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The Short-Form Six-Dimension utility index predicted mortality in the European Prospective Investigation into Cancer-Norfolk prospective population-based study

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Abstract

Objective: To examine the relationship between the Short-Form Six-Dimension (SF-6D) and mortality.

Study Design and Setting: Participants were 17,736 men and women aged 40−79 years at baseline who lived in Norfolk, UK, and had no known cardiovascular disease or cancer, and completed the anglicized Short-Form 36 (SF-36)-item during 1996−2000 in the European Prospective Investigation into Cancer-Norfolk prospective population study. The SF-36 data were converted to SF-6D. The relationship between SF-6D and all-cause and cause-specific mortality were examined.

Results: One thousand and seventy deaths occurred during a total of 115,255 person years of follow-up (mean 6.5 years). Lower SF-6D was associated with increased risk of all-cause mortality in men and women. A decrease of 1 standard deviation (0.12 point) in SF-6D was associated with a 35% increase in all-cause mortality (hazards ratio = 1.35; 95% CI: 1.26, 1.45) after controlling for age, gender, body mass index, systolic blood pressure, cholesterol, diabetes, smoking, and social class. Similar results were observed for cardiovascular, cancer, and other causes of deaths.

Conclusion: Poor health utility measured by the SF-6D predicted increased risk of all-cause and cause-specific mortality in men and women. The present study provides the first evidence of the sensitivity of the SF-6D in predicting mortality in an apparently healthy population.

Keywords: Short-Form 6-Dimension; UK Short-Form 36; Mortality; Health-related quality of life (HRQoL); Preference-based HRQoL; Utility index

1. Introduction

Population health is traditionally measured using objective health outcome measures, such as mortality and morbidity statistics [1]. However, more subjective functional health has been increasingly recognized as an important, meaningful, and valid way of assessing health [2]. One of the most widely used measures of functional health is the Short-Form 36 (SF-36) [2].

However, measures such as the SF-36 are limited in their ability to be used within economic evaluations. The health status profile that is produced does not allow an unambiguous assessment of the improvement or deterioration of functional health unless all elements of the profile move in the same direction, and it does not provide the single index score required to derive a quality-adjusted life year (QALY) as required for economic evaluation [3,4]. For economic evaluation, a measure is required that assigns preference—or utility—weights to the different dimensions within the instrument that reflect their relative value in contributing to functional health and can be summed to generate a single overall index of health status.

Although such utility measures have been developed in their own right, with the EuroQol (EQ-5D) being one of

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What is new?

- There is an inverse relationship between health utility index, Short-Form Six-Dimension (SF-6D), derived from Short-Form 36, and mortality in a general population.
- The relationship between SF-6D and mortality is independent of known risk factors for mortality including age, smoking, social class, and other strong biological determinants such as blood pressure, body mass index, and cholesterol level.
- It appears that SF-6D may serve as an additional marker for identifying the most vulnerable population at risk, and their use in appropriate settings will provide useful information with regard to targeted preventive interventions.

the most well known of these, there has been considerable work to map health status profiles, such as SF-36, to a preference-based utility index [5]. Brazier et al. [6] derived such a single index measure from the SF-36; the Short-Form Six-Dimension (SF-6D). The rationale, mathematical model and derivation of the evaluation index have been described comprehensively by Brazier et al. [6,7].

The reliability and validity of the SF-6D in a population such as patients with spinal cord injury [8] and systemic sclerosis [9] have been previously reported. However, Moock and Kohlmann [10] compared different preference-based quality-of-life measures including the SF-6D in a sample of patients with mild-to-moderate disease and found that differences between measures may have considerable effects in health economic evaluation studies, and cautioned that it is essential to select carefully instruments for a given study. Moreover, in a mathematical model constructed by Marra et al. [11], very different incremental cost−utility ratios were generated depending on the method for determining utility values used in the calculation of QALYs.

Given that the move from the SF-36 profile to a single index figure, SF-6D, requires substantial transformation of the original SF-36 data, one of the key issues with such instruments is the impact upon the instruments sensitivity in predicting mortality. We have previously reported an inverse relationship between the physical and mental component summary scores (PCS and MCS) of the SF-36 and all-cause and cause-specific mortality in the European Prospective Investigation into Cancer (EPIC)-Norfolk prospective population-based study [12,13].

The purpose of the present investigation is therefore to gain a deeper insight into the usefulness of preference-based utility index SF-6D in predicting mortality in a free-living general population who are free of prevalent major illnesses in the UK, EPIC-Norfolk prospective population study. To our knowledge, this is also the largest mapping of the SF-36 data into SF-6D to examine the relationship with total and cause-specific mortality in an apparently healthy free-living general population.

2. Methods

2.1. Participants

The study population consisted of men and women living in the general community aged between 40 and 79 years at the baseline participating in the EPIC-Norfolk. They were recruited between 1993 and 1997 and approximately 30,000 (40% response rate) consented to participate. The Norwich Local Research Ethics Committee approved the study. The primary aim was to examine the relationships between dietary intake and risk of incident cancers in a general population. The secondary aim was to study the relationships between diet, psychosocial, and other lifestyle and disease risk factors and a variety of health outcomes including mortality and chronic conditions. Detailed descriptions of the recruitment and study methodology have been previously reported [14]. Briefly, all eligible individuals in the age range in each participating general practice database were invited by mail. Those who consented to participate were asked to provide baseline survey data and were invited to attend for a health examination.

2.2. Measurements

At the baseline assessment in 1993−1997, measures were taken by trained staff according to standardized protocols [15]. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters: weight (kg)/[height (m)]^2. Blood pressure was measured using an Accutorr Sphygmomanometer after each participant had been seated resting for 5 minutes. Mean of two measurements of blood pressure was used in analysis. Blood samples were also taken at baseline clinic visit. Serum levels of total cholesterol were measured on fresh samples with the RA 1000 (Bayer Diagnostics, Basingstoke, UK).

From responses to the questions ‘‘Have you ever smoked as much as one cigarette a day for as long as a year?’’ and ‘‘Do you smoke cigarettes now?,’’ smoking status was classified as current smoker, former smoker, or those who had never smoked. At baseline, social class was classified according to the Registrar General’s occupation-based classification scheme [16]. Social class I consists of professionals, class II includes managerial and technical occupations, class III is subdivided into nonmanual and manual skilled workers, class IV consists of partly skilled workers, and class V comprises unskilled manual workers [17]. In this study, we used social class obtained at the baseline survey in 1993−1997.

With the baseline health questionnaire, the participants were asked, ‘‘Has the doctor ever told you that you have