行政院國家科學委員會專題研究計畫　成果報告

自我評估健康狀態與死亡間之相關-以一中國人社區人口之七年前瞻性研究

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研究計畫中英文摘要：請就本計畫要點作一概述，並依本計畫性質自訂關鍵詞。

（一）計畫中文摘要。（五百字以內）

背景 過去許多研究顯示自我評估之健康狀態和死亡有所關係，此關係甚至在控制了其他客觀之健康指標後依然存在，自我評估健康狀態指標之價值建立於這些研究之發現。然而這些研究使用單一指標測量自我評估狀態，而缺乏同時考量身體功能、自覺安寧狀態、社會與角色失能和個人自覺健康狀態和死亡間的關係。

目的 本研究目的主要探討在不同的性別下，控制了罹病狀態與門診及住院醫療利用後，Short Form 36 (SF-36) 健康量表 8 個向量對於死亡狀態之預估能力。

方法 本研究將採七年之前瞻性追蹤研究設計，被追蹤之人口為自台中市、台中縣、南投縣、彰化縣與雲林縣居住居民中所抽取出之 2,164 位代表樣本，抽樣方法為四階段抽樣方法，在各階段下，其抽取率與抽取單位之樣本數成比率。以受訓之公共衛生護士進行面訪為資料收集方式，所收集之資料包括 SF-36、慢性病數與人口因子等。SF-36 為一個包含 36 個題目、8 個健康概念的健康量表，每個概念由多個題目所組成，八個操作型向量分別為身體活動功能(簡稱身體活動, PF)、活動功能限制情況(簡稱活動限制, RP)、身體疼痛程度(簡稱身體疼痛, BP)、個人評估身體健康之程度(簡稱自評健康, GH)、活力狀態(VT)、社交情況(SF)、心理健康狀態(簡稱心理健康, MH)及心理健康限制生活程度(簡稱心理限制, RE)，另有兩個摘要量表，分別為身體及心理摘要量表。死亡狀態將由衛生署之死亡資料庫所獲得。統計分析方法為羅吉斯回歸方程式。

結果 10 個 SF-36 量表之未調整勝算比皆達統計顯著，調整年齡、性別和慢性病後，PF、GH、 VT、 RE、MH、PCS 和 MCS 皆達統計顯著，其中 GH、VT、MH、PCS 和 MCS 顯示顯著之趨勢效應(其 p 值分別為 0.0346, 0.0061, 0.0021, 0.0182, and 0.0055)，受測者其 PCS 分數低於 51.37 者其死亡的勝算顯著較分數高於 51.37 者為高(OR, 2.42; 95% CI, 1.11-5.25)。MCS 之分數依四分位分為四個類別，以最高分為參考組(>56.26)，其他三組(≤48.28, 48.29-52.77, and 52.78-56.26) 的勝算比分為 2.88 (95% CI, 1.18-7.03), 1.26 (95% CI, 0.46-3.43), and 1.29 (95% CI, 0.48-3.48). 在同時考量 PCS and MCS 的多變量模式中，其效應仍然和分別考量相類似(PCS 勝算比為 2.32; 95% CI, 1.07-5.05; MCS ≤48.28 為 2.95, 48.29-52.77 為 1.21-7.24 ; 1.35, 0.50-3.67 , and 52.78-56.26 為 1.42, 0.53-3.85)。

關鍵詞：前瞻性追蹤研究設計；SF-36 健康量表；死亡；

（二）計畫英文摘要。（五百字以內）

Background. A growing body of research shows that self-perceptions of health are linked to mortality, even when more “objective” health measures are controlled. A great value of self-assessment of health lies in these findings. However, these studies used a single indicator measuring self-assessment of health. To our knowledge, none of the previous studies simultaneous examine the effects of physical functioning, perceived well-being, social and role disability and personal perceptions of health on mortality.

Objectives. The objective of the present study is to examine the predictive ability of 8 dimensions of Short Form 36 (SF-36) on mortality according to gender controlling for objective health measures in terms of co-morbidity, physician visits and hospitalization in a Chinese, community-based sample.

