

Hand eczema and quality of life: a population-based study

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Summary

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Background Hand eczema is a common disease in the population and is of interest from a public health perspective. Health-related quality of life (HRQoL) is increasingly being measured in dermatology.

Objectives To investigate HRQoL in relation to hand eczema in the general population.

Methods In the Public Health Survey of Stockholm County Council 2006, a questionnaire was sent to 57 009 randomly selected individuals aged 18–84 years. The response rate among persons of working age (18–64 years) was 58%. The questionnaire included a validated question concerning hand eczema and a generic instrument for measurement of HRQoL, the EQ-5D.

Results The proportion of individuals reporting problems was significantly larger among those with than without hand eczema in all five dimensions of the EQ-5D. Gender differences were found in some age subgroups. The EQ-5D index was lower for individuals with hand eczema than for those without, and on the same level as for psoriasis and asthma. Beta regression showed that the strongest confounding factors were low back pain, depression and hay fever/asthma.

Conclusions HRQoL was negatively affected in individuals with hand eczema irrespective of age. With the EQ-5D instrument it is also possible to detect certain gender differences. The EQ-5D index for hand eczema was of the same size as for psoriasis and asthma, all common diseases with an impact on public health. It is of importance to acknowledge the influence of hand eczema on daily life, in order to give the patients good care.

The 1-year prevalence of hand eczema in the general population of Sweden is about 10%, both among adults and among young people.^{1,2} The concept of hand eczema includes several diagnoses, where the most frequently occurring are irritant contact dermatitis and allergic contact dermatitis. However, individuals with hand eczema perceive the lesions on their hands in a similar way, regardless of origin. Hand eczema may constitute a considerable problem for the individual: it may disturb sleep and hamper leisure activities³ and, as an occupational skin disease, it may force the individual into sick leave and eventually result in a change of occupation.⁴

In 1989, Kickbusch defined public health as: ‘...the science and art of promoting health. It does so on the understanding that health is a process engaging social, mental, spiritual and physical well-being. It bases its actions on the knowledge that health is a fundamental resource to the individual, the community and to society as a whole and must be supported through sound investments into conditions of living that create, maintain and protect health’.⁵

The goal of a population-based approach to health is to understand and improve health at the population level. The first public health report in Stockholm was published in 1984 and was based on self-reports from 6300 individuals aged 18 years and over. Since then, five more public health surveys have been conducted in the Stockholm County Council area.

Health-related quality of life (HRQoL) generally refers to the perception of the effects of a disease and its impact on the patient’s daily functioning. HRQoL is the perceived functioning in physical, psychological and social dimensions and is therefore a more holistic assessment than the purely physical/clinical examination. The HRQoL instruments have gained increasing acceptance in the area of dermatology. Several dermatology-specific instruments have been developed and they are sometimes used together with a generic (i.e. not disease-specific) instrument. The pros and cons of generic vs. dermatology-specific instruments have been discussed by Both et al.,⁶ who concluded that the choice of instrument should be based on knowledge about the various instruments and the objectives of the study. HRQoL and hand eczema have been

examined in a few studies and these agree that HRQoL is lower in individuals with hand eczema.^{7–11}

The EQ-5D is a generic instrument that has been developed and refined by an international group of researchers since 1987 (<http://www.euroqol.org/>). The EQ-5D questionnaire has been translated into 27 languages. It has been used in clinical trials as well as in population health surveys. The EQ-5D has been used in very few studies in dermatology: a few times concerning psoriasis and acne and once concerning stasis eczema.^{12–18} To the best of our knowledge, the EQ-5D has not previously been used to study HRQoL and hand eczema. The aim of the present study was to investigate HRQoL in relation to hand eczema in the general population.

Subjects and methods

Questionnaire

The Public Health Survey of Stockholm County Council 2006 was distributed during the second half of 2006. The survey consisted of 90 questions covering different aspects of public health and risk factors. A previously validated question concerning hand eczema was included: 'Have you had hand eczema on any occasion during the past 12 months?'.¹⁹ The questionnaire also included the EQ-5D. Respondents complete the EQ-5D by choosing one of three severity levels on five questions covering five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression (see Appendix 1). Responses on the five dimensions are used to create an index, a single value for each health profile. The EQ-5D instrument concludes by asking the individual to estimate his/her general health status on a visual analogue scale (VAS) graded 0–100, where 0 is the worst imaginable health state and 100 is perfect health.

