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Psychometric properties of self-reported financial toxicity measures in cancer survivors: a systematic review protocol using COSMIN methodology

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ABSTRACT

Introduction Due to the higher costs associated with advancements in cancer treatment and longer duration of cancer survivorship, increasing financial toxicity has become a great threat to survivors, caregivers and public healthcare systems. Since accurate and reproducible measures are prerequisites for robust results, choosing an acceptable measure with strong psychometric properties to assess financial toxicity is essential. However, a description of the psychometric properties of existing measures is still lacking. The aim of this study is to apply COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) methodology to systematically review the content and structural validity of patient-reported outcome measures (PROMs) of financial toxicity for cancer survivors.

Methods and analysis PubMed/Medline, Medline (Ovid), Embase (Ovid), CINAHL (EBSCO), Web of Science, ProQuest Dissertations and Theses, and Cochrane Library (Wiley) will be comprehensively searched from database inception to 15 November 2019. Studies that report the measurement properties of PROMs assessing financial toxicity for cancer survivors will be included. The evaluation of measurement properties, data extraction and data synthesis will be conducted according to the COSMIN methodology.

Ethics and dissemination No individual data are involved in this systematic review. The results will be disseminated to a clinical audience and policy-makers though peer-reviewed journals and conferences and will support researchers in choosing the best measure to evaluate the financial toxicity of cancer survivors.

Strengths and limitations of this study

- This is the first systematic review that will identify generic and cancer-specific patient-reported outcome measures (PROMs) to assess financial toxicity for cancer survivors and provide a comprehensive picture of their measurement properties.
- A robust three-step search of published studies will be undertaken to capture a large range of papers.
- COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) approach will be followed to comprehensively report psychometric properties from multiple validation studies.
- The COSMIN approach will allow healthcare professionals and policy-makers to choose a validated PROM based on its psychometric properties.
- This systematic review will only include studies published in English which may bias the results against non-English speaking countries.

INTRODUCTION

Given the higher costs associated with advancements in cancer treatment and longer duration of cancer survivorship, the increasing financial burden is currently becoming a great threat to survivors, caregivers and public healthcare systems.[1 2] The total global spending on cancer care medicines increased from US$96 billion in 2013 to US$133 billion in 2017 at a compound annual growth rate of 6.5%, which is almost two times larger than the global Gross domestic product (GDP) growth rate.[3 4] Cancer treatment and survivorship are estimated to cost US$173 billion in 2020.[5] Notably, middle-income and low-income countries relying on out-of-pocket payments contribute to global disparities in healthcare spending and inequity in financial vulnerability for cancer survivors.[6 7]

The term 'financial toxicity' (FT) is defined as an economic side effect of cancer treatment.[2 8] It describes the financial burden experienced by cancer survivors with high out-of-pocket medical payments. 'Financial burden' and 'financial distress' are terms commonly used interchangeably with FT.[9 10] FT, first mentioned in 2011, gained traction as a significant impact of cancer treatment in the age of precision medicine.[11] FT covers both 'objective financial burden' and 'subjective financial distress'. The objective financial burden is directly due to the cost of cancer treatment which increases over

time. Subjective financial distress captures all negative emotions, uncomfortable experience and psychological stress of cancer survivors resulting from objective financial burden.[9 11]

A number of studies highlighted the prevalence of FT for cancer survivors in various contexts globally.[9 10 12–15] Azzani *et al* found that 14.8%–78.8% of cancer survivors experienced FT, especially in low-income populations.[12] Atlice's systematic review revealed that in the USA, the mean annual economic costs of cancer treatment ranged from US$380 to US$8236 and that 12%–62% of survivors were in debt.[14]

Azzani *et al*., Gordon *et al* and Altice *et al* reviewed the measures of FT and categorised them as monetary measures, objective measures and subjective measures.[9 12 14] The majority of current studies used monetary and objective indicators to describe cancer survivors' experience with FT. Previous studies suggested that FT should be measured using patient-reported outcomes to reflect cancer survivors' thoughts, complaints and opinions that any numbers or observers cannot.[10] The financial burden of cancer and its treatment needs to be understood within the context of the patient's personal experiences and circumstances. A few cancer-specific and generic PROMs are widely used to evaluate cancer survivors' FT. Among all measures, the COmprehensive Score for financial Toxicity (COST) was the most commonly used PROM and was developed and validated by de Souza *et al*.[16] The COST measure demonstrated high internal consistency (Cronbach's α=0.92) and high test–retest reliability (ICC=0.80 (0.57–0.92)). Other PROMs included the Breast Cancer Finances Survey Inventory,[17] Socioeconomic Wellbeing Scale[18] and InCharge Financial Distress/Financial Wellbeing Scale (InCharge).[19] Additionally, validated subscales, such as Social Difficulties Inventory Cancer Care Outcomes and the Research and Surveillance Consortium Patient survey, were also used to evaluate FT.[20 21] However, the development and validation of current PROMs varied significantly, and none of them are considered the gold standard.

