5- and 10-year intervals appears to be cost-effective for high-risk survivors, and every 5 and 10 years for moderate-risk survivors. Screening every 10 years for low-risk survivors does not appear to be cost-effective.

3.3. Quality Assessment

The methodology for assessing the quality of reporting, presented in Appendix D, describes the quality assessment procedure and the compliance with the CHEERS checklist for each study. As previously mentioned, 14 out of the 34 included studies were published after 2013 when the CHEERS checklist became available [16]. Compliance with the CHEERS checklist ranged from 45 to 98%. One out of the seven studies that achieved more than 90% compliance was published before 2013 [28]. None of the included studies addressed every item listed in the checklist. All studies adequately reported elements relating to background, target population, setting, estimating resources/costs and currency, price date and conversion. For the 16 non-model-based studies, items relating to discount rate, model choice, measurement and valuation of preference-based outcomes, assumptions and description of analytic methods were not applicable. The most poorly reported items related to characterizing uncertainty and heterogeneity.

Time horizon refers to the period over which costs and outcomes are being evaluated. We included studies that evaluated costs and outcomes for a period of 5 years or more. Less than half (14/34) of the included studies stated why their choice of time horizon was appropriate for the study.

Non-model-based economic evaluations did not apply discounting to costs and health consequences and did not thoroughly describe the underlying assumptions or analytical methods used in the evaluation. Five out of the 18 model-based studies did not apply a discounting rate or did not report the use of a discount rate, with only one study explaining why this was appropriate [32]. Six out of the 13 model-based studies where discount rates were applied did not justify the chosen discount rate.

For an economic evaluation, effectiveness refers to the ability of an intervention to provide the desired clinical outcome, which is assessed in item 11 of the checklist. Eight studies, including one non-model-based study, met this criterion. The non-model-based
study performed a literature search and described the methods used for the identification of the included studies and the synthesis of clinical effectiveness data [20].

3.4. Usefulness of Economic Evaluation Studies to Decision-Makers

In assessing the usefulness of the reports, we found that having a high compliance score to the CHEERS reporting checklist does not necessarily guarantee that the study is of great use in decision-making. The summary data extracted in relation to the usefulness of each study are shown in Table 2. Six studies used Markov (state-based) models, one used a decision tree, one study used both a Markov model and a decision tree, while one used discrete event simulation as the model structure. A further six studies used other types of models—namely an empirical model, a validated simulation model, a microsimulation model, a pre-trial economic model and a 5-year projection model. Studies were categorized as having either a “strong”, “moderate” or “limited” level of usefulness for decision-makers. In judging the reporting, we were looking for a clear direction or suggestion about how the results of the analysis could be used to improve the efficiency of healthcare resource use. Seven studies made a clear statement about changing or keeping the allocation of resources or explained how the study’s outcomes are relevant to policies. Ultimately, only one study was rated as “strongly” useful for decision-makers and five studies were rated to be of “moderate” usefulness, while the remaining studies were rated as having “limited” usefulness for decision-makers. The study rated as “strongly” useful was a CUA which utilized a microsimulation model [51], while the studies rated as having “moderate” usefulness were CEA and CUAs that used a Markov model structure (n = 3) [35, 40, 50], discrete event simulation (n = 1) [14] or a 5-year trial model (n = 1) [24].

| Study                      | Model-Based Design | Applied Model Calibration | Direct and Indirect Costs Included | Quality of Life Measure | Outcome Presented as ICER | Full Sensitivity Analysis (More than Two Combination of OW, MW, PSA, TA and SA) | Policy Suggestion/Direction | Level of Usefulness (Strong/Moderate/Limited) |
|---------------------------|--------------------|---------------------------|-----------------------------------|-------------------------|---------------------------|--------------------------------------------------------------------------------|----------------------------|----------------------------------------------|
| colorectal cancer         |                    |                           |                                   |                         |                           |                                                                                |                            |                                              |
| Staib et al. [20]         | No                 | NA                        | No (direct only)                  | No                      | No                        | NA                                                                             | No                         | Limited                                      |
| Bleeker et al. [18]       | No                 | NA                        | No (direct only)                  | No                      | NA                        | NA                                                                             | No                         | Limited                                      |
| Borie et al. [21]         | Yes                | No                        | No (direct only)                  | Yes                     | Yes                       | No (only OW)                                                                  | Yes                        | Limited                                      |
| Renehan et al. [24]       | Yes                | No                        | Yes                               | Yes                     | Yes                       | Yes (OW + SA)                                                                  | Yes                        | Moderate                                     |
| Magee et al. [22]         | Yes                | No                        | No (direct only)                  | No                      | No                        | No (only SA)                                                                  | No                         | Limited                                      |
| Di Cristofaro et al. [19] | No                 | NA                        | No (direct only)                  | No                      | No                        | NA                                                                             | No                         | Limited                                      |
| Mant et al. [23]          | Yes                | No                        | No (direct only)                  | Yes                     | Yes                       | Yes (SA + TA)                                                                  | No                         | Limited                                      |
| breast cancer             |                    |                           |                                   |                         |                           |                                                                                |                            |                                              |
| Grogan et al. [26]        | Yes                | No                        | No (direct only)                  | No                      | No                        | Not conducted                                                                 | No                         | Limited                                      |
| Kokko et al. [27]         | No                 | Na                        | No (direct only)                  | No                      | No                        | NA                                                                             | No                         | Limited                                      |
| Robertson et al. [28]     | Yes                | No                        | No (direct only)                  | Yes                     | Yes                       | Yes (CW + MW + TA)                                                            | No                         | Limited                                      |
| Lu et al. [29]            | Yes                | No                        | No (direct only)                  | No                      | No                        | Not conducted                                                                 | No                         | Limited                                      |
| Bessen et al. [14]        | Yes                | Yes                       | No (direct only)                  | Yes                     | Yes                       | Yes (SA + PSA)                                                                | No                         | Moderate                                     |
| Draeger et al. [33]       | Yes                | No                        | No (direct only)                  | No                      | No                        | NA                                                                             | No                         | Limited                                      |
| skin cancer               |                    |                           |                                   |                         |                           |                                                                                |                            |                                              |
| Hengge et al. [30]        | Yes                | No                        | No (direct only)                  | Yes                     | Yes                       | Not conducted                                                                 | Yes                        | Limited                                      |
| Leiter et al. [31]        | No                 | NA                        | No (direct only)                  | No                      | No                        | NA                                                                             | No                         | Limited                                      |
| Podlipnik et al. [32]     | Yes                | No                        | No (direct only)                  | No                      | No                        | Yes (OW + SA)                                                                  | No                         | Limited                                      |
| cervical cancer           |                    |                           |                                   |                         |                           |                                                                                |                            |                                              |
| Forni et al. [33]         | No                 | NA                        | No (direct only)                  | No                      | No                        | NA                                                                             | No                         | Limited                                      |
| Barea-Carrada et al. [34] | No                 | NA                        | No (direct only)                  | Yes                     | No                        | NA                                                                             | No                         | Limited                                      |
| Augustine et al. [35]     | Yes                | No                        | No (direct only)                  | Yes                     | Yes                       | Yes (OW + SA + PSA)                                                           | Yes                        | Moderate                                     |
| head and neck cancer      |                    |                           |                                   |                         |                           |                                                                                |                            |                                              |
| Shah et al. [37]          | No                 | NA                        | No (direct only)                  | No                      | No                        | NA                                                                             | No                         | Limited                                      |
| Memegušić et al. [38]     | Yes                | No                        | No (direct only)                  | Yes                     | Yes                       | Yes (OW + TW + PSA)                                                           | No                         | Limited                                      |
### 4. Discussion

The review systematically collated the published economic evaluation studies on long-term cancer survivorship care in OECD countries and identified 34 studies published between January 2000 and November 2020. More than one-third of the included studies evaluated survivorship care for colorectal and breast cancer (13/34). Half of the included studies were modeling studies (16/34). Assessing economic evaluations regarding long-term survivorship care for patients who have had cancer is not an easy task for multiple reasons that limit comparison. Firstly, the technology used for detecting and monitoring recurrence varies widely according to the cancer type that is being recovered from. Secondly, the different follow-up regimens that are possible are also very different according to the type of cancer that has been survived. Thirdly, not all papers report outcomes in the same way, which is an understandable and reasonable difference that exists in this field of research.

Numerous different approaches to providing long-term follow-up were found in our search. Hospital vs. community service utilization, follow-up frequency and adherence to guideline-based follow-up vs. bespoke options were the most commonly identified follow-up regimens that were compared, across all cancer groups. Numerous studies found that reducing the number of follow-up visits did not worsen health outcomes and contributed to a reduction in long-term survivorship care costs. These findings were consistent across various cancer types, including lung [43], cervical [33], skin [30] and breast cancer [27], and make intuitive sense given that increased health service utilization is associated with increased costs, regardless of whether the costing perspective is from the individual, the health system or a third-party payer. A small number of studies suggest that specialist attention is not a cost-effective approach to providing long-term follow-up care in comparison to providing services in primary care by non-specialist medical staff or with less reliance on the heavy use of technological support. Baena-Cañada et al. [34] found that primary care-based services were cost-effective for following up patients with cervical cancer, and Imran et al. [47] found that non-specialist follow-up care was feasible.

