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Value of Implementation of Strategies to Increase the Adherence of Health Professionals and Cancer Survivors to Guideline-Based Physical Exercise

Janne C. Mewes, PhD[1], *Lotte M.G. Steuten, PhD*[2,3], *Charlotte IJsbrandy, MD*[4], *Maarten J. IJzerman, PhD*[1,5], *Wim H. van Harten, MD, PhD*[1,6,7,*]

[1]*Health Technology and Services Research, Faculty of Behavioural, Management and Social Sciences, University of Twente, Enschede, The Netherlands;* [2]*Fred Hutchinson Cancer Research Center, Hutchinson Institute for Cancer Outcomes Research, Seattle, WA, USA;* [3]*University of Washington, School of Pharmacy, Seattle, WA, USA;* [4]*Department of Medical Oncology and Scientific Institute for Quality of Healthcare (IQ Healthcare), Radboud University Medical Centre Nijmegen, Nijmegen, The Netherlands;* [5]*MIRA Institute for Biomedical Technology and Technical Medicine, University of Twente, Enschede, The Netherlands;* [6]*Department of Psychosocial Research and Epidemiology, Netherlands Cancer Institute (NKI-AVL), Amsterdam, The Netherlands;* [7]*Rijnstate General Hospital, Arnhem, The Netherlands*

A B S T R A C T

Background: To increase the adherence of health professionals and cancer survivors to evidence-based physical exercise, effective implementation strategies (ISTs) are required. **Objectives:** To examine to what extent these ISTs provide value for money and which IST has the highest expected value. **Methods:** The net benefit framework of health economic evaluations is used to conduct a value-of-implementation analysis of nine ISTs. Seven are directed to health professionals and two to cancer survivors. The analysis consists of four steps: 1) analyzing the expected value of perfect implementation (EVPIM); 2) assessing the estimated costs of the various ISTs; 3) comparing the ISTs' costs with the EVPIM; and 4) assessing the total net benefit (TNB) of the ISTs. These steps are followed to identify which strategy has the greatest value. **Results:** The EVPIM for physical exercise in the Netherlands is €293 million. The total costs for the ISTs range from €34,000 for printed educational materials for professionals to €120 million for financial incentives for patients, and thus all are cost-effective. The TNB of the ISTs that are directed to professionals ranges from €5.7 million for printed educational materials to €30.9 million for reminder systems. Of the strategies that are directed to patients, only the motivational program had a positive net benefit of €100.4 million. **Conclusions:** All the ISTs for cancer survivors, except for financial incentives, had a positive TNB. The largest improvements in adherence were created by a motivational program for patients, followed by a reminder system for professionals.

Keywords: cancer survivors, expected value of perfect implementation, guideline implementation, implementation research, physical exercise, rehabilitation, value-of-implementation analysis.

Introduction

Many cancer survivors experience late and long-term effects of cancer treatment, such as fatigue and reduced health-related quality of life (HRQOL) [1–5]. It has been shown that physical exercise (PE) is an effective way to alleviate the symptoms [1]. The evidence base on the effectiveness of PE for cancer survivors has been growing substantially [2–5]. Consequently, it is recommended for cancer survivors by professional organizations in many countries [1–5]. Nevertheless, from various studies it is known that adherence to a consensus-based guideline is lacking, thereby limiting the effectiveness and cost-effectiveness in the population [6–9]. In the Netherlands, a guideline on cancer rehabilitation was published in 2011, which recommends that all cancer survivors who have completed active curative treatment and are physically able should exercise, ideally by following an exercise intervention of at least moderate intensity [2]. Still, only very few of the eligible cancer survivors are referred to an exercise intervention. One of the reasons might be that the guideline is relatively new and not all professionals are yet aware of the possibilities. Of the survivors who are prescribed exercise, just over half of them take part in at least three-quarter of the sessions [7,10,11]. Thus, after the general implementation of the guideline itself, additional efforts should be undertaken to increase the adherence of professionals to the guideline and of cancer survivors to the prescribed interventions.

Because implementation strategies (ISTs) come at an additional cost, it is worthwhile to evaluate these on their

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* *Address correspondence to:* Wim H. van Harten, Department of Psychosocial Research and Epidemiology, Netherlands Cancer Institute (NKI-AVL), Plesmanlaan 121, Amsterdam 1066 CX, The Netherlands.

E-mail: w.v.harten@nki.nl.

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cost-effectiveness before deciding which one to use. They differ in terms of their effect on adherence, and subsequently on the amount of health benefits that can be achieved, as well as in their costs. Thus, it should be analyzed which IST offers the greatest influence on adherence, and therefore on health, for its cost. Although it is relatively common to evaluate interventions on their cost-effectiveness, it is less common to evaluate efforts to enhance the adherence to clinical guidelines, even though such efforts consume financial resources just like other health care interventions [8,9,12,13]. The aim of this study was to analyze the total net benefit (TNB) of various ISTs for increasing adherence of health professionals to the exercise recommendations of the cancer rehabilitation guideline and of cancer survivors to their prescribed intervention in the Dutch situation, and to identify which IST is the most beneficial.

