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LETTER TO EDITOR

The Hidden Value of Lost Heartbeats: Methods for Valuing Productivity in Cardiovascular Patients

Mehdi Raadabadi [1], Hossein Abolhosseini [2], Mohammad Zahmatkesh [3]✉

[1] Trauma Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[2] Research Center of Persian Medicine, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[3] Student Research Committee, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

✉ Corresponding Author: Mohammad.zahmatkesh5717@gmail.com, Tel: +98 915 9645717

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A B S T R A C T

Cardiovascular diseases (CVDs) are the leading cause of mortality worldwide and in Iran, imposing not only substantial direct healthcare costs but also significant indirect economic burdens that are often overlooked. One of the most important components of this burden is lost productivity, which includes absenteeism, reduced on-the-job productivity, and premature retirement due to illness. Thus, selecting an appropriate instrument to measure and value this productivity loss remains a major challenge in health economic research. A review of previous studies shows that tools such as the Endicott Work Productivity Scale (EWPS), the Health and Labour Questionnaire (HLQ), the Health and Work Questionnaire (HWQ), the Work Productivity and Activity Impairment Questionnaire (WPAI), and the iMTA Productivity Costs Questionnaire (iPCQ) have distinct strengths and limitations. Among currently available instruments, the iPCQ appears to be particularly suitable for many cost-of-illness studies because it simultaneously captures absenteeism, presenteeism, and unpaid work, while also allowing economic valuation; however, the choice of instrument should depend on the study objective, target population, and valuation method. Therefore, given the unique characteristics of cardiovascular patients, including chronic disease progression, recurrent episodes, and cognitive and psychological impairments, careful assessment of hidden productivity loss is essential to capture the true economic burden of these diseases.

Keywords: Absenteeism; Cardiovascular Diseases; Cost of Illness; Presenteeism; Surveys and Questionnaires

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Cardiovascular diseases (CVDs), the leading cause of death worldwide and in Iran, not only impose substantial direct costs on health systems but also generate considerable indirect economic consequences that are often overlooked in conventional assessments (1). According to the World Health Organization, cardiovascular diseases claimed an estimated 19.8 million lives worldwide in 2022, and a large proportion of these deaths occur during the working and economically active years of life (2). Therefore, this substantial burden highlights the need to give greater recognition to the "hidden value of lost heartbeats."

Lost productivity, which includes absenteeism, presenteeism, and premature retirement due to illness, constitutes an important part of the economic burden of CVDs (3). However, the key challenge in this area lies in selecting the appropriate method and instrument for measuring and valuing this lost productivity. The aim of this letter is to briefly review the commonly used instruments in this field and to present methodological considerations for future studies in cardiovascular patients.

Previous studies indicate that several instruments have been developed to assess lost productivity, but each has been designed for specific purposes and differs in terms of productivity domains covered, monetary valuation capability, and feasibility of implementation (4). The most important of these instruments are briefly reviewed below and summarized in Table 1.

The Endicott Work Productivity Scale (EWPS) is one of the earliest instruments in this field and was designed to assess productivity changes in response to treatment interventions. This scale focuses on subjective and functional dimensions of productivity, such as reduced concentration, fatigue, and slowed performance, and is highly sensitive to short-term changes in health status (5). However, its output is mainly qualitative or semi-quantitative and does not directly allow monetary valuation of lost productivity. Therefore, its application in cost-of-illness studies and health economic evaluations is limited, and it is mainly considered a complementary tool in clinical trials.

The Health and Labour Questionnaire (HLQ) adopts a more comprehensive approach and provides quantitative data needed to estimate lost productivity in both paid and unpaid activities (6). Its simultaneous attention to absenteeism, work-related functional limitations, and restrictions in daily activities is one of its major strengths. Nevertheless, the considerable length of the questionnaire and the complexity of valuation calculations may make its use challenging in large-scale studies.

The Health and Work Questionnaire (HWQ) is a multidimensional 24-item instrument with the unique feature of reducing self-report bias through productivity assessments by coworkers and supervisors (7). This approach may improve measurement accuracy, but it also makes implementation more complicated. HWQ is mainly suitable for organizational settings and does not cover unpaid work.