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### Table 2. Cont.

| Study | Hodgkin’s disease | Testicular cancer | Others |
|-------|-------------------|-------------------|--------|
|       | Model-Based Design | Applied Model Calibration | Direct and Indirect Costs Included | Quality of Life Measure | Outcome Presented as ICER | Full Sensitivity Analysis (More than Two Combination of OW, MW, PSA, TA and SA) | Policy Suggestion/Direction | Level of Usefulness (Strong/Moderate/Limited) |
| Model-Based Design | Yes | No | No (direct only) | Yes | Yes | Yes (OW + SA) | Yes | Limited |
| Dryver et al. [39] | No | NA | No (direct only) | No | No | NA | Yes | Limited |
| Guadagnolo et al. [40] | Yes | No | No (direct only) | Yes | Yes | Yes (OW + SA) | Yes | Moderate |
| Charytonowicz et al. [42] | Yes | No | No (direct only) | No | No | No (only OW) | Yes | Limited |
| Others | Gilbert et al. [43] | No | NA | No (direct only) | No | No | NA | No | Limited |
| Dion et al. [44] | No | NA | No (direct only) | No | No | NA | No | Limited |
| Rettenmaier et al. [45] | No | NA | No (direct only) | No | No | NA | No | Limited |
| Rettenmaier et al. [46] | No | NA | No (direct only) | No | No | NA | No | Limited |
| Imran et al. [47] | No | NA | No (direct only) | No | No | NA | Yes | Limited |
| Dansk et al. [48] | Yes | No | No (direct only) | No | No | No | No (only SA) | Yes | Limited |
| Pearce et al. [49] | Yes | No | No (direct only) | No | No | No | Yes (OW + PSA) | Yes | Limited |
| Gao et al. [50] | Yes | No | Yes | Yes | Yes | Yes | Yes (OW + TA) | Yes | Limited |
| Ebhardt et al. [51] | Yes | Yes | Yes | Yes | Yes | Yes | Yes (OW + TW) | Yes | Strong |

NOTE. NA: Due to its nature, an item was not relevant to this study. Strong: “Yes” to all items; Moderate: “No” or “NA” or “Not conducted” to one or two items; Limited: “No” or “NA” or “Not conducted” to more than two items. * Adapted from Cheng et al. [8] and McCreanor et al. [9] with copyright permission for use obtained from the corresponding authors. ICER—Incremental Cost-Effectiveness Ratio; OW—One-Way; MW—Multi-Way; PSA—Probabilistic Sensitivity Analysis; TA—Threshold Analysis; SA—Scenario Analysis.
and beneficial from an economic perspective for low-risk thyroid cancer patients, while Shah et al. [37] and Guadagnolo et al. [40] suggest that reducing follow-up intensity by lowering the number of follow-up assessments with PET-CT reduces costs and does not have a detrimental impact on clinical outcomes for patients with head and neck cancers and Hodgkin’s disease, respectively. These findings could be used to support a “less is more” approach to designing follow-up regimens and support the hypothesis that there is possibly an over-servicing associated with long-term follow-up for some cancer survivors.

We found comparison of study results difficult due to the wide variety of methods used and due to differences in how outcomes were reported. A surprising number of studies \( n = 10 \) presented results from a costing-only perspective, without the measurement of health effects or outcomes and being identified as only costing studies. A further two studies did not include reference to a clear comparator, meaning that comparative analysis of costs and health effects associated with different approaches to follow-up care was not possible [31,50]. The most commonly reported results were presented as cost per health-related measure (QALY/LYG/HALY) \( n = 11 \), followed by cost per follow-up \( n = 10 \) and cost per detected recurrence \( n = 9 \). Some papers reported more than one outcome of interest.

Based on the results, it is recommended to conduct model-based economic evaluation studies to support policymakers. As decision-making in healthcare is increasingly including evidence from economic evaluations, we think that the best approach to assess long-term survivorship care for cancer patients is to review the quality of the evidence that is available and assess the quality in the context of what is required for decision-makers to make good decisions. From our review, it is unclear what information is most valued by decision-makers that are tasked with the difficult job of allocating scarce healthcare resources. What is clear is that the majority of studies \( 26/34 \) did not provide a clear policy statement regarding resource allocation, leaving decision-makers to interpret the findings in an uncertain manner. We propose that all economic evaluations should include clear and direct statements about how the results should be interpreted and used by decision-makers so that there is no ambiguity regarding the steps that follow. If there are multiple decision-makers—for example, stakeholders who have differing information requirements—we suggest that analysts should provide clear statements regarding the results that fit those information requirements. Put simply, analysts who conduct health economic evaluations must be cognizant of their audience and provide a clear and practical interpretation of their results to support good decision-making in the healthcare setting.

5. Conclusions

Our review shows that there is no shortage of economic evidence relating to long-term cancer survivorship care. All types of economic evaluations, other than cost–benefit analysis, were represented. However, we found that there is a shortage of clear author recommendations that help healthcare decision-makers make decisions about the allocation of scarce resources. Most papers included in the review lacked a clear and practical policy statement, which is a key step for having evidence inform new policies or influence funding allocation. We believe that this issue can be easily corrected if authors more closely adhere to the following steps in future economic evaluations on this topic. First, we recommend that authors follow the CHEERS checklist to ensure that their methods, assumptions and approach are laid bare. This encourages clear and easily digested reporting of the context and methods. Second, we recommend that authors explicitly include a policy statement as part of their presentation of results. Such statements must be clear and direct, acting as recommendations for those charged with putting evidence into practice. Having undertaken this review, we recommend that decision-makers only ever consider economic evaluations that include quality of life data and/or some other relevant patient outcome of interest, so that changes to costs and health outcomes can be assessed. We also recommend that those conducting economic evaluations clearly recommend one of three options for adoption: (1) adopt without delay, (2) do not adopt or (3) design and
complete an evaluation plan that allows a clear decision to be made. Finally, based on our review, it is also recommended that policymakers use the findings from decision analytic model-based economic evaluations that are rated as providing “moderately” or “strongly” useful evidence for decision-makers, using criteria that are similar to ours. Following these recommendations will make it easier for decision-makers to use the results for decision-making purposes and bring research findings closer to the decision-making table.

**Author Contributions:** Conceptualization, D.B.; methodology, A.J.; software, A.J.; validation, D.B. and A.J.; formal analysis, A.J.; investigation, A.J.; resources, A.J.; data curation, A.J.; writing—original draft preparation, A.J. and D.B.; writing—review and editing, D.B.; visualization, A.J.; supervision, D.B. All authors have read and agreed to the published version of the manuscript.

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**Conflicts of Interest:** The authors declare no conflict of interest.

### Appendix A

**Table A1. PRISMA item checklist.**

| Section and Topic | Item # | Checklist Item | Reported on Page # |
|-------------------|--------|----------------|--------------------|
| TITLE             | 1      | Identify the report as a systematic review. | 1 |
| ABSTRACT          | 2      | See the PRISMA 2020 for Abstract checklist (Table A2). | 1 |
| INTRODUCTION      | 3      | Describe the rationale for the review in the context of existing knowledge. | 1 |
| METHODS           | 4      | Provide an explicit statement of the objective(s) or question(s) the review addresses. | 1 |
| ELIGIBILITY CRITERIA | 5  | Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses. | 2 |
| INFORMATION SOURCES | 6 | Specify all databases, registers, websites, organizations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted. | 2 |
| SEARCH STRATEGY   | 7      | Present the full search strategies for all databases, registers and websites, including any filters and limits used. Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently and, if applicable, details of automation tools used in the process. Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators and, if applicable, details of automation tools used in the process. | 2, Table A3, Appendix B |
| DATA COLLECTION PROCESS | 8 | List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g., for all measures, time points, analyses), and if not, the methods used to decide which results to collect. | 2, Appendix B |
| DATA ITEMS        | 10a    | | 2, Appendices B and C |
| Section and Topic                           | Item # | Checklist Item                                                                 | Reported on Page # |
|--------------------------------------------|--------|--------------------------------------------------------------------------------|-------------------|
| **Study risk of bias assessment**          | 10b    | List and define all other variables for which data were sought (e.g., participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information. Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process. | 2, Appendices B and C |
| **Effect measures**                        | 11     | Specify for each outcome the effect measure(s) (e.g., risk ratio, mean difference) used in the synthesis or presentation of results. Describe the processes used to decide which studies were eligible for each synthesis. | 3, Tables A6 and A7, Appendix D |
| **Synthesis methods**                      | 12     | Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process. | 2–3, Appendix D |
| **Study characteristics**                 | 13a    | Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions. | 2–3, Table A5, Appendix C |
| **Synthesis methods**                      | 13b    | Describe any methods used to tabulate or visually display results of individual studies and syntheses. | 2–3, Table A5, Appendix C |
| **Synthesis methods**                      | 13c    | Describe any methods used to tabulate or visually display results of individual studies and syntheses. | 2–3, Table A5, Appendix C |
| **Synthesis methods**                      | 13d    | Describe any methods used to investigate any missing data (arising from publication biases). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity and software package(s) used. | NA |
| **Synthesis methods**                      | 13e    | Describe any methods used to explore possible causes of heterogeneity among study results. | NA |
| **Synthesis methods**                      | 13f    | Describe any methods used to assess the robustness of the synthesized results. | NA |
| **Reporting bias assessment**              | 14     | Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases). | 3, Tables A6 and A7, Appendix D |
| **Certainty assessment**                   | 15     | Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome. | NA |
| **RESULTS**                                | 16a    | Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram (see Figure 1). Cite studies that met many but not all inclusion criteria (‘near-misses’) and explain why they were excluded. | 3–11, Table A5, Appendix C and Table A7, Appendix D |
| **Study selection**                        | 16b    | Cite studies that met many but not all inclusion criteria (‘near-misses’) and explain why they were excluded. | Table A4, Appendix B |
| **Study characteristics**                 | 17     | Cite each included study and present its characteristics. | 3–11, Appendices C and D, Appendix D |
| **Risk of bias in studies**               | 18     | Present assessments of risk of bias for each included study. For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g., confidence/credible interval), ideally using structured tables or plots. | 3–11, Table A5, Appendix C |
| **Results of individual studies**         | 19     | For each synthesis, briefly summarize the characteristics and risk of bias among contributing studies. Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g., confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect. | 8–11, Appendices C and D |
| **Results of syntheses**                  | 20a    | For each synthesis, briefly summarize the characteristics and risk of bias among contributing studies. Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g., confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect. | 8–11, Table A5, Appendix C |
| **Results of syntheses**                  | 20b    | Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results. | 9–11, Table A5, Appendix C |
| **Reporting biases**                      | 21     | Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed. | Table A7, Appendix D |
| **Certainty of evidence**                 | 22     | Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed. | Table A7, Appendix D |
Table A1. Cont.