Indices for the EQ-5D dimensions are calculated using coefficients. In this study, the U.K. coefficients were used, as no value sets based on a Swedish population are available yet. The coefficients are based on Time Trade Off (TTO) studies, where 2997 persons representative of the noninstitutionalized adult population of England, Scotland and Wales were asked to value their health profiles. TTO involves asking the respondents to imagine giving up some life-span to have perfect health. The index for the U.K. value sets ranges from –0.594 to 1.000, where 1 = perfect health and 0 = dead. The negative EQ-5D scores represent certain health states valued as worse than dead.^{20,21}

Study population

The questionnaire was sent to 57 009 randomly selected individuals aged 18–84 years in the Stockholm County area. The response rate among persons of working age (18–64 years) was 58% (27 994/47 931). The gender distribution of responders was 45% men (12 580/27 994) and 55% women (15 414/27 994). Among the nonresponders to the questionnaire, men and younger individuals were over-represented.

The total internal drop-out for the five dimensions of the EQ-5D, the EQ-5D VAS and the hand eczema question was 2747, leaving values from 25 247 participants available for analyses. Index data concerning other diagnoses were calculated from questionnaires that included responses to all EQ-5D dimensions and the diagnosis in question.

Statistics

The χ^2 test was performed to test for differences in proportions reporting problems in the five dimensions of the EQ-5D. Linear-by-linear association was used to test for significant trends across age groups in each dimension, separately for those with and without hand eczema. Mann–Whitney tests were performed to test differences between EQ-5D indices. Spearman correlation was used to measure the correlation between index and VAS values. For the above analyses SPSS version 16.0 (SPSS Inc., Chicago, IL, U.S.A.) was used.

A histogram revealed that EQ-5D values were heavily skewed to the left (Fig. 1). Hence, taking the logarithm of the EQ-5D values would not render normally distributed data. In order to adjust for confounding variables when estimating the difference of EQ-5D index between those with and those without hand eczema, a beta regression, a type of generalized linear model, was performed.²² The assumptions are that the dependent variable is continuous or interval and the values have to be bounded (0, 1). Values of 0 and 1 are transformed by the formula:

$$Y^* = [y(N - 1) + 0.5]/N$$

where Y^* is the transformed EQ-5D index yielding values of 0.00002 and 0.99998.

EQ-5D index values < 0, and thus not fitting in the analysis, constituted 1.0% of the included 25 247 individuals. The

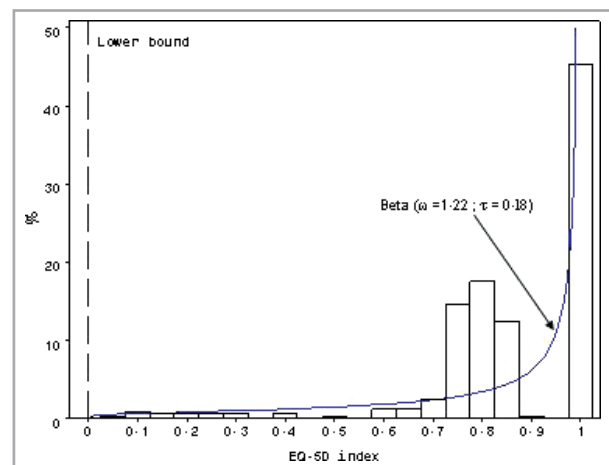


Fig 1. Histogram showing the EQ-5D indices for individuals with an EQ-5D index between 0 and 1. The curve represents the estimated distribution from the beta regression with two shape parameters, ω and τ .

shape of beta-distributed data is described by two parameters, ω and τ . The distribution is skewed to the left, symmetrical or skewed to the right when $\omega > \tau$, $\omega = \tau$ or $\omega < \tau$, respectively. In a beta regression, the mean is estimated by a logit model and it is possible to calculate the mean of EQ-5D index by the formula:

$$\mu_i = \frac{\exp(b_0 + b_1 \cdot x_1 + b_2 \cdot x_2 + \dots + b_k \cdot x_k)}{1 + \exp(b_0 + b_1 \cdot x_1 + b_2 \cdot x_2 + \dots + b_k \cdot x_k)}$$

where the outcome μ_i is a continuous variable.