The Work Productivity and Activity Impairment Questionnaire (WPAI) is one of the most widely used instruments in international studies. It measures four domains (absenteeism, presenteeism, activity impairment, and overall work productivity loss) over a 7-day recall period (8). Its main advantages are simplicity, short completion time, and applicability across various diseases. However, its output is reported as a percentage of impairment and requires additional assumptions for monetary valuation.

The iMTA Productivity Costs Questionnaire (iPCQ) is another standardized instrument used in health economic evaluations that separately measures three main components: absenteeism, presenteeism, and unpaid work (9). One of its key advantages is that the data obtained can be used to estimate productivity costs using standard health economic approaches, including the Human Capital Approach (HCA) and, in some settings, the Friction Cost Method (FCM). However, the accuracy of the resulting economic estimates still

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depends on the chosen valuation method, the reference wage rate, and the assumptions applied in the analysis. In addition, like many self-reported instruments, it is subject to recall bias.

Therefore, it appears that the iPCQ has advantages over many existing instruments in studies aimed at estimating the comprehensive indirect costs of disease and conducting health economic evaluations. However, this does not mean it is universally superior in all research settings. For example, in short-term clinical trials focusing on work-related functional changes, the EWPS or WPAI may also be appropriate, and in organizational studies, the HWQ may provide more detailed information on workplace performance.

Table 1. Brief comparison of commonly used instruments for measuring lost productivity

Instrument	Absenteeism	Presenteeism	Unpaid work	Direct monetary valuation	Main limitation
EWPS	Limited	Yes	No	No	More suitable for clinical assessment
HLQ	Yes	Yes	Yes	Requires additional calculations	Long and complex
HWQ	Yes	Yes	No	Limited	Difficult to implement in organizations
WPAI	Yes	Yes	Daily activities	Indirect	Requires economic assumptions
iPCQ	Yes	Yes	Yes	Yes (with standard health economic methods)	Reliance on self-report and the need for an appropriate valuation method

Abbreviations: EWPS, Endicott Work Productivity Scale; HLQ, Health and Labour Questionnaire; HWQ, Health and Work Questionnaire; WPAI, Work Productivity and Activity Impairment Questionnaire; iPCQ, iMTA Productivity Costs Questionnaire.

Given the unique characteristics of cardiovascular diseases, including their chronic and progressive nature, recurrent episodes, and cognitive and psychological consequences such as post-myocardial infarction depression, choosing an appropriate instrument for assessing lost productivity is particularly important. A prospective study by Kasprzak et al. showed that cognitive impairment is common after myocardial infarction and may persist for at least six months (10), which could reduce work capacity and productivity even after return to work. Such presenteeism is not fully captured by many traditional methods that focus solely on absenteeism.

From a health economic perspective, monetary valuation of lost productivity is usually performed using two main approaches. Under HCA, all time lost due to illness is valued according to the individual's wage, whereas the FCM limits the valuation to the production lost during the friction period, that is, until a replacement worker is hired. The choice between these approaches can substantially influence estimates of the indirect costs of disease and should be clearly reported in study methods.

In summary, the selection of an appropriate instrument for valuing lost productivity should be based on the study objective, disease type, population characteristics, valuation method, and practical feasibility. Among existing instruments, the iPCQ, due to its simultaneous coverage of the three major components of productivity loss, its applicability in economic cost estimation, and the availability of a validated Persian version, may be a suitable option for many cost-of-illness studies in cardiovascular patients. Nevertheless, its limitations, including reliance on self-report and sensitivity of the results to the valuation method, should be considered when interpreting findings. Overall, incorporating lost productivity into economic evaluations of cardiovascular diseases can provide a more complete picture of the true burden of disease and support more efficient

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allocation of health resources. The use of standardized and locally validated instruments, together with transparent selection of valuation methods, can improve the quality of evidence and facilitate evidence-based decision-making in health systems.

Authors' Contributions

M.R. Conceptualization, Literature Review, Methodology, Writing – Original Draft Preparation; H.A. Literature Review, Investigation, Critical Review, Writing – Review & Editing; M.Z. Conceptualization, Methodology, Supervision, Writing – Review & Editing. All authors read and approved the final version of the manuscript.

Artificial Intelligence Use Disclosure Statement

Artificial intelligence tools were used solely for language editing, grammatical checking, and translation to improve the clarity and linguistic quality of the manuscript. The authors reviewed and approved all final content and take full responsibility for the accuracy and integrity of the manuscript.

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