| Section and Topic               | Item # | Checklist Item                                                                 | Reported on Page # |
|---------------------------------|--------|-------------------------------------------------------------------------------|--------------------|
| DISCUSSION                      |        |                                                                               |                    |
| Discussion                      | 23a    | Provide a general interpretation of the results in the context of other evidence. | 11–12              |
|                                 | 23b    | Discuss any limitations of the evidence included in the review.               | 11–12              |
|                                 | 23c    | Discuss any limitations of the review processes used.                         | 11–12              |
|                                 | 23d    | Discuss implications of the results for practice, policy and future research.  | 11–12              |
| OTHER INFORMATION               |        |                                                                               |                    |
| Registration and protocol       | 24a    | Provide registration information for the review, including register name and registration number, or state that the review was not registered. | 2                  |
|                                 | 24b    | Indicate where the review protocol can be accessed, or state that a protocol was not prepared. | 2                  |
|                                 | 24c    | Describe and explain any amendments to information provided at registration or in the protocol. | 2                  |
| Support                         | 25     | Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review. | NA                |
| Competing interests             | 26     | Declare any competing interests of review authors.                            | 12                 |
| Availability of data, code and other materials | 27     | Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review. | Appendices A–D  |

Table A2. PRISMA for Abstracts checklist *.

| Section and Topic               | Item # | Checklist Item                                                                 | Reported on Page # |
|---------------------------------|--------|-------------------------------------------------------------------------------|--------------------|
| TITLE                           | 1      | Identify the report as a systematic review.                                 | 1                  |
| BACKGROUND                      |        |                                                                               |                    |
| Objectives                      | 2      | Provide an explicit statement of the main objective(s) or question(s) the review addresses. | 1                  |
| METHODS                         |        |                                                                               |                    |
| Eligibility criteria            | 3      | Specify the inclusion and exclusion criteria for the review.                 | 1                  |
| Information sources             | 4      | Specify the information sources (e.g., databases, registers) used to identify studies and the date when each was last searched. | 1                  |
| Risk of bias                    | 5      | Specify the methods used to assess risk of bias in the included studies.     | 1                  |
| Synthesis of results            | 6      | Specify the methods used to present and synthesize results.                 | 1                  |
| RESULTS                         |        |                                                                               |                    |
| Included studies                | 7      | Give the total number of included studies and participants and summarize relevant characteristics of studies. | 1                  |
| Synthesis of results            | 8      | If meta-analysis was performed, report the summary estimate and confidence/credible interval. If comparing groups, indicate the direction of the effect (i.e., which group is favored). | 1                  |
| DISCUSSION                      |        |                                                                               |                    |
| Limitations of evidence         | 9      | Provide a brief summary of the limitations of the evidence included in the review (e.g., study risk of bias, inconsistency and imprecision). | 1                  |
| Interpretation                  | 10     | Provide a general interpretation of the results and important implications.   | 1                  |
Table A2. Cont.

| Section and Topic | Item # | Checklist Item | Reported on Page # |
|-------------------|--------|----------------|--------------------|
| OTHER             |        |                |                    |
| Funding           | 11     | Specify the primary source of funding for the review. | NA                 |
| Registration      | 12     | Provide the register name and registration number. | 1                  |

* This abstract checklist retains the same items as those included in the PRISMA for Abstracts statement published in 2013 but has been revised to make the wording consistent with the PRISMA 2020 statement and includes a new item recommending that authors specify the methods used to present and synthesize results (item #6).

Appendix B

Review protocol: Economic evaluation of long-term survivorship care for cancer patients in OECD countries: A systematic review

The review was conducted according to the PRISMA 2020 guidelines [11] and included searches of electronic databases and searching of reference lists. It includes original research focusing on economic evaluations for follow-up strategies of patients previously treated for cancer, including screening for certain issues or the cost-effectiveness of long-term follow-up care/survivorship care.

Data sources: Three electronic databases, namely Medline, PubMed and PsycINFO, and the National Health Service Economic Evaluation Databases as well as the Health Technology Assessment Databases were searched with the assistance of librarians.

Table A3. Search strategy.

| Search Terms | Numbers |
|--------------|---------|
| 1. PUBMED    |         |
| 1. “economic evaluation” or “economic analysis” or “cost” or expenditure or “out of pocket” or “cost of illness” or “health care cost” or “direct service cost” or “drug cost” or “hospital cost” | 883,278 |
| 2. “Costs and Cost Analysis” [MeSH Terms] OR “Economics” [MeSH Terms] OR “Economics” [MeSH Subheading] OR “Cost of Illness” [MeSH Terms] OR “Cost Sharing” [MeSH Terms] OR “Cost Savings” [MeSH Terms] OR “technology, high cost” [MeSH Terms] OR “Cost Control” [MeSH Terms] OR “Cost-Benefit Analysis” [MeSH Terms] OR “Cost Allocation” [MeSH Terms] OR “Health Care Costs” [MeSH Terms] OR “Direct Service Costs” [MeSH Terms] OR “Hospital Costs” [MeSH Terms] OR “Employer Health Costs” [MeSH Terms] OR “Drug Costs” [MeSH Terms] OR “Health Expenditures” [MeSH Terms] | 742,199 |
| 3. 1 OR 2    | 1,328,609 |
| 4. “follow-up” or “secondary prevent” or “after treatment” or “after chemo” or “after radiation” or “after care” or “after cur” or “post treatment” or “post chemo” or “post radiotherapy” or “survivorship care” or “long-term strategy” | 1,568,415 |
| 5. “Neoplasms” [MeSH Terms] (cancer* or carcinoma* or histiocytosis or leukemia or lymphoma* or medulloblastoma* or neoplasm* or nephroblastoma* or neuroblastoma* or oncolog* or osteosarcoma* or retinoblastoma* or sarcoma* or tumor* or neoplasm*).ti,ab. | 3,378,598 |
| 6. 5 OR 6    | 4,370,095 |
| 7. (Australia or Austria or Belgium or Canada or Chile or Colombia or Czech Republic or Denmark or Estonia or Finland or France or Germany or Greece or Hungary or Iceland or Ireland or Israel or Italy or Japan or Korea or Latvia or Lithuania or Luxembourg or Mexico or Netherlands or “New Zealand” or Norway or Poland or Portugal or Slovak Republic or Slovenia or Spain or Sweden or Turkey or “United Kingdom” or England or United States).ti,ab. | 1,153,236 |
| 8. 3 and 4 and 7 and 8 | 1499 |
| 9. Filters: 2000–2020 and English | 1277 |
| Search Terms                                                                                             | Numbers |
|---------------------------------------------------------------------------------------------------------|---------|
| 2. MEDLINE                                                                                               | 2107    |
| (“economic evaluation*” or “economic analys*” or “cost* utility” or “cost analysis” or “cost effective*” or “cost benefit” or “cost minimization” or “cost minimization” or expenditure or “out of pocket” or “cost of illness*” or “health care cost*” or “direct service cost*” or “drug cost*” or “hospital cost*”) AND (“Follow-up” or “secondary prevent*” or “after treatment” or “after chemo*” or “after radiation” or “after care” or “after cur*” or “post treatment” or “post chemo*” or “post radiotherapy” or “survivorship care” or “long-term strateg*” or “short-term strateg*”) AND (Cancer* or carcinoma* or histiocytosis or leukemia or lymphoma* or medulloblastoma* or neoplasm* or nephroblastoma* or neuroblastoma* or oncolog* or osteosarcoma* or retinoblastoma* or sarcoma* or tumor* or neoplasm*) AND (Australia or Austria or Belgium or Canada or Chile or Colombia or Czech Republic or Denmark or Estonia or Finland or France or Germany or Greece or Hungary or Iceland or Ireland or Israel or Italy or Japan or Korea or Latvia or Lithuania or Luxembourg or Mexico or Netherlands or “New Zealand” or Norway or Poland or Portugal or Slovak Republic or Slovenia or Spain or Sweden or Turkey or “United Kingdom” or England or United States) Filters: 2000–2020 and English |         |
| 3. PsychINFO                                                                                              | 204     |
| (“economic evaluation*” or “economic analys*” or “cost* utility” or “cost analysis” or “cost effective*” or “cost benefit” or “cost minimization” or “cost minimization” or expenditure or “out of pocket” or “cost of illness*” or “health care cost*” or “direct service cost*” or “drug cost*” or “hospital cost*”) AND (“follow-up” or “secondary prevent*” or “after treatment” or “after chemo*” or “after radiation” or “after care” or “after cur*” or “post treatment” or “post chemo*” or “post radiotherapy” or “survivorship care” or “long-term strateg*” or “short-term strateg*”) AND (cancer* or carcinoma* or histiocytosis or leukemia or lymphoma* or medulloblastoma* or neoplasm* or nephroblastoma* or neuroblastoma* or oncolog* or osteosarcoma* or retinoblastoma* or sarcoma* or tumor* or neoplasm*) AND (Australia or Austria or Belgium or Chile or Colombia or Czech Republic or Denmark or Estonia or Finland or France or Germany or Greece or Hungary or Iceland or Israel or Iran or Italy or Japan or Korea or Latvia or Lithuania or Luxembourg or Mexico or Netherlands or “New Zealand” or Norway or Portugal or Slovak Republic or Slovenia or Spain or Sweden or Turkey or “United Kingdom” or England or United States) Filters: 2000–2020 and English |         |
| 4. National Health Service Economic Evaluation Databases up to 2015                                       | 750     |
| (“Follow-up” or “secondary prevent*” or “after treatment” or “after chemo*” or “after radiation” or “after care” or “after cur*” or “post treatment” or “post chemo*” or “post radiotherapy” or “survivorship care” or “long-term strateg*” or “short-term strateg*”) AND (Cancer* or carcinoma* or histiocytosis or leukemia or lymphoma* or medulloblastoma* or neoplasm* or nephroblastoma* or neuroblastoma* or oncolog* or osteosarcoma* or retinoblastoma* or sarcoma* or tumor* or neoplasm*) AND (Australia or Austria or Belgium or Canada or Chile or Colombia or Czech Republic or Denmark or Estonia or Finland or France or Germany or Greece or Hungary or Iceland or Ireland or Israel or Iran or Italy or Japan or Korea or Latvia or Lithuania or Luxembourg or Mexico or Netherlands or “New Zealand” or Norway or Portugal or Slovak Republic or Slovenia or Spain or Sweden or Turkey or “United Kingdom” or England or United States) Filters: English |         |
| 5. National Health Service Economic Evaluation Databases                                                  | 67      |
| (“follow-up” or “secondary prevent*” or “after treatment” or “after chemo*” or “after radiation” or “after care” or “after cur*” or “post treatment” or “post chemo*” or “post radiotherapy” or “survivorship care” or “long-term strateg*” or “short-term strateg*”) AND (cancer* or carcinoma* or histiocytosis or leukemia or lymphoma* or medulloblastoma* or neoplasm* or nephroblastoma* or neuroblastoma* or oncolog* or osteosarcoma* or retinoblastoma* or sarcoma* or tumor* or neoplasm*) AND (Australia or Austria or Belgium or Canada or Chile or Colombia or Czech Republic or Denmark or Estonia or Finland or France or Germany or Greece or Hungary or Iceland or Ireland or Israel or Iran or Italy or Japan or Korea or Latvia or Lithuania or Luxembourg or Mexico or Netherlands or “New Zealand” or Norway or Portugal or Slovak Republic or Slovenia or Spain or Sweden or Turkey or “United Kingdom” or England or United States) Filters: English |         |
| 6. From other source: reference list review of any article chosen for possible inclusion                  | 17      |
Question of interest: What is the current cost-effectiveness evidence for long-term survivorship care compared to usual care for cancer patients?

