

# Determinants of Self-Rated Health Three Months after Stroke

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*Objectives:* Self-rated health is an important aspect of life after stroke. The aim of this study was to compare self-rated health in a population of stroke patients to the general Danish population and to analyze to what extent clinical and patient-related factors influence self-rated health 3 months after stroke. *Methods:* We sent questionnaires on self-rated health (Short Form-12 Health Survey) to all patients younger than 80 years with first-time stroke admitted to any hospital in the Central Denmark Region between October 1, 2008, and December 31, 2011 (N = 2414). Information on clinical and patient-related determinants of self-rated health was obtained from population-based national health registers. *Results:* Compared to the general population, stroke patients rated their health lower than the general Danish population. The largest differences were found in domains of physical health, and only minor differences were identified in mental health between the study and the general Danish population. Stroke severity, comorbidity, smoking, educational level, and age were strongly associated with self-reported health. For patients with a “very severe” stroke, the adjusted odds ratios (ORs) of reduced mental health were 1.6 (95% confidence interval [CI]: 1.3-2.6) and 5.1 (95% CI: 2.7-9.6) for low physical health, compared to patients with “mild stroke.” Patients with a Charlson Comorbidity Index score of 3 or higher had a higher risk of low mental health (OR 1.9 [95% CI: 1.3-2.6]) and low physical health (OR 2.8 [95% CI: 1.9-4.0]) than patients with no additive diseases. *Conclusions:* Stroke had a marked impact of self-rated health, particularly physical health. Higher stroke severity and level of comorbidity were important risk factors of reduced self-rated health. **Key Words:** Cohort study—determinants—health-related quality of life—self-rated health—stroke—questionnaires.

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## Introduction

Improvements in the treatment of stroke have increased the number of survivors. This may potentially increase the number of patients with disability and reduced quality of life.<sup>1</sup> It is estimated that one third of stroke survivors require daily assistance for the rest of their lives.<sup>2,3</sup>

It is evident that measurements of mortality, neurological status, and disability are not sufficient to assess the entire range of stroke sequelae.<sup>3</sup> Other measurements that may help reflect the true burden of disease are necessary to make a qualified assessment of a patient's outcome. Self-rated health or health-related quality of life has been defined as “a self-rated measure consisting of multiple dimensions that includes but is not limited to the concepts of physical, social, and emotional health.”<sup>4</sup> Self-rated health is regarded as important to understand

a patient's needs and to evaluate the effects of therapeutic interventions.<sup>5</sup> Further, low self-rated health is found to be associated with other end points, for example, higher long-term mortality and lack of return to work.<sup>6,7</sup> Stroke patients report lower overall well-being than do healthy controls,<sup>8</sup> but knowledge on factors affecting self-rated health after stroke is sparse and inconsistent. The disparities among the existing studies have been interpreted as being due to variations in the instruments used to assess self-rated health and variations between the examined patient populations.<sup>8,9</sup> However, small sample sizes and the lack of information on potentially important determinants including in-hospital stroke care and lifestyle factors may also have contributed to inconsistencies in findings.

The aim of the present study was to compare self-rated health in a population of stroke patients to the general Danish population, and to analyze to what extent clinical and patient-related factors influence self-rated health 3 months after stroke in a large Danish cohort of stroke patients.

## Materials and Methods

### *Subjects and Study Design*

The source population consisted of all patients with first-time stroke admitted to any hospital in the Central Denmark Region between October 1, 2008, and December 31, 2011. The Central Denmark Region is one of five administrative units in Denmark with 1.2 million inhabitants.<sup>10</sup> Patients were admitted to 1 of 7 departments treating stroke patients in the region. Patients younger than 80 years, alive 90 days after stroke, and living in their own homes before the stroke were included and invited to participate in the study.

Three months after the stroke, a questionnaire including questions on self-rated health and attained education was delivered by mail. Nonrespondents were sent a new questionnaire 3 months later and again 6 months after the first questionnaire if there is still no response.

All patients were identified from the Danish Stroke Register (DSR), a nationwide initiative to monitor and improve the quality of care.<sup>11</sup> Participation is mandatory for all Danish departments treating patients for acute stroke. Data are prospectively collected during admission by health-care professionals using standardized registration forms. The register has been found to be highly valid regarding patient registration.<sup>11,12</sup>

Since 1968, all Danish residents have been assigned a unique civil registration number that is used in all health databases and permits unambiguous record linkage between databases. The Civil Registration System contains information on, for example, the civil registry number, name, gender, address, date of birth, and vital status.<sup>13</sup> Information on address and vital status was collected using this number before approaching each patient.

### *Self-Rated Health*

Outcome was self-rated health measured with the Short Form-12 Health Survey (SF-12) 3 months after stroke. The SF-12 is a generic measure of self-rated health that describes the patients' experiences of function and well-being in physical, mental, and social dimensions of life during the previous 4 weeks. The scale consists of 12 questions that correspond to 8 subscales and 2 summary scores.<sup>14</sup> The summary scores include the Physical Component Summary (PCS) and the Mental Component Summary (MCS). All of the SF-12 scores are each graded from 0 to 100, with higher scores indicating better health. The summary scores are norm-based with a mean of 50 and the standard deviation (SD) equals 10.<sup>14</sup> We used the Danish translation of the standard SF-12 version 2.0 with scoring as suggested by Ware and Sherbourne.<sup>14,15</sup> All scores were norm-based when compared with the general Danish population.<sup>16,17</sup> Both the SF-12 scores from the Danish general population and the study population were norm-based to Scandinavian (Swedish) values using the calculator accessible at the SF-36 homepage.<sup>18</sup> Clinical relevant differences were defined as differences larger than 5 points according to the original manual of SF-36 and the interpretation of half a standard deviation by Norman et al.<sup>14,19,20</sup>

### *Patient-Related Variables*

Information on gender and age at the time of stroke was obtained from the civil registration number. Educational level was obtained from the questionnaire. If educational level was missing in the questionnaire, register-based information on trade union membership was procured.<sup>21</sup>

Information on marital status, smoking, alcohol consumption, and body mass index was obtained from the DSR.

### *Clinical Variables*

The Charlson Comorbidity Index covers 19 major disease categories in an overall measure of comorbidity.<sup>22</sup> The index was calculated from data obtained from the Danish National Patient Registry.<sup>22,23</sup> Stroke was not included in the calculation of the index. The type and severity of stroke (the Scandinavian Stroke Scale [SSS]) at admission were collected from the DSR. SSS is graded from 0 to 58, with low scores indicating severe stroke.<sup>24</sup> An expert panel established by the DSR identified 9 processes of acute stroke care based on international guidelines.<sup>11</sup> A time frame was defined for each process. Patients were classified as eligible or noneligible for specific processes of care depending on relevance and contraindications.<sup>25</sup> The proportion of relevant processes of care received within each time frame was used to reflect the quality of in-hospital stroke care (Table 1).

A total of 4327 patients with first-time stroke and younger than 80 years were identified, and 3221 patients fulfilled the inclusion criteria. Ninety patients died

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