In accordance with our definition of FT, Witte *et al* summarised methods for measuring subjective financial distress in cancer survivors.[10] However, they did not report the psychometric properties of PROMs, making it hard for researchers to choose one measure from the existing PROMs to assess FT. Since accurate and reproducible PROMs are a prerequisite for robust results, choosing an acceptable PROM with strong psychometric properties is essential.[22 23] However, a description of the psychometric properties of existing PROMs is still lacking.

Therefore, to obtain robust evidence and enable a better understanding of the psychometric properties of PROMs assessing FT for cancer survivors, our study adopted the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) approach to comprehensively report psychometric properties from multiple validation studies.[24] As a method for selecting PROMs both in research and in clinical practice, this approach is used for the first time to focus on the various psychometric properties of the validation studies rather than reporting the content of PROMs.

METHODS AND ANALYSIS

Aim and design

The aim of this study is to apply COSMIN methodology to systematically review the content and structural validity of PROMs measuring FT for cancer survivors.[24] This systematic review will be conducted according to the guidance of COSMIN and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement (PRISMA).[25]

Search strategy

The comprehensive search strategy will be developed in conjunction with a senior health research librarian. A comprehensive three-step search of published studies will be undertaken. The first step will involve a limited search via PubMed/Medline to capture keywords by analysing the text in the title and abstract and the index terms used to describe each paper. This will inform the development of a search strategy specific to each database, which will be the second step. Finally, references in all included studies will be manually reviewed to supplement the database search.

Papers will be collected from the following databases from inception to 1 March 2020: PubMed/Medline, Medline (Ovid), Embase (Ovid), CINAHL (EBSCO), PsycINFO (EBSCO), Web of Science, ProQuest Dissertations and Theses, and Cochrane Library (Wiley). In PubMed/Medline, we will search for papers in English using Medical Subject Headings (MeSH) terms ([cancer OR neoplasms] AND ["cancer survivors" OR patient OR survivors] AND "cost of illness") combined with (cancer OR [patient* OR survivor*] AND [cost OR bill* OR expense OR productivity loss OR "out-of-pocket" OR "economic burden" OR "financial toxicity" OR "financial hardship" OR "financial burden"] AND "COSMIN search filter"). A COSMIN search filter was developed instead of using keywords, such as questionnaire, survey and scale, to find studies on measurement properties. The search strategies are presented in online supplementary file 1. Finally, references in all included studies will be manually reviewed to supplement the database search.

Inclusion and exclusion criteria

The inclusion criteria are as follows: (1) studies that focus on individuals with any type of cancer who are still living[26]; (2) studies that aim to assess the FT (or financial hardship, financial distress or financial burden) of cancer survivors, which is related to the economic side effects of cancer treatment, by using PROMs; (3) studies that evaluate one or more measurement proprieties of a PROM, including but not limited to structural validity, internal consistency, reliability, measurement error, hypothesis testing for construct validity, cross-cultural validity/measurement invariance, criterion validity and

responsiveness; and (4) studies published in English. Original studies in any country or setting and with any sample size are eligible for inclusion. Studies that provide indirect evidence of the measurement properties (eg, using the PROM to compare with another instrument) are excluded.

Study screening and selection

All identified citations will be imported into EndNote V.X8 (Clarivate Analytics, Pennsylvania, USA). After removal of duplicates, two reviewers will independently perform the screening and selection (ZZ and WX) based on the established inclusion and exclusion criteria. Any disagreements that arise between the two reviewers will be resolved by a third reviewer (YH).