Cancer survivorship: The most widely used definition of cancer survivorship is from the National Coalition for Cancer Survivorship in the USA and includes for each person the period “from the time of diagnosis, through the balance of his or her life, regardless of the ultimate cause of death” [2].

Stages of survivorship: Different stages of survivorship comprise acute (diagnosis to treatment), chronic (ongoing) and long-term/late survivorship (≥5 years post-diagnosis) [3].

Population: Cancer patients of any age and sex who have received survivorship care after initial cancer treatment.

Intervention(s), exposure(s):
- Any long-term strategy or any long-term follow-up care or survivorship care (≥5 years after initial treatment) as care used in a supportive role to improve quality of life as well as diagnostic strategy to detect recurrence. Types of care that were included in the review were:
  - Management and/or screening for certain issues such as curable recurrence
  - Diets, including the use of dietary supplements
  - Exercise
  - Counseling
  - E-health technologies: web-based or app-based e-health interventions
- Fertility treatments
- Any study setting (e.g., hospital- or community-based)
- Any form of recruitment

Comparator(s)/control: Any control group or comparators assigned when comparing an intervention or strategy related to the strategy for cancer survivors as well as no comparator if it is a costing-only study.

Study designs of interest: Prospective and retrospective cohorts, randomized control trials and economic modeling studies.

Inclusion criteria:
1. Studies that either estimated the impact of survivorship care, comparing it to no survivorship care, or compared different long-term care strategies for cancer survivors in OECD countries
2. Economic evaluations: costing studies, cost-effectiveness analyses, cost–utility analyses, cost–consequences analyses and cost minimization analyses were included if they reported both the costs and benefits expected for both usual care and the comparator(s)
3. Research articles published in English language
4. Research limited to human studies
5. Full publication or manuscript available for review

Exclusion criteria:
Articles were initially excluded if they were duplicates or if the title clearly demonstrated that the intervention and outcome of interest were not the focus of the review. Articles were then excluded based on the following:
1. Economic evaluation of active surveillance vs. initial treatment (5)
2. Economic evaluation of curative interventions (7)
3. Economic evaluation of follow-up care for hyperplasia/dysplasia (12)
4. Economic evaluation of follow-up care for mixed patients (1)
5. Economic evaluation of management of chemo/radiotherapy-induced symptoms (22)
6. Economic evaluation of palliative care (2)
7. Economic evaluation of supporting management during initial treatment (31)
8. Not follow-up/survivorship care (2)
9. Not economic study (4)
10. Only focused on costs and did not report health benefits (34)
11. Protocols/conference abstract/review papers (38)
12. Used same data/reported same study (4)
13. Economic evaluation of breast implant (4)
14. Economic issue of survivors (8)
15. Followed up for less than 5 years (27)

**Table A4.** A list of studies that met many inclusion criteria (“near-misses”) but were excluded due to a short follow-up period (less than 5 years).

| #  | Study Author and Publication Year | Follow-Up Period |
|----|----------------------------------|------------------|
| 1  | Augestad et al. [54]             | 24 months        |
| 2  | Verberne et al. [55]             | 3 years          |
| 3  | Beaver et al. [56]               | 24 months        |
| 4  | Benning et al. [57]              | 12 months        |
| 5  | Burm et al. [58]                 | 9–15 months      |
| 6  | Coyle et al. [59]                | 24 months        |
| 7  | Kimman et al. [60]               | 1 year           |
| 8  | Oltra et al. [61]                | 3 years          |
| 9  | Wojcinski et al. [62]            | 12 months        |
| 10 | Armstrong et al. [63]            | 2 years          |
| 11 | Dixon et al. [64]                | 12 months        |
| 12 | Ham et al. [65]                  | 3.5 months       |
| 13 | Bongers et al. [66]              | Mean (SD) = 31.6 (9.8) months |
| 14 | Greuter et al. [67]              | 3 and 6 months   |
| 15 | Heinzel et al. [68]              | Unclear          |
| 16 | Jeyarajah et al. [69]            | Mixed 3 and/or 5 years |
| 17 | Kampshoff et al. [70]            | 12 weeks         |
| 18 | Kent et al. [71]                 | Up to 5 years    |
| 19 | Lizée et al. [72]                | 2 years          |
| 20 | Moore et al. [73]                | 12 months        |
| 21 | Nam et al. [74]                  | Unclear          |
| 22 | Polinder et al. [75]             | 12 months        |
| 23 | Pollack et al. [76]              | 366–1095 days    |
| 24 | Shih et al. [77]                 | 6 months         |
| 25 | van der Spek et al. [78]         | 6 months         |
| 26 | van Dongen et al. [79]           | 12 months        |
| 27 | van Loon et al. [80]             | Up to 5 years    |

**Main outcome(s):** Assess the cost-effectiveness of long-term survivorship care for cancer survivors.

**Measures of effect:** Incremental effectiveness, incremental costs and ICER (incremental cost-effectiveness ratio) values.

**Data extraction:** The initial search was performed by two reviewers using predetermined search terms and strategies from chosen databases. All identified papers were imported into EndNote and screened in accordance with PRISMA guidelines.

After removal of duplicates, the titles and abstracts were screened for relevance and eligibility criteria. The two reviewers then extracted the data from the studies selected for
inclusion using a pre-designed extraction form. The data extraction sheet was first pilot tested on 10 studies and then revised accordingly to include the following.

**Identification of study:**
16. Record the first author’s last name and initials
17. Record the journal name
18. Record the year of publication
19. Record the volume and page numbers

**Characteristics of study:**
20. Setting
21. Type of cancer
22. Patient population (age if available)
23. Intervention
24. Comparator
25. Type of economic evaluation
26. Study design
27. Discount rate
28. Perspective
29. Costs included
30. Time horizon/study period
31. Outcome measures
32. Baseline analysis
33. Sensitivity analysis
34. Main results
35. Additional comments (a threshold value, etc.)

**Quality of reporting assessment:** The full texts of all included articles were assessed for reporting quality by two independent reviewers using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist. Any discrepancies over reporting quality assessment between the two reviewers were resolved by discussion with a third reviewer. The standards of the input data for health economic analysis in the decision model were ranked based on the hierarchy adapted by Cooper and colleagues.

**Strategy for data synthesis:** After screening the title, abstract and full text, data were extracted from relevant articles and were summarized in tables. The data fields were as follows: research question, setting and location, perspective, time horizon, discount rate, structure of the economic model if applied, study population, intervention and comparator, outcome measures, incremental cost-effectiveness ratio (ICER) and sensitivity analysis method.