Methods. A 7-year follow-up study design will be conducted. The study cohort is a representative sample 2,164 community residents of Taichung City, and Taichung, NanTou,

ChangHwan, and Yunlin Counties of Taiwan in October 1994. These study subjects were drawn by a four-stage sampling design with sampling rate proportional to size within each stage. A face-to-face interview was used for data collection to collect information about sociodemographic data, co-morbidity, health care service utilization, and Chinese-version SF-36. The SF-36 is a short questionnaire with 36 items which measure eight multi-item variables: physical functioning, social functioning, role limitations due to physical problems, role limitations due to emotional problems, mental health, energy and vitality, pain, and general perception of health. Vital status was obtained via linkage with Death Data-set of National Health Department. The relationship between subjective health and 7-year mortality was studied using the Cox's Proportional Hazard model.

Results. The crude odds ratios (ORs) were statistically significant for all scales. After adjusting for the effects of age, gender, and chronic disease, scales of PF, GH, VT, RE, MH, PCS, and MCS were statistically significant. Among these significant scales, GH, VT, MH, PCS, and MCS showed a significant trend with mortality (p for trend =0.0346, 0.0061, 0.0021, 0.0182, and 0.0055, respectively). Subjects with PCS score less than or equal to 51.37 increased risk of death compared with those with PCS score greater than 51.37 (OR, 2.42; 95% CI, 1.11-5.25). The MCS score at baseline was categorized into 4 categories (≤48.28, 48.29-52.77, 52.78-56.26, >56.26) according quartile so that the odds of death was for those with score of MH ≤48.28, 48.29-52.77, and 52.78-56.26 were 2.88 (95% CI, 1.18-7.03), 1.26 (95% CI, 0.46-3.43), and 1.29 (95% CI, 0.48-3.48), comparing with those with MCS >56.26. In multivariate model considering the effects of PCS and MCS simultaneously, the effects of PCS and MCS remained similar (OR, 2.32; 95% CI, 1.07-5.05 for PCS; 2.95, 1.21-7.24 for MCS ≤48.28; 1.35, 0.50-3.67 for MCS 48.29-52.77, and 1.42, 0.53-3.85 for MCS 52.78-56.26).

Keywords. Cohort study; SF-36; mortality

SPECIFIC OBJECTIVE

The objective of the present study is to examine the predictive ability of 8 dimensions of SF-36 on mortality controlling for objective health measures in terms of age, gender, and co-morbidity in a Taiwan, community-based sample.

BACKGROUND AND SIGNIFICANCE

The Importance of Medical Outcome Instrument

As the objectives of medical care for patients not only in prolonging the duration of life but also in improving the quality of life, achieving a more effective life (McDermott, 1981) and preserving function and well-being (American College of Physicians, 1988; Cluff, 1981; Ellwood, 1988; Schroeder, 1987; Tarlov, 1983) have been recognized by our medical society, it has been increasing consensus about the importance of the centrality of the patient point of view in monitoring the quality of medical care outcomes (Geigle & Jones, 1990; Ware & Sherbourne, 1992).

One reason for the need of medical outcome instrument is that traditional measures of morbidity and mortality are generally agreed to be too narrow to measure the potential benefits of health care interventions, which can influence a wide number of variables such as physical mobility, emotional well-being, social life, and overall well-being (Brazier, 1992), especially when the premature mortality is going down, life expectancy prolongs, and the prevalence of disability raises.