Quality appraisal

The measurement properties will be evaluated in three steps. First, we will apply the COSMIN Risk of Bias Checklist to assess the methodological quality of PROM development. This domain contains 35 items grouped into two sections: PROM design and cognitive interview studies. Second, we will assess the methodological quality in terms of content validity. This section includes 38 items divided into patient and professional sections that ask about the relevance, comprehensiveness and comprehensibility of the PROM. Finally, we will evaluate eight measurement properties: structural validity, internal consistency, cross-cultural validity, reliability, measurement error, criterion validity, hypothesis testing and responsiveness. Each measurement property will be rated as 'very good', 'adequate', 'doubtful' or 'inadequate quality'. The methodological quality of the study will be rated based on the worst score counts method. For example, if any items of the domain are scored as inadequate quality, the overall quality of the study will be rated as inadequate quality. Two reviewers (ZZ and WX) will independently appraise the studies, and disagreements will be resolved by a third reviewer (YH).

Data extraction

Two reviewers (ZZ and WX) will independently extract data from the included papers, including the authors, date of publication, PROM, country/language, study design, study population, sample size, measurement domains, number of items and main findings. Additionally, data from the COSMIN Checklist will be extracted. Any discrepancies will be resolved through discussion between the two reviewers.

Data synthesis

Data synthesis will comprise two steps. First, the results of the single study will be rated against the updated criteria for good measurement properties, including structural validity, internal consistency, reliability, measurement error, hypothesis testing for construct validity, cross-cultural validity/measurement invariance, criterion validity and responsiveness. Each measurement property will be rated as sufficient (+), insufficient (−), or indeterminate (?). If the ratings for each study are all sufficient or insufficient, the results can be pooled, and the overall rating will be either sufficient or insufficient. If the ratings are inconsistent, explanations of inconsistency will be explored. If the explanation is reasonable, ratings will be provided in the subgroup (eg, different languages of a PROM); however, if the explanation is not reasonable, the overall rating of this measurement property will be inconsistent (±). If there is no information supporting the rating, the overall rating will be indeterminate (?). Consequently, the evidence will be summarised and graded according to the modified The Grading of Recommendations Assessment, Development and Evaluation (GRADE) system (eg, high, medium, low and very low evidence). Four of the five GRADE factors have been adopted in the COSMIN methodology, including risk of bias, inconsistency, imprecision and indirectness. The quality of the evidence is graded for each measurement property and each PROM separately. Two reviewers will independently assess the quality of the evidence with GRADE, and any discrepancies will be resolved by a third reviewer (YH).

Patient and public involvement

No patients or members of the public were involved in the design of this systematic review.

Ethics and dissemination

No individual data are involved in this systematic review. The results will be disseminated to a clinical audience and policy-makers though peer-reviewed journals and conferences and will support researchers in choosing the best measure to evaluate the FT of cancer survivors.

DISCUSSION

To our knowledge, this is the first systematic review that will identify generic and cancer-specific PROMs to assess FT for cancer survivors and provide a comprehensive picture of their measurement properties. The synthesised results will allow healthcare professionals and policymakers to choose a validated PROM based on its psychometric properties. This study will also enable guideline developers to better understand the underlying measurement properties of existing PROMs measuring FT for cancer survivors.

While we will develop a systematic review based on the COSMIN criteria and PRISMA guidelines, some potential challenges may exist. First, according to the COSMIN criteria, nine psychometric properties should be assessed: content validity, structural validity, internal consistency, reliability, measurement error, hypothesis testing for construct validity, cross-cultural validity/measurement invariance, criterion validity and responsiveness. However, the included studies may report only some of these psychometric properties. Our conclusion may therefore apply only to specific properties of PROMs. Second, the discordant use of FT leads to a very large variety of scales and

questionnaires used to measure this issue. Among them, many studies used self-made questionnaires and did not provide enough information on validation. Therefore, we will include only studies that aimed to develop or validate a PROM. Last, potential publication bias may still exist, as with all systematic reviews. We will extensively search multiple electronic databases without time restrictions to minimise the likelihood of missing relevant studies. Despite the challenges, based on our preliminary search, it will be highly possible to draw valid conclusions on the content and structural validity of PROMs measuring FT for cancer survivors.

This review will be the first to evaluate the psychometric properties of FT measures for cancer survivors. The results of the present systematic review will provide a foundation for future studies assessing FT. We will publish this study in a peer-reviewed academic journal to reach both academic and non-academic audiences interested in the topic. We will also present the results at both national and international conferences. A summary of the results will be presented to healthcare professionals and health consumer groups. In addition, policy-makers will be reached via briefing notes and other potential avenues.

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Contributors Study design: ZZ. Study screening and selection, quality appraisal and data analysis: ZZ, WX and YH. Data extraction: ZZ and WX. Supervision: LL, YH and JP. Protocol and manuscript writing: ZZ and WX. Critical revisions: LL, YH and WKWS. All authors revised and accepted the final draft.

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