Methods

The analysis is based on the value-of-implementation framework of Fenwick et al. [6] and Hoomans et al. [8,14]. It consisted of the following steps, which are further explained in the sections that follow:

1. analyzing the expected value of perfect implementation (EVPIM);
2. assessing the costs of the ISTs under comparison;
3. comparing the ISTs' costs to the EVPIM to decide which of these forms a cost-effective way of spending financial resources;
4. evaluating the ISTs that are cost-effective on the basis of their TNB to identify which IST has the greatest value.

The value-of-implementation methodology is described in detail elsewhere [6,8,13,14].

Intervention and Patient Description

In this study, a standard cancer rehabilitation exercise program used in cancer rehabilitation is evaluated. The typical average program duration is 12 weeks, with two weekly sessions of 90 minutes delivered by a physical therapist to groups of six patients. The physical therapist also conducts a 20-minute intake session and an in-between consultation. The patients are adult cancer survivors, diagnosed with any type of cancer, who have completed primary treatment. They experience at least one late or long-term symptom through cancer or its treatment that can be alleviated through exercising, such as fatigue, low quality of life, reduced cardiopulmonary fitness, or reduced physical functioning [15–19]

Analysis of the EVPIM

Analysis

The EVPIM is analyzed using the net benefit framework of health economic evaluation. To arrive at an intervention's net benefit, the incremental effect is multiplied with the willingness to pay (WTP) and the incremental costs are deducted. An intervention is cost-effective at the chosen WTP when the net benefit is at least 0 [20,21].

Net benefit:

$$NB = WTP \times \Delta E - \Delta C. \tag{1}$$

The EVPIM represents the difference between the net benefit of the exercise program being implemented perfectly with 100% adherence and with adherence on the current level [6].

Net benefit of the clinical guideline:

$$NB_{cg} = \Delta E_{cg} \times \lambda - \Delta C_{cg}. \tag{2}$$

Total net benefit of the guideline in perfect use:

$$TNB_{cg\_perfect} = NB_{cg} \times d_{cg} \times s_{pp} \tag{3}$$

Total adherence:

$$adr = adr_{hp} \times adr_{pt}. \tag{4}$$

Total net benefit of the guideline in current use:

$$TNB_{cg\_current} = TNB_{cg\_perfect} \times adr. \tag{5}$$

Expected value of perfect implementation:

$$EVPIM_{cg\_current} = TNB_{cg\_perfect} - TNB_{cg\_current}. \tag{6}$$

where

ΔE_{cg} = incremental effectiveness of the clinical guideline;
λ = willingness to pay;
ΔC_{cg} = incremental costs of the clinical guideline;
NB_{cg} = net benefit of the clinical guideline;
$TNB_{cg\_perfect}$ = total net benefit of the clinical guideline in perfect use;
d_{cg} = duration of guideline usage;
s_{pp} = size of the patient population served;
adr = total adherence;
adr_{hp} = adherence by health professionals;
adr_{pt} = adherence by patients;
$TNB_{cg\_current}$ = total net benefit of the clinical guideline in current use; and
$EVPIM_{cg\_current}$ = expected value of perfect implementation.

If the EVPIM has a positive value, it is cost-effective to use this amount to invest in ISTs that aim at improving the current level of implementation [14].

Data

The incremental effectiveness of PE for cancer survivors is based on the meta-analyses of Fong et al. [22] and Mishra et al. [15]. These meta-analyses included 34 and 33 randomized controlled trials, respectively, and found that PE had a significant impact on HRQOL. Of the included articles, the studies in which the short form 36 health survey was used were identified [16–19,23,24]. From these, the corresponding EuroQol five-dimensional questionnaire (EQ-5D) values representing the societal health utility can be deduced. This is done by first computing the mental and physical component scale scores (if not already stated in the article) for the baseline and last follow-up measurement in the intervention and control groups, using the short form 36 health survey manual and the Dutch reference scores [25]. The algorithm by Ara and Brazier [26] was used to derive the corresponding EQ-5D utility values. The difference in the EQ-5D scores from baseline to the follow-up measurement is analyzed per study for the intervention and control groups. Afterward the difference in improvement between the intervention and control groups is calculated per study. From these values, the weighed mean difference in the EQ-5D value from baseline to follow-up is generated. To analyze the quality-adjusted life-year (QALY) gain, this difference is multiplied by 5 years, because studies have shown the effectiveness to last this long [27–29].

The exercise program's costs consist of costs for the physical therapist for preparing and conducting all sessions and consultations as well as of administrative costs. The costs are based on the program description and on previous research into the required time for the tasks [30]. Health care costs include consultations and medication and are based on previous research [30]. The WTP is set at €30,000 for one additional QALY [31] and the guideline's