For the medical outcome instruments is needed in Taiwan is that several significant

phenomena of aging population such as prolonged life expectancy and increasing proportion of the very old have been emerged in the past decade. The average life expectancy is 78 years for women and 72 years for men in Taiwan. There were more than 1.6 million individuals aged 65 and over who represent 8.44% of the total population[1]. By the year 2051, it is estimated that there would be more than 6 millions elderly individuals and they would represent almost 23.9% of the population[1]. Along with the aging population, the mortality and morbidity patterns change. Most of the 10 leading causes of death in people 65 years and older are now related to chronic diseases. In addition to this marked change in the cause of death, the causes of morbidity have shifted to chronic disable conditions such as stroke and arthritis. In such a society in which chronic diseases are becoming increasingly prevalent, the objective of medical care is more often a reduction in morbidity than it is a cure of disease or prolongation of life. Even when the objective of prolonging life has been achieved, morbidity is also an important outcome because patient may suffer from treatment-induced adverse effects. In addition, as life expectancy prolongs, the prevalence of disability raises. Under these conditions, morbidity, mortality, and physiologic indicators become too narrow to measure the potential benefits of health care interventions, which can influence a wide number of quality of life variables.

The Short Form 36 (SF-36)

Of numerous existing outcome measures, there are 4 main advantages of the short form 36 (SF-36). First, SF-36, which was developed from the Rand Corporation's health insurance experiment in the United States, has been widely applied in clinical research and practice, health policy evaluation, general population surveys, and other applications involving diverse populations (Ware J., 1993). Second, SF-36 is currently regarded as one of the more promising generic health outcome measure because of its brevity and methodological quality. The questionnaire, modified from an original lengthy battery of 108 questions, contains 36 items covering eight multi-item scales (Ware J., 1993). It was developed to overcome the lengthy and complex measures' limitation in widespread dissemination. Third, the objective of constructing the eight SF-36 scales was to achieve representation of multi-dimensional health concepts and measurements of the full range of health state. It consists of eight scales measuring four health concepts of both physical and mental health: behavioral functioning, perceived well-being, social and role disability, and personal evaluations of general health. These health concepts are culturally appropriate for Chinese people. Fourth, SF-36 has been developed under protocol of International Quality of Life Assessment (IQOLA) project for translation, adaptation, and testing the cross-cultural applicability. The psychometric testing results for the translated versions indicate that SF-36 is a valid and reliable generic health survey instrument across different cultures or nations.

The Importance of Current Study

A growing body of research shows that self-perceptions of health are linked to mortality, even when more "objective" health measures are controlled. Previous study, which reviewed twenty-seven community studies, concluded that self-assessment of health is an independent predictor of mortality in nearly all the studies (Idler and Benyamini, 1997). A great value of self-assessment of health lies in these findings. The unique contribution of health perceptions to mortality is substantial for both older adults and general population samples. However, these studies used a single indicator measuring self-assessment of health. The strength of a single indicator is that it's quick when administered. Nevertheless, the coarseness of single-item measures appears to limit their usefulness in detecting small to moderate differences between groups and even large differences for individual patients, and in measuring multi-dimensional health concepts. To our knowledge, none of the previous studies simultaneous examine the effects of physical functioning, perceived well-being, social and role disability and personal perceptions of health on mortality.

A variety of explanations have been put forth to explain the relation between health perceptions and mortality (Idler and Benyamini, 1997; Mossey & Shapiro, 1982; Rakowski, Mor, & Hiris, 1991). One possibility is that health perceptions reflect insights into people's health that are not captured by more objective health measures. Another other possibility is that individuals who rate their health as poor may miss certain "critical points" in initiating health-promoting actions, thereby precipitating health problems (Rakowski et al., 1991). Alternatively, positive self-perceptions of health may be beneficial because optimistic feelings in themselves are protective (Mossey & Shapiro, 1982).

To date, the effect of gender on the relationship between subjective health and mortality is still unclear, and previous studies have found inconsistent results. The association between subjective health and mortality is sometimes stronger in men than in women (Idler & Kasl, 1991; Jylha, Guralnik, Ferrucci, Jokela, & Heikkinen, 1998); sometimes vice versa (Grant, Piotrowski, & Chappell, 1995; McCallum, Shadbolt, & Wang, 1994; Simons, McCallum, Friedlander, & Simons, 1996); and sometimes the same (Kaplan, Barell, & Lusky, 1998). The contradictory results need further analyses to lead to an understanding of the role of the gender in the pathway from physical and mental impairments to death.