The beta regression was performed with the procedure NLMIXED in SAS 9.1 (SAS Institute Inc., Cary, NC, U.S.A.).

The study was approved by the Regional Ethical Review Board in Stockholm, Sweden (2008/853-31).

Results

The proportions of individuals reporting problems in any of the five dimensions of the EQ-5D in relation to hand eczema, age and gender are shown in Table 1. For the purpose of the descriptive information given in Table 1, the answers are dichotomized into problems (second or third response alternative) and no problems (first response alternative). The proportion of individuals reporting problems was significantly larger in the group with hand eczema in all dimensions of the EQ-5D, compared with the group without. Women reported more problems than men in several dimensions. This is more

obvious in the group without hand eczema, but significant differences between genders were found in two dimensions and in some subgroups in the hand eczema group. The proportion of individuals reporting problems increased with age in all dimensions ($P < 0.001$) except for the 'anxiety/depression' dimension, and this was seen irrespective of hand eczema status. In the anxiety/depression dimension, the proportion of individuals reporting problems remained stable in the hand eczema group and decreased with age in the no hand eczema group ($P < 0.001$).

The mean EQ-5D index and mean EQ-5D VAS for individuals with and without hand eczema are shown in Table 2, in total and divided into subgroups based on age and gender. The difference in index values between individuals with and without hand eczema was statistically significant ($P < 0.001$) in totals as well as in all the subgroups. Table 2 also shows the correlation between index and VAS. The correlation was strong, except for men aged 18–34 years with hand eczema, and for men and women without hand eczema, where the correlation was moderate.

Mean EQ-5D indices for different self-reported diagnoses in the survey are presented in Table 3. All questions have been dichotomized as a yes/no variable. Hand eczema seems to have an impact on HRQoL similar in magnitude to that of, for example, psoriasis and asthma.

Figure 1 shows EQ-5D indices, revealing a distribution that is skewed to the left. The bar at 0.99998 constitutes nearly

Table 1 The proportion of individuals reporting problems^a in any of the five dimensions of EQ-5D in relation to hand eczema, gender and age

	Hand eczema				No hand eczema			
Age (years)	18–34	35–49	50–64	18–64	18–34	35–49	50–64	18–64
n	831	889	737	2457	6906	8134	7750	22 790
Men/women	257/574	324/565	286/451	867/1590	2969/3937	3728/4406	3714/4036	10 411/12 379
EQ-5D dimension (%)								
Mobility								
Men	2.3	12.0***	19.6***	11.6***	2.4	4.8	11.9	6.6
Women	3.0	8.8**	23.5***	10.9***	3.1	6.1	14.7	7.9
All	2.8	10.0***	22.0***	11.2***	2.8	5.5	13.3	7.3
Self-care								
Men	1.2	2.5	4.9**	2.9***	0.5	1.3	2.2	1.4
Women	0.2	2.8**	4.2*	2.3***	0.5	1.2	2.4	1.4
All	0.5	2.7***	4.5***	2.5***	0.5	1.3	2.3	1.4
Usual activities								
Men	5.1	13.3***	17.1***	12.1***	5.0	5.8	10.4	7.2
Women	7.7	16.1***	25.5***	15.7***	6.0	9.4	14.3	9.9
All	6.9	15.1***	22.3***	14.4***	5.6	7.7	12.4	8.7
Pain/discomfort								
Men	31.1**	54.6***	62.9***	50.4***	23.9	35.6	47.3	36.5
Women	38.9***	49.9***	68.1***	51.1***	30.9	42.7	56.7	43.5
All	36.5***	51.6***	66.1***	50.8***	27.9	39.5	52.2	40.3
Anxiety/depression								
Men	40.5***	42.0***	39.5***	40.7***	29.8	26.8	24.0	26.7
Women	50.3***	46.7***	47.2***	48.2***	43.1	35.0	33.9	37.2
All	47.3***	45.0***	44.2***	45.5***	37.4	31.3	29.2	32.4

^aSecond or third response alternative in the EQ-5D questionnaire. Comparison of hand eczema vs. no hand eczema within subgroups: * $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$. **Bold** = statistically significant differences ($P < 0.05$) between genders within cells.

