Nottingham Health Profile: reliability in a sample of 542 subjects with major amputation of one or several limbs

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Abstract
The reliability of a generic health-related quality of life measure was assessed for subjects with major amputation of one or several limbs. The Nottingham Health Profile was sent a first time to 1011 limb amputees, and a second time to the 542 respondents to the first inquiry. The intraclass correlation coefficient (ICC) between the answers to each survey was highest for the categories of distress caused by pain (ICC = 0.83), emotional reactions (ICC = 0.83) and mobility (ICC = 0.81). It was found satisfactory for energy level (ICC = 0.75), sleep (ICC = 0.75) and social isolation (ICC = 0.64). It is concluded that the NHP is a reliable health related quality of life measure for amputees.

Introduction
Health related quality of life has become a major medical issue. The status of patients and the outcome of medical actions are no longer exclusively described by the medical staff, but also by the patients themselves in terms of health related quality of life.

The scarcity of specific instruments makes it most difficult to assess health-related quality of life in connection with one specific illness. Specific instruments do not allow comparison of different illness groups. Instead of creating another specific instrument, the authors chose to apply a generic questionnaire to a specific group of patients, limb amputees. This approach has the advantage of further documenting the impairment in comparison with population values and across several conditions. Validity and reliability of generic instruments may change when applied to a specific condition or group. Therefore the test-retest reliability of the Nottingham Health Profile was checked.

The annual incidence of lower limb amputation in France in 1995 was 6.6 per 10^5 (Germanaud, 1996). People aged between 70 and 79 had the highest rate of amputation, due to First World War injuries and to vascular diseases. The few specific instruments for amputees (Day, 1981; Grise et al., 1993; Bilodeau et al., 1998; Legro et al., 1998) mainly concern functional aspects of daily life and prosthesis-related problems. Several authors measured the health-related quality of life of amputees with various instruments known to be valid and reliable in the general population (Matsen et al., 2000; Pezzin et al., 2000; Greive and Lankhorst, 1996; De Fretes et al., 1994). Duration of amputation appears to have a major impact on health-related quality of life and should be taken into account when considering other factors.

Method
Study instrument
The Nottingham Health Profile (NHP) is a generic health related quality of life measure (Hunt and McEwen, 1980). The NHP is valid and reliable in the general population (Hunt et al., 1980). It is designed to measure perceived distress related to health conditions. The NHP consists of two parts. Part I is most widely used.
and contains 38 questions, covering six categories of distress: energy level, pain, emotional reactions, sleep, social isolation, and mobility. The NHP is self-administered and can be used in a postal inquiry. Respondents must answer “yes” or “no”, scored respectively 1 and 0. Series of weights are used to score each category from 0 to 100. A low NHP score signifies a high quality of life. The NHP exists in several languages and a valid French version is available (Bucquet et al., 1990).

Study population

Major amputations of limbs were considered to include upper or lower limb disarticulations, amputations at trans-humeral, trans-radial, transfemoral and trans-tibial level but not partial hand or partial foot. Study subjects could have one or several major amputations.

Study sample

One thousand and eleven (1011) potential respondents were selected from the records of the Centre Régional d’Appareillage des Anciens Combattants et Victimes de Guerre de Nancy (Nancy Region Prosthesis Centre for War Victims). This is one of several medical centres, which were created in 1920 after the First World War primarily to supply victims of war with adaptive equipment. At the present time, the centre is managed by the French Ministry of Defense, and follows victims of war as well as independent workers living in the East of France. Selected subjects had major amputations of either one or several limbs.

Procedure

The NHP was mailed to 1011 subjects. A letter explaining the aim of the study and an information form concerning date of birth, sex, cause, level and date of amputation were sent. For test-retest reliability assessment the NHP was sent a second time three months later to the respondents to the first inquiry.

Data analysis

Statistical analyses were performed with SAS version 8.0. Characteristics of respondents and non-respondents to the second inquiry were compared using student t-test and chi-square test for continuous and categorical variables respectively.

NHP scores were computed by dimensions according to recommendations and are presented as mean and standard deviation. Test-retest reliability was assessed by calculating the Intraclass Correlation Coefficient (ICC), using a fixed effect two-way analysis of variance. The ICC is a measure of measurement concordance that varies between 0 and 1. Concordance between two measures is excellent when the ICC is close to 1, below 0.8 it is good, below 0.6 it is fair and below 0.4 it is moderate (Landis and Koch, 1977).