Methods

Study Design

A 7-year prospective follow-up study will be conducted. In 1994, the Short Form 36 Health Survey was administered to 2,164 residents of Taichung City, and Taichung, NanTou, ChangHwan, and Yunlin Counties of Taiwan. These 2,164 persons were followed up by telephone and were linked with Death Dataset of National Health Department (1995-2001).

Study Population and Sampling Method

The target population was residents of Taichung City, and Taichung, NanTou, ChangHwan, and Yunlin Counties of Taiwan in October 1994. There were a total of 1,149,288 households and 4,741,870 residents in this area during the time of study, about 22.6% of the national population. The sampling frame of this study used the set of all family records from the Bureau of Households. Since Taiwan has good registration of households, this sampling frame should provide good reliability.

A four-stage sampling design was used to draw subjects, with sampling rate proportional to size (SRPS) within each stage. In the first stage of sampling, 20 city districts or townships were randomly selected from a total of 89. In the second stage, 3 Tsuns or Lis (blocks of household units) were randomly selected from each sample city districts/townships, for a total of 60 Tsuns or Lis. In the third stage, 50 households were randomly selected from each sample Tsun or Li, for a total of 3,000 sample households. In this way, each household had the same probability (0.0026) of being selected as a sample household. In the final stage of sampling, a subject was randomly selected from each sample household. A total of 3,000 subjects were selected in our study, and 2,164 agreed to participate. Thus the overall response rate is 72.13%. About 40% them were between 25-44 years old and 51.1% were male. More than 60% of them had less than or equal to 9 years of education. The percentages of subjects reporting that they had a chronic condition at the time of interview, had bed-ridden days, and work loss days due to illness in the past 6 months are 16.2%, 6.0%, and 9.5%, respectively.

Data Collection

We used a face-to-face interview for data collection. At the beginning of the study, a trained interviewer visited the study subjects at their homes to collect information about sociodemographic data and Chinese-version SF-36. Three attempts were made to contact selected study subjects in a

week. If the last attempt failed to contact a subject, this subject would be given up. In this study, two waves of data was collected one year apart in the end of 1994 and 1995. The first wave of data was used for the current paper.

Measurement

SF-36

The SF-36 is a short questionnaire with 36 items which measure eight multi-item variables: physical functioning (10 items), social functioning (2 items), role limitations due to physical problems (4 items), role limitations due to emotional problems (3 items), mental health (5 items), energy and vitality (4 items), pain (2 items), and general perception of health (5 items). There is a further unscaled single item on changes in respondents‘ health over the past year. For each variable item scores are coded, summed, and transformed to a scale from 0 (worst possible health state measured by the questionnaire) to 100 (best possible health state). In addition, SF-36 Physical (PCS) and Mental (MCS) Component Summary scales are derived following the standard SF-36 scoring algorithms. For the SF-36, a high score indicates better health state.

Sociodemographic Factors

Age, gender, and level of education were collected in the questionnaire.

Morbidit Illness y or Variables

Morbidity was assessed through questions about (1) chronic conditions that diagnosed by a doctor, (2) number of bed-ridden days during the past 6 months, and (3) number of work loss days due to illness during the past 6 months.

Number of chronic conditions: Interviewees were asked whether they have hypertension, diabetes, cancer, stroke, asthma, liver diseases, arthritis rheumatism, kidney disease, and heart disease. Number of chronic conditions was derived from the summation of the above diseases.

Number of bed-ridden days during the past 6 months: Those who endorsed being restricted to bed due to illness during the past 6 months reported the number of their bed-ridden days.

Number of work loss days due to illness during the past 6 months: Those who endorsed being absent from working due to illness during the past 6 months reported the number of their work loss days.

Vital Status Ascertainment

All persons who participated at the baseline interview were followed up by phone to ascertain participants’ vital status either via study subjects or via their family members. Vital status was also obtained via linkage with Death Dataset of National Health Department (1995-2001). Those whose status was not confirmed were censored.