Table 2 Mean EQ-5D index, mean EQ-5D visual analogue scale (VAS) and correlation between the two values for individuals with and without hand eczema, in total and in subgroups by age and gender

Gender	Age (years)	n	Index	95% CI	VAS	95% CI	Correlation coefficient, index vs. VAS
Hand eczema							
Men	18–34	257	0.852	0.828–0.876	79.813	77.837–81.788	0.379
Men	35–49	324	0.777	0.748–0.806	75.133	73.070–77.196	0.603
Men	50–64	286	0.739	0.705–0.773	72.206	69.702–74.710	0.691
Women	18–34	574	0.831	0.816–0.846	78.930	77.614–80.246	0.528
Women	35–49	565	0.786	0.765–0.807	75.671	72.860–78.482	0.671
Women	50–64	451	0.705	0.679–0.731	71.760	69.755–73.765	0.745
All	18–34	831	0.838	0.825–0.851	79.203	78.708–80.298	0.483
All	35–49	889	0.783	0.766–0.800	75.475	74.176–76.774	0.643
All	50–64	737	0.718	0.697–0.739	71.934	70.370–73.498	0.722
All	18–64	2457	0.782	0.772–0.792	75.674	74.905–76.443	0.555
No hand eczema							
Men	18–34	2969	0.898	0.892–0.904	83.218	82.714–83.722	0.446
Men	35–49	3728	0.874	0.868–0.880	81.540	81.048–82.032	0.524
Men	50–64	3714	0.836	0.829–0.843	79.646	79.070–80.221	0.606
Women	18–34	3937	0.861	0.856–0.866	80.920	80.420–81.420	0.496
Women	35–49	4406	0.839	0.833–0.845	80.142	79.627–80.657	0.565
Women	50–64	4036	0.793	0.786–0.800	78.546	77.948–79.144	0.664
All	18–34	6906	0.877	0.873–0.881	81.908	81.549–82.267	0.479
All	35–49	8134	0.855	0.851–0.859	80.783	80.424–81.142	0.546
All	50–64	7750	0.814	0.809–0.819	79.073	78.657–79.489	0.663
All	18–64	22 790	0.848	0.845–0.851	80.542	80.322–80.762	0.626

CI, confidence interval.

Table 3 Mean EQ-5D index for various self-reported diagnoses in the Public Health Survey Stockholm County Council 2006

Diagnosis	n	Index	95% CI
All 18–64 years	26 336	0.839	0.836–0.842
Hay fever and/or asthma	9378	0.814	0.809–0.819
Hay fever	8759	0.814	0.809–0.819
Asthma	2175	0.796	0.786–0.806
Psoriasis	879	0.791	0.775–0.807
Hand eczema	2571	0.779	0.769–0.789
Diabetes	799	0.710	0.689–0.731
Depression	3620	0.659	0.649–0.649
Low back pain ^a	3868	0.634	0.625–0.643
Rheumatoid arthritis	515	0.561	0.533–0.589
Chronic obstructive lung disorder	209	0.559	0.512–0.606

^aTwo or more times during the past week. CI, confidence interval.

50% of the individuals who are included in the beta regression analysis. The two shape parameters, ω and τ , estimated by the model, are 1.22 and 0.18, respectively.

Table 4 shows univariate as well as multivariate analysis. First, we investigated which variables were potential confounders by considering only those showing a P-value ≤ 0.20 . Next we tested which of the variables changed the beta coefficient of hand eczema by more than 20%. If a variable also

met this second criterion it was considered a confounder and was included in the multivariate analysis. The reduction of difference in EQ-5D index (calculated by the beta coefficient) between individuals with and without hand eczema in the multivariate compared with the univariate analysis is an indication that the difference is at least partly explained by other factors: low back pain, depression and asthma/hay fever.

Discussion

The present study confirms that HRQoL measured with the EQ-5D is negatively affected in individuals with hand eczema. The mean EQ-5D index was significantly lower for those with hand eczema than for those without, both in the group as a whole and within all age and gender subgroups. This indicates that hand eczema has an impact on HRQoL for all those affected. The EQ-5D VAS scores showed that individuals with hand eczema rated their health as significantly poorer than those without.