The quality of the selected economic evaluations was assessed using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist. This checklist provides 24 items, with accompanying recommendations and examples to ensure more consistency and transparent reporting of economic evaluations. Each item in the CHEERS checklist was scored as having met the criteria in full (1), partially (0.5) or not at all (0) or as not applicable (NA).
### Appendix C

**Table A5. Characteristics of included studies.**

| Author (Publication Year) | Setting | Type of Cancer | Intervention | Comparator | EE Type | Study Design | Discount Rate | Perspective | Costs Included | Time Horizon | Outcome Measures | Sensitivity Analysis |
|---------------------------|---------|----------------|--------------|------------|---------|--------------|---------------|-------------|----------------|--------------|------------------|----------------------|
| 1 Staib et al., (2000)    | Germany | Colorectal     | Intensive follow-up | None       | Costing study | Retrospective data audit | NA | Not reported (health system) | Personnel, infrastructure and test costs | 10 years | Cost per followed cancer patient | Not conducted |
| 2 Bleeker et al., (2001)  | The Netherlands | Colonic | Mixed follow-up | None | Costing study | Retrospective data audit | NA | Not reported (health system) | Tests and examination costs | 43 months | Cost of follow-up diagnostic event per curative resected recurrence | Not conducted |
| 3 Borie et al., (2004)    | France  | Colorectal     | Standard follow-up | Simplified follow-up | CUA | Markov Model | NA | Not reported (health system) | The costs of the examination carried out | 5-7 years | Δcost/ΔQALY | OW |
| 4 Renehan et al., (2004)  | UK      | Colorectal     | Intensive follow-up | Usual follow-up | CEA | 5-year trial model | Benefits 1.5% and costs 6% | Health service perspective | Direct, indirect and overhead costs | 5 years | Δcost/ΔLY | OW, SA |
| 5 Macafee et al., (2008)  | UK      | Colorectal     | Intensive follow-up | Usual follow-up | CEA | Retrospective data used for 5-year projection | Costs 3.5% | Hospital perspective | Direct hospital costs | 5 years | Cost of follow-up and cost of resectable recurrence | SA |
| 6 Di Cristofaro et al., (2012) | Italy | Colorectal | Multiple surveillance protocols | None | Costing study | Retrospective data audit | NA | Not reported (health system) | Costs for follow-up tests | 5 years | Cost of follow-up and cost of resectable recurrence | The costs and the percentage of recurrence following the various surveillance protocols Recurrence rate | Not conducted |
| 7 Mant et al., (2017)     | UK      | Colorectal     | CT and CEA follow-up | Minimal follow-up | CUA | Randomized controlled trial and a pre-trial economic model | Costs and benefits 3.5% | The perspective of the UK NHS | Costs for visits and tests | 8 years | Δcost/ΔQALY | SA, TA |
| 8 Grogan et al., (2002)   | Australia | Breast | 13 follow-up schedules | Minimal follow-up | Costing study | Retrospective data audit used to establish an empirical model | NA | Not reported (health system) | Costs for visits and tests | 70 months | Cost of follow-up per detection of salvageable event per patient | Not conducted |
| 9 Kokko et al., (2005)    | Finland | Breast | Routine follow-up | Unclear | Costing study | Randomized controlled trial | No | The hospital perspective | Costs for visits and tests | 4 years | Cost per detected recurrence | Not conducted |
| Author (Publication Year) | Setting | Type of Cancer | Intervention | Comparator | EE Type | Study Design | Discount Rate | Perspective | Costs Included | Time Horizon | Outcome Measures | Sensitivity Analysis |
|---------------------------|---------|----------------|--------------|------------|---------|--------------|---------------|-------------|----------------|--------------|-----------------|---------------------|
| Robertson et al., (2011)  | UK      | Breast         | Mammography  | No surveillance | CUA     | Markov modeling | Costs and benefits 3.5% | The UK NHS | Costs incurred by the NHS | Lifetime | Δcost/ΔQALY | Detection rate of small tumors (2 cm or smaller) and associated costs for each strategy Not conducted |
| Lu et al., (2012)         | The Netherlands | Breast | 3 alternate strategies | Guideline follow-up | CEA     | An extended and validated simulation model | NA | Not reported (health system) | Costs for follow-up tests Percentage of small tumors identified by tests | Lifetime | Cost per QALY gained; Δcost/ΔQALY | Not conducted |
| Bessen et al., (2015)     | Australia | Breast | Intensive follow-up | Simplified follow-up | CUA     | Retrospective data audit and discrete event simulation model | NA | Not reported (health system) | Costs for tests | 5 years | Potential savings of follow-up | Predefined follow-up sensitivity analysis |
| Draeger et al., (2020)    | The Netherlands | Breast | Unclear | Unclear | CEA     | Quasi-experimental pre/post study | NA | Not reported (health system) | Costs for diagnostic procedures, clinical follow-up visits | 5 years | Costs per detected metastasis and cost per QALY gained Not conducted |
| Hengge et al., (2007)     | Germany | Melanoma | Intensive follow-up | Guideline follow-up | CUA     | Markov model | NA | Not reported (health system) | Costs for each technical follow-up investigation | 5 years | Costs for the detection of one recurrence Not conducted |
| Leiter et al., (2009)     | Germany | Melanoma | Technical | None | CEA     | Retrospective data audit | NA | Not reported (health system) | Cost for each technical follow-up investigation | 5 years | Not conducted |
| Podlipnik et al., (2019)  | Spain   | Malignant melanoma | CT | Contrast brain MRI | CEA     | Decision tree | Not applied | Healthcare system | Costs for visits and tests | 5 years | Cost-effectiveness ratio per patient | OW, SA |
| Forni et al., (2007)      | Italy   | Cervical | Simplified follow-up | Usual follow-up | CEA     | Retrospective data audit | NA | Not reported (health system) | The costs of the examination carried out | 5 years | Not conducted |
| Author (Publication Year) | Setting          | Type of Cancer               | Intervention                          | Comparator                | EE Type  | Study Design                  | Discount Rate | Perspective                  | Costs Included                      | Time Horizon Study Period | Outcome Measures                                                                 | Sensitivity Analysis |
|--------------------------|------------------|-----------------------------|---------------------------------------|---------------------------|----------|------------------------------|---------------|------------------------------|-----------------------------------|-------------------------|-----------------------------------------------------------------------------------|----------------------|
| Baena-Cañada et al., (2013) | UK               | Cervical                    | Primary care follow-up                | Specialist-led follow-up  | CMA      | Retrospective data audit     | NA            | Not reported (health system)  | Costs for visits and complementary tests | 5 years                 | Cost of the follow-up, events, HRQL and satisfaction                              | OW, SA, PSA          |
| Auguste et al., (2014)    | UK               | Cervical                    | MRI with or without CT                | Clinical follow-up        | CUA      | Markov model                 | Costs 3.5%    | Healthcare system             | Costs for tests                  | 5 years                 | Δcost/ΔQALY                                                                        | OW, SA, PSA          |
| Shah et al., (2015)       | Australia        | Head, neck + nasopharyngeal | PET-CT scan                          | No PET-CT scan            | CEA      | Quasi-experimental pre/post study | Costs 5%      | Hospital perspective         | Direct costs                     | 5 years                 | The proportion of radically treatable recurrences                                | Not conducted        |
| Meregaglia et al., (2018) | Italy and Switzerland | Head and neck               | Intensive follow-up                  | Symptom-driven surveillance | CUA      | Markov model                 | Costs and benefits 3% | Healthcare system             | Costs for hospital admissions, specialist visits, radiological exams, laboratory tests and outpatient treatment | Lifetime               | Δcost/ΔQALY, Δcost/ΔLYG                                                           | OW, TW, PSA          |
| Dryver et al., (2003)     | Canada           | Hodgkin’s disease           | CXR, CT, blood count                 | None                      | Costing study | Retrospective data audit | NA            | Not reported (health system)  | Costs for visits and tests          | 1–120 months | the cost per true relapse                                                       | Not conducted        |
| Guadagnolo et al., (2006) | USA              | Hodgkin’s disease           | Routine annual CT                    | Non-CT modalities         | CUA      | Markov model                 | Costs and benefits 3% | Modified societal perspective | Visits and blood tests             | Lifetime                 | Δcost/ΔQALY, Δcost/ΔLY                                                              | SA, OW               |
| Clasen et al., (2009)     | Germany          | Seminoma                    | Technical                             | None                      | Costing study | Retrospective data audit | NA            | Not reported (health system)  | Cost for each technical follow-up investigation | 10 years                | Cost per relapse detected                                                       | Not conducted        |
| Charytonowicz et al., (2019) | USA             | TGCT                        | mRNA testing                         | CT-based follow-up        | Costing study | Markov model                 | Costs and benefits 5% | Healthcare system             | Costs for visits and tests          | 10 years                | The sensitivity of each tests The cost of follow-up care The cost per relapse detected by a surgeon or FP and 5 years survival rate | OW                   |
| Gilbert et al., (2000)    | Canada           | Lung                        | Specialist outpatient                | Non-specialist follow-up | CEA      | Retrospective data audit     | NA            | Not reported (health system)  | Personnel, infrastructure and test costs | 1 to 107 months | Not conducted                                                                    | Not conducted        |
Table A5. Cont.