Statistical Analysis

Univariate and Multivariate logistic regression models were used to estimate the odds ratio of death during the follow-up period for those individuals reporting, at baseline, high versus low levels of SF-36 scores. These variables will be examined separately and adjusted for age, gender and co-morbidity. Subsequently, the 2 summary component scales, PCS and MCS, of SF-36 were examined simultaneously, adjusting for age, gender, and co-morbidity. The LOGISTIC of SAS 8.02 will be used to fit the proportional hazards models.

Results

The mean age of the study subjects was 36.3 years old. The proportion of female was 50.7%. The mean education was 6.7. About 20% of them having chronic condition at baseline. The

mean of 10 scales of SF-36 were PF (mean [SD], 91.1 [18.1]), RP (86.1 [36.1]), BP (80.4 [14.8]), GH (73.6 [19.4]), VT (70.7 [15.9]), SF (87.6 [15.8]), RE (86.3 [31.4]), MH (79.4 [14.5]), PCS (52.5 [7.1]), and MCS (50.9 [7.7]) (Table 1).

The mean differences of 10 scales of SF-36 between dead and live subjects were PF (mean difference [95% CI], 22.47 [18.36, 26.57]), RP (26.33 [18.87, 33.78]), BP (11.65 [8.21, 15.08]), GH (18.44 [13.97, 22.91]), VT (12.85 [9.16, 16.54]), SF (15.00 [11.35, 18.65]), RE (23.80 [16.48, 31.12]), MH (9.91 [6.52, 13.31]), PCS (8.28 [6.66, 9.89]), and MCS (5.21 [3.41, 7.01]) (Table 2). The crude odds ratios (ORs) were statistically significant for all scales (Table 3). After adjusting for the effects of age, gender, and chronic disease, scales of PF, GH, VT, RE, MH, PCS, and MCS were statistically significant. Among these significant scales, GH, VT, MH, PCS, and MCS showed a significant trend with mortality (p for trend =0.0346, 0.0061, 0.0021, 0.0182, and 0.0055, respectively). Subjects with PF score less than or equal to 75 increased risk of death compared with those with PF score greater than 75 (OR, 2.57; 95% CI, 1.32-5.64). The odds of death for subjects with low GH score (≤62) was 2.41 times of that for subjects with high GH score (95% CI, 1.37-4.23). The odds of death for subject with low VT score (≤60) was 1.92 times the odds for those with high VT score (>60) (95% CI, 1.12-3.30). Those who had RE score less than 100 had a higher risk of death compared with those had score of 100 (OR,1.79; 95% CI, 1.02-3.15). The MH score at baseline was categorized into 4 categories (≤60, 60-76, 77-84, >84) according quartile so that the odds of death was for those with score of MH ≤60, 60-76, and 77-84 were 7.68 (95% CI, 1.73-34.05), 5.65 (95% CI, 1.20-26.54), and 4.26 (95% CI, 0.88-20.61), comparing with those with MH >84. Subjects with PCS score less than or equal to 51.37 increased risk of death compared with those with PCS score greater than 51.37 (OR, 2.42; 95% CI, 1.11-5.25). The MCS score at baseline was categorized into 4 categories (≤48.28, 48.29-52.77, 52.78-56.26, >56.26) according quartile so that the odds of death was for those with score of MH ≤48.28, 48.29-52.77, and 52.78-56.26 were 2.88 (95% CI, 1.18-7.03), 1.26 (95% CI, 0.46-3.43), and 1.29 (95% CI, 0.48-3.48), comparing with those with MCS >56.26.

In multivariate model considering the effects of PCS and MCS simultaneously, the effects of PCS and MCS remained similar (OR, 2.32; 95% CI, 1.07-5.05 for PCS; 2.95, 1.21-7.24 for MCS ≤48.28; 1.35, 0.50-3.67 for MCS 48.29-52.77, and 1.42, 0.53-3.85 for MCS 52.78-56.26.