HRQoL in individuals with hand eczema differed slightly between subgroups based on age and gender (Table 1). A closer look at the young men and women (18–34 years) revealed that only the 'pain/discomfort' and 'anxiety/depression' dimensions were causing significant differences in EQ-5D index between those with and without hand eczema. For the middle age-group (35–49 years), the proportion of individuals reporting problems was larger in the hand eczema

Table 4 Univariate and multivariate beta regressions with beta coefficients for different variables. The middle column shows the percentage change of the beta coefficient for hand eczema when the variable in question is incorporated in the analysis

Variable	Univariate analysis	% change in beta coefficient for hand eczema	Multivariate analysis
Hand eczema	$b_0 = 1.92^a$ $b = -0.33^b$		$b_0 = 2.34$ $b = -0.17$
Low back pain	$b_0 = 2.13$ $b = -1.34$	35.5	$b = -1.27$
Depression	$b_0 = 2.08$ $b = -1.06$	28.9	$b = -0.91$
Age group (years)	$b_0 = 0.93$		
18–34	$b = 1.18$		
35–49	$b = 1.00$		
50–64	$b = 0.76$		
Female gender	$b_0 = 2.04$ $b = -0.27$	6.9	
Rheumatoid arthritis	$b_0 = 1.94$ $b = -1.40$	18.7	
Diabetes	$b_0 = 1.91$ $b = -0.47$	16.7	
Chronic obstructive lung disorder	$b_0 = 1.90$ $b = -1.16$	17.4	
Psoriasis	$b_0 = 1.90$ $b = -0.24$	19.7	
Hay fever and/or asthma	$b_0 = 1.95$ $b = -0.16$	23.4	$b = -0.08$

^a b_0 = beta coefficient included in the formula for calculation of mean EQ-5D index for those answering negatively to the variable in question. ^b b = beta coefficient expressing the change in EQ-5D index for those answering positively to the variable in question, included together with b_0 in the formula for calculation of mean EQ-5D index.

group in all dimensions of the EQ-5D. Among individuals without hand eczema, gender differences were found in four of five dimensions, with women scoring more poorly. However, the men in this age group with hand eczema reported problems to the same degree as the women in all dimensions. One reason might be that men are more unaccustomed, and therefore not as compliant, to the frequent moisturizing treatment hand eczema demands, which would relieve the pain and the fissures.²³ Also in the oldest age group (50–64 years), the proportion of individuals reporting problems was larger in the hand eczema group in all dimensions of the EQ-5D. Individuals without hand eczema in this age group showed gender differences in four dimensions, but these differences were seen only in the 'usual activities' and the 'anxiety/depression' dimensions among those with hand eczema. As many as one of four women with hand eczema reported problems with 'usual activities'. Women tend to be responsible for many of the household chores, e.g. washing dishes and doing laundry (Statistics Sweden, <http://www.scb.se/>). Maybe the high proportion of women reporting problems with 'usual activities' is a result of this domestic strain. Although there are more women with hand eczema, the results do not mirror the tendency for women in general to score lower on the EQ-5D. On the contrary, men seem to 'catch up' on the women when affected with hand eczema.

In a Swedish study from 2004,⁹ HRQoL in hand eczema was measured with the generic instrument SF-36 together with the dermatology-specific instrument Dermatology Life Quality Index (DLQI). Both instruments showed that HRQoL was lower for individuals with hand eczema. However, a gender difference in the mental health dimension, with women scoring more poorly, was detected with the SF-36 and not with the DLQI. In a recent multicentre study using the DLQI, a lowered HRQoL was found, with no gender differences, even though the men in that study had significantly more severe hand eczema than the women.⁷ As the present study is based on self-reported hand eczema, it was not possible to determine the severity of the eczema. However, some gender differences were found. It appears that these generic instruments (SF-36 and EQ-5D) are more suited than the DLQI to detect gender differences concerning hand eczema and HRQoL.

Hand eczema is often a chronic condition^{3,8} and the influence on HRQoL also seems to be long lasting. A study from 1990 showed that more than 80% of individuals with hand eczema considered that hand eczema interfered with their working and personal life in some way.⁸ In a follow-up of the same cohort 15 years later, 36% reported sleep disturbances and 72% reported hampered leisure activities in the last 12 months.³ In the present study, the only problems that decreased with age were in the anxiety/depression dimension

among individuals without hand eczema. For those with hand eczema, the proportions of individuals reporting problems remained equally high. This suggests that emotional problems related to hand eczema do not decline with age.