| Author (Publication Year) | Setting       | Type of Cancer | Intervention                   | Comparator      | EE Type | Study Design             | Discount Rate | Perspective | Costs Included                  | Time Horizon       | Outcome Measures                          | Sensitivity Analysis |
|----------------------------|---------------|----------------|--------------------------------|-----------------|---------|--------------------------|---------------|-------------|-----------------------------------|---------------------|--------------------------------------------|----------------------|
| 27 Dion et al., (2010)     | Canada        | Renal          | Clinical guidelines            | Usual follow-up | CEA     | Retrospective data audit | NA            | Not reported (health system)     | Costs for visits and tests | 5 years                  | The total cost of follow-up per patient and per patient month | Not conducted         |
| 28 C. R. Rettenmaier et al., (2010) N. | USA           | Uterine        | Imaging                       | None            | CEA     | Retrospective data audit | NA            | Not reported (health system)     | Costs for tests and visits  | 20 years                  | The cost per patient recurrence          | Not conducted         |
| 29 Rettenmaier et al., (2010) | USA           | Ovarian and primary peritoneal | Imaging                       | None            | CEA     | Retrospective data audit | NA            | Not reported (health system)     | Costs for tests and visits  | 16 years                  | The cost per patient recurrence          | Not conducted         |
| 30 Imran et al., (2019)    | Canada        | Thyroid        | Primary care follow-up         | Tertiary care follow-up | CEA     | Retrospective data audit | NA            | Not reported                     | Costs for visits and tests | 62 months                  | The average cost of follow-up per survivor | Not conducted         |
| 31 Dansk et al., (2016)    | Sweden        | Bladder        | Flexible cystoscopy with WLFC and BLFC | Flexible cystoscopy with WLFC only | CCA     | Mixed: decision tree and Markov model | Costs 3% | Hospital and other purchaser perspectives | Costs for visits and tests | 5 years                  | Detection rate, hospital bed days and number of procedures | SA                  |
| 32 Pearce et al., (2016)   | Ireland       | Prostate       | Guideline follow-up            | Current guideline | CMA     | Markov model          | Costs 5%      | Healthcare payer                 | Costs for visits          | 10 years                 | The average cost of follow-up per survivor | OW, PSA             |
| 33 Gao et al., (2017)      | Australia     | Hem. malignancy | 12-month intervention         | None            | CEA     | Markov model          | Costs and benefits 3% | Health sector perspective | Lifetime              | ∆cost/∆QALY health-adjusted life years (HALYs) gained | OW, SA               |
| 34 Ehrhardt et al., (2020) | USA           | Childhood cancer | 1-, 2-, 3-, 5- and 10-year interval screening | No screening | CUA     | Microsimulation       | Costs and benefits 3% | Not reported (societal perspective) | Lifetime              | ∆cost/∆QALY lifetime | OW, TW                          |                     |

CUA—cost–utility analysis; CEA—cost-effectiveness analysis; CCA—cost–consequence analysis; CMA—cost minimization analysis; OW—one-way; PSA—probabilistic sensitivity analysis; SA—scenario analysis; TA—threshold analysis; MW—multi-way; QALY—quality-adjusted life year; HALY—health-adjusted life year; LYG—life-year gained.
### Appendix D

Table A6. CHEERS checklist—items to include when reporting economic evaluation of health interventions.

| Number of ITEM | Description of ITEM                                                                 | Summary of Criterion                          |
|----------------|--------------------------------------------------------------------------------------|-----------------------------------------------|
| Item 1         | Identify the study as an economic evaluation or use more specific terms such as “cost-effectiveness analysis”, and describe the interventions compared. | Title identifies an economic evaluation       |
| Item 2         | Provide a structured summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses) and conclusions. | Structured summary was presented in abstract   |
| Item 3         | Present the study question and its relevance for health policy or practice decisions. | Background and objectives were provided        |
| Item 4         | Describe characteristics of the base case population and subgroups analyzed, including why they were chosen. | Target population and subgroups were reported  |
| Item 5         | State relevant aspects of the system(s) in which the decision(s) need(s) to be made.  | Setting and location were reported             |
| Item 6         | Describe the perspective of the study and relate this to the costs being evaluated.  | Study perspective was reported                 |
| Item 7         | Describe the interventions or strategies being compared and state why they were chosen. | Comparator(s) was/were reported               |
| Item 8         | State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate. | Time horizon was reported                      |
| Item 9         | Report the choice of discount rate(s) used for costs and outcomes and say why appropriate. | Discount rate was used                         |
| Item 10        | Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed. | Choice of health outcomes was reported        |
| a. Single study-based estimates: Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data. | a. Measurement of effectiveness (single study-based) |
| b. Synthesis-based estimates: Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data. | b. Measurement of effectiveness (synthesis-based) was reported |
| Item 11        | If applicable, describe the population and methods used to elicit preferences for outcomes. | Measurement and valuation of preference-based outcomes |
| a. Single study-based economic evaluation: Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs. | a. Estimating resources and costs—single study-based |
| b. Model-based economic evaluation: Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs. Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate. | b. Estimating resources and costs—model-based |
| Item 12        | If applicable, describe the population and methods used to elicit preferences for outcomes. | Currency, price date and conversion were reported |
| Item 13        | If applicable, describe the population and methods used to elicit preferences for outcomes. | Choice of model was reported                  |
| Item 14        | If applicable, describe the population and methods used to elicit preferences for outcomes. | Choice of model was reported                  |
| Item 15        | If applicable, describe the population and methods used to elicit preferences for outcomes. | Choice of model was reported                  |
| Number of ITEM | Description of ITEM | Summary of Criterion |
|----------------|---------------------|----------------------|
| Item 16        | Describe all structural or other assumptions underpinning the decision-analytical model. Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty. Report the values, ranges, references and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended. For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios. a. Single study-based economic evaluation: Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact of methodological assumptions (such as discount rate, study perspective). b. Model-based economic evaluation: Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions. If applicable, report differences in costs, outcomes, or cost-effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information. Summarize key study findings and describe how they support the conclusions reached. Discuss limitations and the generalizability of the findings and how the findings fit with current knowledge. Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other nonmonetary sources of support. Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations. | Assumptions were described Analytic methods were described Study parameters were reported Incremental cost and outcomes were reported a. Characterizing uncertainty (single study-based) b. Characterizing uncertainty (model-based) was reported Characterizing heterogeneity was reported Study findings, limitations, generalizability and current knowledge were mentioned Source of funding was mentioned Conflicts of interest were presented |

The reporting quality of the selected papers was assessed using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS), consisting of a 24-item checklist with accompanying recommendations to ensure consistent and transparent reporting in economic evaluations [16].
### Table A7. Quality of reporting assessment using the CHEERS criteria.

| Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Summary of criterion | | | | | | | | | | | | | | | | | | | | |
| Compliance with the CHEERS checklist | | | | | | | | | | | | | | | | | | | | |
| Title identifies an economic evaluation | | | | | | | | | | | | | | | | | | | | |
| Structured summary was presented in abstract | | | | | | | | | | | | | | | | | | | | |
| Background and objectives were provided | | | | | | | | | | | | | | | | | | | | |
| Target population and subgroups were reported | | | | | | | | | | | | | | | | | | | | |
| Setting and location were reported | | | | | | | | | | | | | | | | | | | | |
| Study perspective was reported | | | | | | | | | | | | | | | | | | | | |
| Comparator(s) was/were reported | | | | | | | | | | | | | | | | | | | | |
| Time horizon was reported | | | | | | | | | | | | | | | | | | | | |
| Discount rate was used | | | | | | | | | | | | | | | | | | | | |
| Choice of health outcomes was reported | | | | | | | | | | | | | | | | | | | | |
| a. Measurement of effectiveness (single study-based) | | | | | | | | | | | | | | | | | | | | |
| b. Measurement of effectiveness (synthesis-based) was reported | | | | | | | | | | | | | | | | | | | | |
| Measurement and valuation of preference-based outcomes | | | | | | | | | | | | | | | | | | | | |
| a. Estimating resources and costs (single study-based) | | | | | | | | | | | | | | | | | | | | |
| b. Estimating resources and costs (model-based) | | | | | | | | | | | | | | | | | | | | |
| Currency, price date and conversion were reported | | | | | | | | | | | | | | | | | | | | |
| Choice of model was reported | | | | | | | | | | | | | | | | | | | | |
| Assumptions were described | | | | | | | | | | | | | | | | | | | | |
| Analytic methods were described | | | | | | | | | | | | | | | | | | | | |
| Study parameters were reported | | | | | | | | | | | | | | | | | | | | |
| Incremental cost and outcomes were reported | | | | | | | | | | | | | | | | | | | | |
| a. Characterizing uncertainty (single study-based) | | | | | | | | | | | | | | | | | | | | |
| b. Characterizing uncertainty (model based) was reported | | | | | | | | | | | | | | | | | | | | |
| Characterizing heterogeneity was reported | | | | | | | | | | | | | | | | | | | | |
| Study findings, limitations, generalizability and current knowledge were mentioned | | | | | | | | | | | | | | | | | | | | |
| Source of funding was mentioned | | | | | | | | | | | | | | | | | | | | |
| No conflicts of interest were presented | | | | | | | | | | | | | | | | | | | | |
| Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item |
| 4    | Renehan et al., (2004) | 83%  | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 0.5<sup>c</sup> | 1    | 0.5<sup>a</sup> | NA  | 1    | 1    | 1    | 1    | 0    | 1    | 0    | 0    | 1    | 1    | 1    | 1    |
| 5    | Macafee et al., (2008) | 63%  | 1    | 0.5<sup>b</sup> | 1    | 1    | 1    | 1    | 1    | 0.5<sup>c</sup> | 0.5<sup>c</sup> | 1    | 0.5<sup>a</sup> | NA  | 1    | 1    | 0    | 1    | 0    | 0    | 0    | 0    | 1    | 1    | 0    | 1    |
| 6    | Di Cristofaro et al., (2012) | 60%  | 1    | 0.5<sup>b</sup> | 1    | 1    | 1    | 0    | 0    | 0    | 0.5<sup>c</sup> | NA  | 1    | 0.5<sup>e</sup> | NA  | 1    | NA  | NA  | NA  | NA  | NA  | 0    | 1    | 0    | 1    | 0.5<sup>i</sup> | 0    | 0    |
| 7    | Mant et al., (2017) | 85%  | 1    | 0.5<sup>b</sup> | 1    | 1    | 1    | 1    | 1    | 0.5<sup>c</sup> | 1    | 0.5<sup>a</sup> | 1    | 1    | 0.5<sup>f</sup> | 1    | 1    | 1    | 1    | 0.5<sup>h</sup> | 0    | 1    | 1    | 1    |
|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|      | Breast cancer |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 8    | Grogan et al., (2002) | 46%  | 0.5<sup>a</sup> | 0.5<sup>b</sup> | 1    | 1    | 1    | 0    | 1    | 0.5<sup>c</sup> | 0    | 1    | 0.5<sup>e</sup> | NA  | 1    | 1    | 0.5<sup>f</sup> | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.5<sup>i</sup> | 1    | 0    |
| 9    | Kokko et al., (2005) | 60%  | 0.5<sup>a</sup> | 0.5<sup>b</sup> | 1    | 1    | 1    | 1    | 1    | 0.5<sup>c</sup> | NA  | 1    | 0.5<sup>e</sup> | NA  | 1    | NA  | NA  | NA  | NA  | 0    | 0    | 0    | 0    | 0    | 1    | 1    | 0    |
| 10   | Robertson et al., (2011) | 92%  | 1    | 0.5<sup>b</sup> | 1    | 1    | 1    | 1    | 1    | 0.5<sup>c</sup> | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 0    | 1    | 1    | 1    | 1    |
| 11   | Lu et al., (2012) | 65%  | 1    | 0.5<sup>b</sup> | 1    | 1    | 1    | 0    | 1    | 0    | 1    | 0.5<sup>e</sup> | NA  | 1    | 1    | 1    | 0    | 0.5<sup>k</sup> | 1    | 0    | 1    | 0    | 1    | 0    |
| 12   | Bessen et al., (2015) | 71%  | 1    | 0.5<sup>b</sup> | 1    | 1    | 1    | 0    | 1    | 0.5<sup>c</sup> | 0    | 1    | 0.5<sup>e</sup> | NA  | 1    | 1    | 1    | 1    | 1    | 0    | 1    | 1    | 1    |
| 13   | Draeger et al., (2020) | 68%  | 0.5<sup>a</sup> | 0.5<sup>b</sup> | 1    | 1    | 1    | 0    | 1    | 1    | NA  | 1    | 0.5<sup>e</sup> | NA  | 1    | 1    | NA  | NA  | NA  | 0    | 1    | 0    | 0    | 1    | 1    | 1    |
| 14   | Hengge et al., (2007) | 52%  | 1    | 0.5<sup>b</sup> | 1    | 1    | 1    | 0    | 1    | 0.5<sup>c</sup> | 0    | 1    | 0.5<sup>e</sup> | NA  | 1    | 1    | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 0    | 0    | 1    |
| Item | Item 1 | Item 2 | Item 3 | Item 4 | Item 5 | Item 6 | Item 7 | Item 8 | Item 9 | Item 10 | Item 11 | Item 12 | Item 13 | Item 14 | Item 15 | Item 16 | Item 17 | Item 18 | Item 19 | Item 20 | Item 21 | Item 22 | Item 23 | Item 24 |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 15   | Leiter et al., (2009) | 58% | 0.5 \(^a\) | 0.5 \(^b\) | 1 | 1 | 1 | 1 | 0 | 0 | 1 | NA | 1 | 0.5 \(^e\) | NA | 1 | 1 | NA | NA | NA | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 16   | Podlipnik et al., (2019) | 71% | 1 | 0.5 \(^b\) | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 \(^c\) | 0.5 \(^d\) | 1 | 0.5 \(^e\) | NA | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| 17   | Forni et al., (2007) | 53% | 1 | 0.5 \(^b\) | 1 | 1 | 1 | 0 | 1 | 0.5 \(^c\) | NA | 1 | 0.5 \(^e\) | NA | 1 | 1 | NA | NA | NA | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 18   | Baena-Cañada et al., (2013) | 60% | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0.5 \(^c\) | NA | 1 | 0.5 \(^e\) | 1 | 1 | 1 | NA | NA | NA | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 19   | Auguste et al., (2014) | 94% | 1 | 0.5 \(^b\) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 20   | Shah et al., (2015) | 66% | 0.5 \(^a\) | 0.5 \(^b\) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 \(^e\) | NA | 1 | 1 | NA | 1 | NA | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 21   | Meregaglia et al., (2018) | 90% | 1 | 0.5 \(^b\) | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 \(^c\) | 0.5 \(^c\) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 22   | Dryver et al., (2003) | 48% | 0.5 \(^a\) | 0.5 \(^b\) | 1 | 1 | 1 | 0 | 0 | 1 | NA | 1 | 0.5 \(^e\) | NA | 1 | 1 | NA | NA | NA | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 23   | Guadagnolo et al., (2006) | 88% | 1 | 0.5 \(^b\) | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 \(^c\) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 24   | Clasen et al., (2009) | 48% | 0.5 \(^a\) | 0 | 1 | 1 | 1 | 0 | 0 | 0.5 \(^c\) | NA | 1 | 0.5 \(^e\) | NA | 1 | 1 | NA | NA | NA | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item | Item |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 25   | Charytonowicz et al., (2019) | 79%  | 1    | 0.5  | b  | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 0.5  | e  | NA   | 1    | 1    | 1    | 1    | 1    | 0    | 0    | 1    | 1    | 1    |
| 26   | Gilbert et al., (2000)       | 48%  | 0    | 0.5  | b  | 1    | 1    | 1    | 0    | 1    | 0    | 1    | 0.5  | c  | NA   | 1    | 0.5  | e  | NA   | 1    | 1    | NA   | NA   | NA   | 0    | 0    | 0    | 1    | 0    | 0    |
| 27   | Dion et al., (2010)          | 63%  | 1    | 0.5  | b  | 1    | 1    | 1    | 0    | 1    | 0.5  | c  | NA   | 1    | 0.5  | e  | NA   | 1    | 1    | NA   | NA   | NA   | 0    | 0    | 0    | 1    | 1    | 0    | 1    |
| 28   | C. R. Rettenmaier et al., (2010) | 45%  | 0.5  | a  | 0.5  | b  | 1    | 1    | 1    | 0    | 0    | 0    | 0.5  | c  | NA   | 1    | 0.5  | e  | NA   | 1    | 1    | NA   | NA   | NA   | 0    | 0    | 0    | 0    | 1    | 0    | 0    |
| 29   | N. Rettenmaier et al., (2010) | 50%  | 0.5  | a  | 0.5  | b  | 1    | 1    | 1    | 0    | 0    | 0    | 0.5  | c  | NA   | 1    | 0.5  | e  | NA   | 1    | 1    | NA   | NA   | NA   | 0    | 0    | 0    | 0    | 1    | 1    | 0    |
| 30   | Imran et al., (2019)         | 55%  | 0.5  | a  | 0.5  | b  | 1    | 1    | 1    | 0    | 1    | 0.5  | c  | NA   | 1    | 0.5  | e  | NA   | 1    | 1    | NA   | NA   | NA   | 0    | 0    | 0    | 0    | 1    | 1    | 0    |
| 31   | Dansk et al., (2016)         | 90%  | 1    | 0.5  | b  | 1    | 1    | 1    | 1    | 1    | 1    | 0.5  | c  | 1    | 0.5  | e  | NA   | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| 32   | Pearce et al., (2016)        | 98%  | 1    | 0.5  | b  | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| 33   | Gao et al., (2017)           | 94%  | 1    | 0.5  | b  | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 0.5  | c  | 0.5  | e  | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| 34   | Elhardt et al., (2020)       | 90%  | 1    | 0.5  | b  | 1    | 1    | 1    | 0    | 1    | 1    | 1    | 1    | 1    | 1    | 0.5  | c  | 0.5  | e  | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |

**NOTE:** 1: criterion met; 0.5: criterion partially met; 0: criterion not met; NA: criterion not applicable; due to their nature, not all CHEERS items were relevant to all studies. a Did not identify the study as an economic evaluation or use more specific terms. b Did not provide a perspective or inputs or uncertainty intervals in abstract. c Did not state why appropriate/why they were chosen. d Did not apply discount rate but explained reason. e Did not state why the single study was a sufficient source of clinical effectiveness data. f Did not give reasons for the specific type of decision analytical model used and did not show the model structure. g Assumption was not described. h Non-parametric bootstrapping was used. i Did not discuss limitations.
27. Kokko, R.; Hakama, M.; Holli, K. Follow-up cost of breast cancer patients with localized disease after primary treatment: A randomized trial. *Breast Cancer Res. Treat.* 2005, 93, 255–260. [CrossRef]
28. Robertson, C.; Arcot Ragupathy, S.K.; Boachie, C.; Dixon, J.M.; Fraser, C.; Hernández, R.; Heys, S.; Jack, W.; Kerr, G.R.; Lawrence, G.; et al. The clinical effectiveness and cost-effectiveness of different surveillance mammography regimens after the treatment for pri-mary breast cancer: Systematic reviews registry database analyses and economic evaluation. *Health Technol. Assess.* 2011, 15, 1–322. [CrossRef]
29. Lu, W.; Greuter, M.J.; Schaapveld, M.; Vermueken, K.M.; Wiggers, T.; de Bock, G.H. Safety and cost-effectiveness of shortening hospital follow-up after breast cancer treatment. *Br. J. Surg.* 2012, 99, 1227–1233. [CrossRef]
30. Hengghe, U.R.; Wallerand, A.; Stutzki, A.; Kockel, N. Cost-effectiveness of reduced follow-up in malignant melanoma. *J. Dtsch. Derm. Ges.* 2007, 5, 898–907. [CrossRef]
31. Leiter, U.; Marghoo, A.A.; Lasithiotakis, K.; Eigentler, T.K.; Meier, F.; Meisner, C.; Garbe, C. Costs of the detection of metastases and follow-up examinations in cutaneous melanoma. *Melanoma Res.* 2009, 19, 50–57. [CrossRef]
32. Podlipnik, S.; Moreno-Ramirez, D.; Carrera, C.; Barreiro, A.; Manubens, E.; Ferrandiz-Pulido, L.; Sánchez, M.; Vidal-Sicart, S.; Malvéhy, J.; Puig, S. Cost-effectiveness analysis of imaging strategy for an intensive follow-up of patients with American Joint Committee on Cancer stage IB, IIC and III malignant melanoma. *Br. J. Derm.* 2019, 180, 1190–1197. [CrossRef]
33. Forni, F.; Ferrandina, G.; Deodato, F.; Macchia, G.; Morganti, A.G.; Smaniotto, D.; Luzi, S.; D’Agostino, G.; Valenti, V.; Cellini, N. Squamous cell carcinoma antigen in follow-up of cervical cancer treated with radiotherapy: Evaluation of cost-effectiveness. *Int. J. Radiat Oncol. Biol. Phys.* 2007, 69, 1145–1149. [CrossRef]
34. Baena-Canada, J.M.; Ramirez-Daffös, P.; Cortés-Carmona, C.; Rosado-Varela, P.; Nieto-Vera, J.; Benítez-Rodríguez, E. Follow-up of long-term survivors of breast cancer in primary care versus specialist attention. *Fam Pr.* 2013, 30, 525–532. [CrossRef]
35. Auguste, P.; Barton, P.; Meads, C.; Davenport, C.; Malysiak, S.; Kowalska, A.; Guest, P.; Martin-Hirsch, P.; Borowiack, E.; et al. Evaluating PET-CT in routine surveillance and follow-up after treatment for cervical cancer: A cost-effectiveness analysis. *BJOG* 2014, 121, 464–476. [CrossRef]
36. Meads, C.; Davenport, C.; Malysiak, S.; Kowalska, A.; Guest, P.; Martin-Hirsch, P.; Borowiack, E.; Auguste, P.; Barton, P. Evaluating PET-CT in the detection and management of recurrent cervical cancer: Systematic reviews of diagnostic accuracy and subjective elicitation. *Int. J. Gynaecol. Obst.* 2014, 121, 398–407. [CrossRef]
37. Shah, K.; Te Marvelde, L.; Collins, M.; De Abreu Lourenco, R.; D’Costa, I.; Coleman, A.; Fuá, T.; Liu, C.; Rischin, D.; Lau, E.; et al. Safety and cost analysis of an (18)FDG-PET-CT response based follow-up strategy for head and neck cancers treated with primary radiation or chemoradiation. *Oral Oncol.* 2015, 51, 529–535. [CrossRef]
38. Mereaglia, M.; Cairns, J.; Licitira, L.; Bossi, P. The use of intensive radiological assessments in routine surveillance after treatment for head and neck cancer: An economic evaluation. *Eur. J. Cancer* 2018, 93, 89–98. [CrossRef]
39. Dryver, E.T.; Jernström, H.; Tompkins, K.; Buckstein, R.; Imrie, K.R. Follow-up of patients with Hodgkin’s disease following curative treatment: The routine CT scan is of little value. *Br. J. Cancer* 2003, 89, 482–486. [CrossRef]
40. Guadagnolo, B.A.; Punglia, R.S.; Kuntz, K.M.; Mauch, P.M.; Ng, A.K. Cost-effectiveness analysis of computerized tomography in the routine follow-up of patients after primary treatment for Hodgkin’s disease. *J. Clin. Oncol.* 2006, 24, 4116–4122. [CrossRef] [PubMed]
41. Clasen, J.; Schmidberger, H.; Souchon, R.; Weissbach, L.; Hartmann, M.; Hartmann, J.T.; Hehr, T.; Bamberg, M. What is the value of routine follow-up in stage I seminoma after paraaortic radiotherapy? An analysis of the German Testicular Cancer Study Group (GTCSG) in 675 prospectively followed patients. *Strahlenther. Onkol.* 2009, 185, 349–354. [CrossRef] [PubMed]
42. Charytonowicz, D.; Aubrey, H.; Bell, C.; Ferret, M.; Tsui, K.; Atfield, R.; Coleman, N.; Murray, M.J.; Wilson, E.C.F. Cost Analysis of Noninvasive Blood-Based MicroRNA Testing Versus CT Scans for Follow-up in Patients With Testicular Germ-Cell Tumors. *Clin. Genitourin. Cancer* 2019, 17, e733–e744. [CrossRef] [PubMed]
43. Gilbert, S.; Reid, K.R.; Lam, M.Y.; Petsikas, D. Who should follow up lung cancer patients after operation? *Ann. Thorac. Surg.* 2000, 69, 1696–1700. [PubMed]
44. Dion, M.; Martinez, C.H.; Williams, A.K.; Chalasani, V.; Nott, L.; Pautler, S.E. Cost analysis of two follow-up strategies for localized kidney cancer: A Canadian cohort comparison. *Can. Urol. Assoc. J.* 2010, 4, 322. [CrossRef]
45. Rettenmaier, C.R.; Rettenmaier, N.B.; Wojciechowski, T.; Abaid, L.N.; Brown, J.V.; III; Michi, J.P.; Goldstein, B.H. The utility of routine follow-up procedures in the surveillance of uterine cancer: A 20-year institutional review. *Oncology* 2010, 79, 262–268. [CrossRef] [PubMed]
46. Rettenmaier, N.; Rettenmaier, C.; Wojciechowski, T.; Abaid, L.; Brown, J.; III; Michi, J.; Goldstein, B. The utility and cost of routine follow-up procedures in the surveillance of ovarian and primary peritoneal carcinoma: A 16-year institutional review. *Br. J. Cancer* 2010, 103, 1657–1662. [CrossRef] [PubMed]
47. Imran, S.A.; Chu, K.; Rajaraman, M.; Rajaraman, D.; Ghosh, S.; De Brabandere, S.; Kaiser, S.M.; Van Uum, S. Primary versus Tertiary Care Follow-Up of Low-Risk Differentiated Thyroid Cancer: Real-World Comparison of Outcomes and Costs for Patients and Health Care Systems. *Eur. Thyroid. J.* 2019, 8, 208–214. [CrossRef] [PubMed]
48. Dansk, V.; Malmström, P.U.; Bläckberg, M.; Malmenäs, M. Hexaminolevulinate hydrochloride blue-light flexible cystoscopy in the detection and follow-up of nonmuscle-invasive bladder cancer: Cost consequences during outpatient surveillance in Sweden. *Future Oncol.* 2016, 12, 1025–1038. [CrossRef] [PubMed]
71. Kent, M.S.; Korn, P.; Port, J.L.; Lee, P.C.; Altorki, N.K.; Korst, R.J. Cost effectiveness of chest computed tomography after lung cancer resection: A decision analysis model. *Ann. Thorac. Surg.* 2005, 80, 1215–1222, discussion 1222-3. [CrossRef]

72. Lizée, T.; Basch, E.; Trémolières, P.; Voog, E.; Domont, J.; Peyraga, G.; Urban, T.; Bennouna, J.; Septans, A.L.; Balavoine, M.; et al. Cost-Effectiveness of Web-Based Patient-Reported Outcome Surveillance in Patients With Lung Cancer. *J. Thorac. Oncol.* 2019, 14, 1012–1020. [CrossRef]

73. Moore, S.; Corner, J.; Haviland, J.; Wells, M.; Salmon, E.; Normand, C.; Brada, M.; O’Brien, M.; Smith, I. Nurse led follow up and conventional medical follow up in management of patients with lung cancer: Randomised trial. *BMJ* 2002, 325, 1145. [CrossRef][PubMed]

74. Nam, R.K.; Redelmeier, D.A.; Spiess, P.E.; Sampson, H.A.; Fradet, Y.; Jewett, M.A. Comparison of molecular and conventional strategies for followup of superficial bladder cancer using decision analysis. *J. Urol.* 2000, 163, 752–757. [CrossRef]

75. Polinder, S.; Verschuur, E.M.L.; Siersema, P.D.; Kuipers, E.J.; Steyerberg, E.W. Cost comparison study of two different follow-up protocols after surgery for oesophageal cancer. *Eur. J. Cancer* 2009, 45, 2110–2115. [CrossRef]

76. Pollack, C.E.; Frick, K.D.; Herbert, R.J.; Blackford, A.L.; Neville, B.A.; Wolff, A.C.; Carducci, M.A.; Earle, C.C.; Snyder, C.F. It’s who you know: Patient-sharing, quality, and costs of cancer survivorship care. *J. Cancer Surviv.* 2014, 8, 156–166. [CrossRef][PubMed]

77. Shih, S.T.F.; Butow, P.; Bowe, S.J.; Thewes, B.; Turner, J.; Gilchrist, J.; Mihalopoulos, C. Cost-effectiveness of an intervention to reduce fear of cancer recurrence: The Conquerfear randomized controlled trial. *Psycho-Oncol.* 2019, 28, 1071–1079. [CrossRef]

78. van der Spek, N.; Jansen, F.; Holtmaat, K.; Vos, J.; Breitbart, W.; van den Berg, M.; van Uden-Kraan, C.F.; Tollenaar, R.A.E.M.; Cuijpers, P.; Coupé, V.M.H; Verdonck-de Leeuw, I.M. Cost-utility analysis of meaning-centered group psychotherapy for cancer survivors. *Psycho-Oncol.* 2018, 27, 1772–1779. [CrossRef]

79. van Dongen, J.M.; Persoon, S.; Jongeneel, G.; Bosmans, J.E.; Kersten, M.J.; Brug, J.; Nollet, F.; Chinapaw, M.J.M.; Buffart, L.M. Long-term effectiveness and cost-effectiveness of an 18-week supervised exercise program in patients treated with autologous stem cell transplantation: Results from the EXIST study. *J. Cancer Surviv.* 2019, 13, 558–569. [CrossRef]

80. van Loon, J.; Grutters, J.P.; Wanders, R.; Boersma, L.; Dingemans, A.M.; Bootsma, G.; Geraedts, W.; Pitz, C.; Simons, J.; Brans, B.; et al. 18FDG-PET-CT in the follow-up of non-small cell lung cancer patients after radical radiotherapy with or without chemotherapy: An economic evaluation. *Eur. J. Cancer* 2010, 46, 110–119. [CrossRef]