Early health economic modelling to support the development of LifeChamps Digital Platform for older cancer survivors

MT69

Stafylas P.[1], Tychala C.[1], Billis A.[2], Levva S.[3], Sachoulidou A.[4], Kartsidis P.[2], Karaiskou M.[1], Lagakis P.[2], Petridis G.[2], Bamidis P.D.[2]

[1] HealThink (Medical Research & Innovation PC), Thessaloniki, Greece; [2] Laboratory of Medical Physics and Digital Innovation, School of Medicine, Aristotle University of Thessaloniki, Greece; [3]Bioclinic Thessaloniki, Greece; [4] 2nd Department of Propaedeutic Surgery Aristotle University of Thessaloniki

Introduction

Despite biological age should not be a factor in determining whether or not to provide curative cancer treatment, there is emerging evidence that older patients are under-treated. Moreover, disparities in access to cancer care lead to increased morbidity and mortality.[1-7]

LifeChamps is an EU Horizon 2020 project that aims to create a digital platform to enable monitoring of health-related quality of life and frailty in patients with cancer over the age of 65.[7] Furthermore, it aims to contribute to improvement of elders' people quality of life and enhance clinician monitoring, in a significant manner, by using emerging technologies in the fields of Big Data, Data Analytics and Artificial Intelligence,[7] and offering a novel digital health platform that is data-centric and intelligent. The design, development, and evaluation of the platform will be performed with active participation and feedback from patients and clinicians in line with current guidelines for co-design in healthcare services.[8-10]

Objective

The objective of this analysis was to assess the potential value of LifeChamps Digital Platform (LDP) before clinical testing and to identify information gaps and uncertainties, optimizing further research and development.

Methods

An early cost-effectiveness model (CEM) was developed in Microsoft Excel® to estimate quality-adjusted life years (QALYs), healthcare & non-healthcare costs, and incremental cost-effectiveness ratio (ICER) of LDP plus standard of care (SoC) compared with SoC alone, for female breast cancer survivors over the age of 65 in line with published sources.[11,12]

We assigned available project population baseline characteristics to a hypothetical cohort of 1,000 patients, and we run the analysis from the perspective of Greek third-party payer perspective (Greek acronymic EOPYY), assuming a one-year time horizon. Gross Domestic Product per capita in Greece (17,013 €) was defined as the cost-effectiveness threshold.[13]

Efficacy and healthcare resource use were extracted from interviews with participating patients, physicians, and researchers. QALYs have been estimated using EQ-5D-5L, FACT-G7 and EORTC QLU-C10D instruments. In the current early analysis, the costs were divided in two categories: Direct and Technology-related costs (Table 2). Available literature and public sources of data were used for cost calculations.

The base case analysis assumed that the cohort was equal to 1,000 patients, QALYs were based on the EQ-5D-5L instrument, while the development cost (TRL7) was not included.

Deterministic and probabilistic sensitivity analyses were conducted to assess the robustness of the results.

Table 1. Key design parameters

Aim	Compare health and economic outcomes of LDP plus SoC vs. SoC used by breast cancer survivors
Intervention	LDP plus SoC
Comparator	SoC alone
Population	Breast cancer survivors aged ≥ 65 years old
Setting and perspective	Greek third-party payer perspective (Greek acronymic EOPYY)
Time horizon	1 year
Costs	National currency (€) at 2023 prices
Benefits	QALYs
Cost-effectiveness threshold	17,013 € (GDP per capita in Greece for 2021)

Abbreviations: QALYs: quality-adjusted life years; SoC: standard of care; GDP: Gross domestic product; LDP: LifeChamps Digital Platform

Table 2. Cost Categories

Directs costs	Technology-related costs
Physician visits costs	Development cost for LDP (TRL 7)
Laboratory/ blood tests costs	Installation-Ready for the market (TRL7 to TRL9)
Imaging costs	Hardware
	Technical Support

Abbreviations: TRL: Technology readiness level; LDP: LifeChamps Digital Platform

Results

The base-case analysis revealed that patients using the LDP could gain 0.22 more QALYs (0.98 for LDP plus SoC and 0.76 for SoC) with an additional cost of 1,110 € per patient (1,778 € for LDP plus SoC and 668 € for SoC). The ICER was estimated at 4,990 €/QALY, far below the accepted ICER thresholds (Table 3).