There was a strong correlation between EQ-5D index and VAS (Table 2). However, the mean self-estimated health seen in the VAS score was consistently lower than the calculated index. As the index is based on how the general population estimates the condition, this may indicate something about how hand eczema is perceived by persons without the condition. That the people around them underestimate the impact of the condition might in itself constitute a problem in the everyday working and social life of individuals with hand eczema. The youngest age group had a somewhat weaker correlation between index and VAS. This moderate correlation indicates that the instrument may not cover some information of importance for this age group. The otherwise strong correlation between index and VAS is, however, an indication that it is possible to use VAS as a proxy for HRQoL in some situations.

To be able to see hand eczema in context we checked the mean index for some other diagnoses included in the survey (Table 3). The EQ-5D index for hand eczema was of the same size as those for psoriasis and asthma. These are all common diseases in the population and are therefore of potential psychosocial and economic impact for society as well as for the individual. The definition of public health in the introduction stressed the point that health must be supported through investments that create, maintain and protect health. With a public health survey that also includes HRQoL, there is a possibility to evaluate health in a more comprehensive way and on a population level. This will in turn provide more information about where and how preventive measures and treatment efforts should be concentrated.

The relation between hand eczema and EQ-5D index was found to be strongly confounded by low back pain and depression (Table 4). The beta coefficient of hand eczema was reduced by 50% from the univariate compared with the multivariate analysis. The somewhat surprising finding, that low back pain was the largest confounding factor for hand eczema, may seem more reasonable if one takes into account which professions involve risk factors for hand eczema, e.g. hair-dressing, the health care sector, institutional housekeeping and construction work. These jobs often require uncomfortable working postures and heavy lifting.²⁴ Depression was also found to be a major confounder. Many chronic conditions are followed by depression.^{25–29} It is reasonable to believe that chronic hand eczema would be a risk factor for depression, because of its consequences.³⁰ The last identified confounder, hay fever and/or asthma, belongs to the 'atopic family' together with childhood eczema, which is a well-known risk factor for developing hand eczema as an adult.³¹

We chose to analyse the answers from persons of working age, as hand eczema is often an occupational disease. Besides, as people grow older, other health problems escalate as well, which might obscure the findings. Therefore the age of

65 years seemed to be a reasonable cut-off point. The participants in the present study were not patients, but rather a random sample from the general population; this serves to reduce potential problems of selection bias. Among non-responders, men and younger individuals were over-represented. Unfortunately, a further analysis on nonresponders was not possible. As the EQ-5D values were heavily skewed to the left (Fig. 1), we used beta regression to model data when adjusting for confounding variables. This procedure was found to be well suited in this type of study.

The EQ-5D is an instrument with several advantages. It is short, without too much detail, which makes it very quick and easy to complete. It enables comparisons between different states or diseases, a feature that could be of importance for a public health approach. However, it does not capture the specifics pertaining to each illness. The questions might be more directly applicable to some diagnoses than to others. For example, the strongest confounding diagnoses of this study, low back pain and depression, may correspond more directly to the questions in the instrument. A comparison of the EQ-5D with the DLQI would be of value to give a further evaluation of the use of the instrument regarding hand eczema.

In conclusion, HRQoL was negatively affected in individuals with hand eczema irrespective of age. With the EQ-5D instrument it was also possible to detect certain gender differences. The EQ-5D index was of the same size as those for psoriasis and asthma, all three common diseases with an impact on public health. It is of importance to acknowledge the impact of hand eczema on daily life, in order to give the patients good care.

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Appendix 1. The EQ-5D questionnaire

By placing a tick in one box in each group below, please indicate which statements best describe your own health state today.

Mobility

- I have no problems in walking about ☐
 I have some problems in walking about ☐
 I am confined to bed ☐

Self-care

- I have no problems with self-care ☐
 I have some problems washing or dressing myself ☐
 I am unable to wash or dress myself ☐

Usual activities (e.g. work, study, housework, family or leisure activities)

- I have no problems with performing my usual activities ☐
 I have some problems with performing my usual activities ☐
 I am unable to perform my usual activities ☐

Pain/discomfort

- I have no pain or discomfort ☐
 I have moderate pain or discomfort ☐
 I have extreme pain or discomfort ☐

Anxiety/depression

- I am not anxious or depressed ☐
 I am moderately anxious or depressed ☐
 I am extremely anxious or depressed ☐