Our study identified significant effects of Physical and Mental Summary Scales of SF-36, that measuring the effects of physical functioning, perceived well-being, social and role disability and personal perceptions of health, on mortality.

Table 1. Distributions of study subjects' sociodemographic factors and 10 scales of SF-36 at baseline.

Variables	Mean	SD
Sociodemographic Factors		
Age, years	36.3	21.8
Gender, female, n (%)[a]	637	50.7
Education, years	6.7	5.0
Having chronic condition, n (%)[a]	244	19.4
SF-36		
Physical Functioning	91.1	18.1
Role-Physical	86.1	36.1
Bodily Pain	80.4	14.8
General Health	73.6	19.4
Social Functioning	70.7	15.9
Vitality	87.6	15.8
Role-emotion	86.3	31.4
Mental Health	79.4	14.5
Physical Component Scale	52.5	7.1
Mental Component Scale	50.9	7.7

[a] N and % are presented.

Table 2. Mean differences and their 95% confidence interval for 10 scales of SF-36 between those who were dead and not.

Variables	Mean Differences	95% CI
SF-36		
Physical Functioning	22.5	18.4-26.6
Role-Physical	26.3	18.9-33.8
Bodily Pain	11.7	8.2-15.1
General Health	18.4	14.0-22.9
Social Functioning	12.9	9.2-16.5
Vitality	15.0	11.4-18.7
Role-emotion	23.8	16.5-31.1
Mental Health	9.9	6.5-13.3
Physical Component Scale	8.3	6.7-9.9
Mental Component Scale	5.2	3.4-7.0

Table 3. Crude and adjusted odds ratios of mortality and their 95% confidence intervals for 10 scales of SF-36.

Variables	Crude OR (95% CI)	Adjusted[a] OR (95% CI)
SF-36		
Physical Functioning (>75 as reference)		
≤75	7.8 (4.7-12.7)	2.5 (1.3-4.6)
Role-Physical (100 as reference)		
≤99	3.9 (2.4-6.4)	1.7 (1.0-3.0)
Bodily Pain (>74 as reference)		
≤74	3.7 (2.3-6.0)	1.6 (0.9-2.8)
General Health (>74 as reference)		
≤62	9.1 (3.6-23.1)	2.4 (0.9-6.6)
63-77	2.0 (0.7-5.6)	0.8 (0.3-2.4)
78-90	2.2 (0.7-6.6)	1.6 (0.5-5.1)
Social Functioning (>87.5 as reference)		
≤87.5	3.7 (2.0-6.6)	1.6 (0.8-3.1)
Vitality (>85 as reference)		
≤60	10.1 (2.4-42.2)	3.4 (0.7-16.0)
61-75	5.1 (1.2-21.6)	2.2 (0.7-10.7)
76-85	2.1 (0.4-10.1)	1.2 (0.2-6.3)
Role-emotion (>99 as reference)		
≤99	3.6 (2.2-5.9)	1.8 (1.0-3.1)
Mental Health (>84 as reference)		
≤68	2.6 (3.0-52.6)	7.7 (1.7-34.1)
68-76	6.8 (1.6-29.9)	5.7 (1.2-26.5)
77-84	4.6 (1.0-20.7)	4.3 (0.9-20.6)
Physical Component Scale (>51.4 as reference)		
≤51.4		2.4 (1.1-5.3)
Mental Component Scale (>56.3 as reference)		
≤48.3		2.9 (1.2-7.0)
48.4-52.8		1.3 (0.5-3.4)
52.9-56.3		1.3 (0.5-3.5)

[a] Ajusted for age, gender, and chronic condition.

Table 4. Mean differences and their 95% confidence interval for 10 scales of SF-36 between those who were dead and not.

Variables	Multivariate OR (95% CI)
Physical Component Scale (>51.4 as reference)	
≤51.4	2.3 (1.1-5.0)
Mental Component Scale (>56.3 as reference)	
≤48.3	3.0 (1.2-7.2)
48.4-52.8	1.3 (0.5-3.7)
52.9-56.3	1.4 (0.5-3.9)

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