Sensitivity analysis generated outcomes between 2,549 - 16,659 €/QALY, indicating that LDP is potentially a cost-effective solution for older cancer survivors, under the assumptions made (Figure 1). However, the results are sensitive to efficacy variation and organizational/setting aspects.

Table 3. Base-case results

	LDP plus SoC per patient	SoC per patient	Incremental
Cost [a]	1,778 €	668 €	1,110 €
QALYs [b]	0.98	0.76	0.22
ICER (€/QALY)			**4,990 € per QALY**

[a] without development cost
[b] based on EQ-5D-5L
Abbreviations: QALY: quality-adjusted life year; SoC: standard of care; ICER: incremental cost-effectiveness ratio LDP: LifeChamps Digital Platform

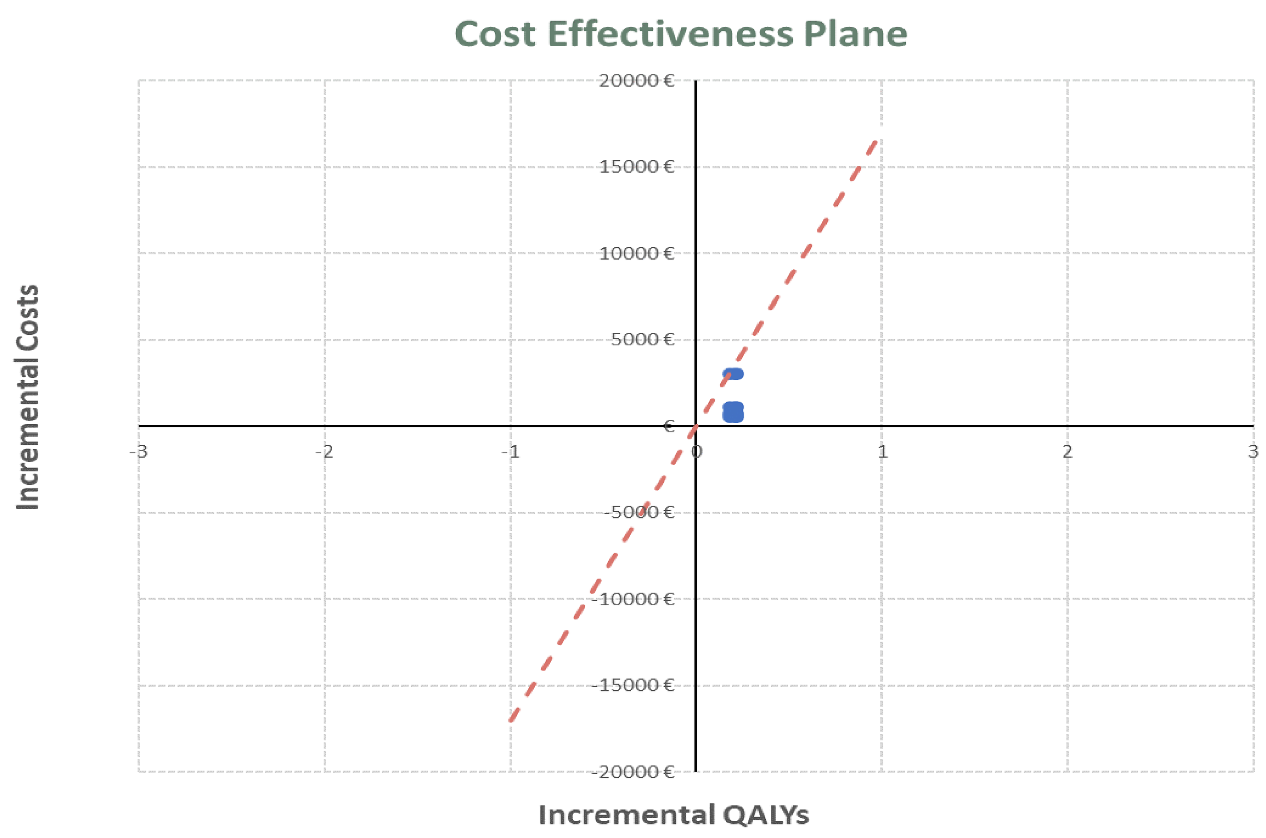

Figure 1. Cost-effectiveness plane

Conclusions

This early health technology assessment of LDP suggests promising clinical and economic outcomes for older patients with breast cancer and supports further research, development and testing in the clinical setting. The proposed model structure will be a key resource as more data became available. When clinical trial results will be available, cost-effectiveness analysis will be updated.

Limitations

- In the current study, the possible training cost both for physicians and patients as well as the time and consequently cost spending by physicians to review the patient data collected is not included in the LDP-related costs, as the platform is not yet available to physicians and patients.
- There was a lack of actual results of effectiveness and health care resources use, resulting in adoption of participating patients', physicians', and researchers' estimations regarding the expected change in Quality of Life (QoL) and healthcare resources use.

Acknowledgements

LifeChamps has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875329.

All authors contributed to and approved the presentation.

Contact

Panos Stafylas MD, MSc, PhD
Scientific Director (HealThink)
E-mail: healthink@healthink.info

1. Dharmarajan KV, Presley CJ, Wyld L. Care disparities across the health care continuum for older adults: lessons from multidisciplinary perspectives. American Society of Clinical Oncology Educational Book. 2021;41:e215-e224.
2. Le Saux O, Falandry C. Is There an Age Threshold for Holding Off on Testing Novel Therapies? Current Oncology Reports. 2018;20:1-7.