Table 1. Sociodemographic and diagnostic characteristics of the 267 respondents and the 275 non-respondents to the second inquiry.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Respondents (267)</th>
<th>Non-respondents (275)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at the time of the inquiry</td>
<td>65 ± 14.5</td>
<td>67.3 ± 13.9</td>
</tr>
<tr>
<td>Age at the time of amputation</td>
<td>30.5 ± 21.2</td>
<td>33.4 ± 22.6</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>85%</td>
<td>83%</td>
</tr>
<tr>
<td>Female</td>
<td>15%</td>
<td>18%</td>
</tr>
<tr>
<td>Cause of amputation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traumatic</td>
<td>74%</td>
<td>71%</td>
</tr>
<tr>
<td>Vascular</td>
<td>19%</td>
<td>23%</td>
</tr>
<tr>
<td>Other</td>
<td>8%</td>
<td>6%</td>
</tr>
<tr>
<td>Level of amputation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trans-tibial</td>
<td>48%</td>
<td>51%</td>
</tr>
<tr>
<td>Trans-femoral</td>
<td>31%</td>
<td>31%</td>
</tr>
<tr>
<td>Trans-radial</td>
<td>13%</td>
<td>10%</td>
</tr>
<tr>
<td>Trans-humeral</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Several limbs</td>
<td>6%</td>
<td>5%</td>
</tr>
</tbody>
</table>
Table 2. Quality of life scores, ascertained by the NHP through two successive inquiries at an interval of less than two months, among 254 subjects with major amputation of one or several limbs; a low NHP score means good quality of life and high a NHP score poor quality of life (*signifies p<0.0001).

<table>
<thead>
<tr>
<th>Category</th>
<th>First inquiry</th>
<th>Second inquiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobility*</td>
<td>42.5 (±25.8)</td>
<td>41.1 (±25.6)</td>
</tr>
<tr>
<td>Pain*</td>
<td>45 (±32.4)</td>
<td>43. (±32.3)</td>
</tr>
<tr>
<td>Energy level*</td>
<td>58.9 (±37.7)</td>
<td>54.2 (±39.1)</td>
</tr>
<tr>
<td>Emotional reactions*</td>
<td>25.3 (±29.3)</td>
<td>19.6 (±26.2)</td>
</tr>
<tr>
<td>Social isolation*</td>
<td>17 (±23.6)</td>
<td>13.3 (±22.5)</td>
</tr>
<tr>
<td>Sleep*</td>
<td>38.5 (±35.8)</td>
<td>33.7 (±35)</td>
</tr>
</tbody>
</table>

Results

Response rate

Five hundred and forty-two (542) subjects (53.6%) answered the first inquiry. From these subjects 267 (49.3%) answered the second inquiry. Time between the two responses was 52.4 (±9.8) days.

Population

The sociodemographic and diagnostic characteristics of the respondents and non-respondents to the second inquiry are presented in Table 1. Subjects who answered twice were aged 65 (±14.5) years at the time of the inquiry, and 30.5 (±21.2) years at the time of amputation. The male to female sex ratio was 5.7. Level of amputation was trans-tibial for 48%, trans-femoral for 31%, trans-radial for 13% and trans-humeral for 2%. Six percent (6%) of respondents had several limbs amputated. Cause of amputation was trauma for 74% and vascular disease for 19%. The remaining 7% were performed because of malformation, infection, tumour or electrocution.

Test-retest reliability of the NHP

The scores of quality of life obtained by the NHP from the first and the second inquiry are shown in Table 2. The highest scores (meaning poor quality of life) were obtained for the energy level, pain, mobility and sleep categories. The ICC for each category of distress is shown in Table 3. It was high for pain (0.81), emotional reactions (0.83), and mobility (0.81). The ICC was slightly lower for energy level and sleep (0.75) and lower for social isolation (0.64).

Discussion

Mean response rate to mail surveys varies between 44.6 and 85.2%. Response rates can be improved by face to face or telephone recruitment or by sending a “reminder” (Sitzia and Wood, 1998). The fact that such methods were not used in this study may explain the relatively low response rates (53.6% to the first and 49.3% to the second inquiry) that nevertheless remained within the accepted range of postal surveys (Asch et al., 1997).

Levels of amputation were similar to those in other studies (Fernandez et al., 2000), lower
limb amputations being more frequent than upper limb amputations. Most of the amputees were young (30.5±21.2) and trauma victims (72%). This might be explained by the type of patients studied: war victims and self-employed persons. The subjects in this study had been amputated for a long time (33.7 years) and their amputation-related status may be considered as stable.

A stable state is considered to be necessary to investigate test-retest reliability.

Reliability of the NHP is satisfactory in all categories of distress. Mobility, pain and emotional reactions have a high reliability. As shown by Pell et al. (1993), mobility is the most impaired category for amputated subjects, followed by energy and sleep. All these categories had a high correlation between the first and the second inquiry.

Grise et al., (1993) and Legro et al., (1998) developed reliable and valid measure instruments for amputees. Quality of life is studied amongst other aspects and in relation to walking function or the prosthesis. These specific instruments allow comparison of individuals with the same pathology. A generic instrument, such as the NHP permits comparison of different pathologies. Data on health related quality of life assessed by the NHP exist for several conditions, especially heart diseases (O'Brien and Rushby, 1990).

**Conclusions**

The NHP is a generic measure instrument of health related quality of life. It was found to be reliable for limb amputees. The NHP provides a useful tool for prospective studies in order to distinguish the “time” factor from other factors determining health-related quality of life.

**REFERENCES**