3. Popescu T, Karlsson U, Vinh-Hung V, et al. Challenges facing radiation oncologists in the management of older cancer patients: Consensus of the International Geriatric Radiotherapy Group. Cancers. 2019;11(3):371.
4. Schroyen S, Adam S, Jerusalem G, Missotten P. Ageism and its clinical impact in oncogeriatry: state of knowledge and therapeutic leads. Clinical interventions in aging. 2015:117-125.
5. Swaminathan D, Swaminathan V. Geriatric oncology: problems with under-treatment within this population. Cancer biology & medicine. 2015;12(4):275.
6. Sedrak MS, Freedman RA, Cohen HJ, et al. Older adult participation in cancer clinical trials: a systematic review of barriers and interventions. CA: a cancer journal for clinicians. 2021;71(1):78-92.
7. Papachristou N, Kartsidis P, Anagnostopoulou A, et al. A Smart Digital Health Platform to Enable Monitoring of Quality of Life and Frailty in Older Patients with Cancer: A Mixed-Methods, Feasibility Study Protocol. Paper presented at: Seminars in Oncology Nursing 2023.
8. Deverka PA, Bangs R, Kreizenbeck K, et al. A new framework for patient engagement in cancer clinical trials cooperative group studies. JNCI: Journal of the National Cancer Institute. 2018;110(6):553-559.
9. Slattery P, Saeri AK, Bragge P. Research co-design in health: a rapid overview of reviews. Health research policy and systems. 2020;18(1):1-13.
10. Marshall-McKenna R, Kotronoulas G, Kokoroskos E, et al. A multinational investigation of healthcare needs, preferences, and expectations in supportive cancer care: co-creating the LifeChamps digital platform. Journal of Cancer Survivorship. 2023;17(4):1094-1110.
11. Gray E, Donten A, Karssemeijer N, et al. Evaluation of a stratified national breast screening program in the United Kingdom: an early model-based cost-effectiveness analysis. Value in Health. 2017;20(8):1100-1109.
12. Husereau D, Drummond M, Augustovski F, et al. Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) statement: updated reporting guidance for health economic evaluations. International journal of technology assessment in health care. 2022;38(1):e13.
13. ELSTAT. Hellenic Statistical Authority (ELSTAT), Gross domestic product per capita 2021. https://www.statistics.gr/el/statistics/-/publication/SEL33/2021. 2021.