Quality of life measures – an overview

Maria Kołtowska-Häggström
Proper Medical Writing, Warsaw, Poland and Uppsala, Sweden

Correspondence to:
Maria Kołtowska-Häggström
Proper Medical Writing
Topiel 21/7
00-342 Warsaw
Poland
+48 511 755 549
+46 703 69 57 17
maria.koltowska-haggstrom@propermedicalwriting.com

Abstract
HR-QoL measurements attempt to turn subjective information into objective information. In this article, I describe the different kinds of health-related quality of life (HR-QoL) measures, how they work, and how they can be interpreted. Main types of HR-QoL measures include generic; disease- or population-specific; dimension-specific; individualised; and preference-based. Each serves different purpose and should be applied to different populations. For example, generic measures can be used in general populations and across various diseases, whereas disease-specific ones address specific diseased populations. I also discuss key considerations for using and presenting HR-QoL measures, including ensuring that a validated and legally obtained measure is administered; describing the type and specifics of the HR-QoL measure; and explaining how the measure was used, how scores were computed, and how to interpret them.

Health-related quality of life (HR-QoL) belongs to the family of patient-reported outcomes. HR-QoL measurements attempt to turn subjective reports into objective data. This requires properly developed and well-validated measures, developed following well-defined and strict rules, such as those described in the *Guidance for Industry, Patient-Reported Outcome Measures: Use in Medical Product Development to Support Labeling Claims*, published by the US FDA in 2009.[1] Developing HR-QoL measures is laborious, time-consuming, and requires a highly skilled and knowledgeable team of researchers.

In this article, I describe the different kinds of HR-QoL measures, how they work, and how they can be interpreted. Depending on the purpose of measuring HR-QoL and the target population, HR-QoL measures are categorised as generic; disease- or population-specific; dimension-specific; individualised; and preference-based. Preference-based measures are sometimes referred to as "utility measures" because they primarily serve to generate utilities, a unit used in health economic evaluations, although utilities can also be derived from certain generic and disease-specific measures.[2] Furthermore, some measures can fall into two categories; for example, dimension-specific measures, which can be used in general population as well as across different diseases, can also be considered generic.

Generic HR-QoL measures
Generic HR-QoL measures are designed for use in any population, irrespective of disease status, that is, in patients regardless of the condition they suffer from and in general populations. Many generic measures focus on physical function and measure impairment, disability, or handicap. Others cover psychological issues. Although they are often considered as not being sensitive enough to detect changes specific to certain diseases, they allow comparisons across different conditions and with general populations. The most widely used generic measures are EQ-5D, the SF-36 (36-Item Short Form Survey) and the NHP (Nottingham Health Profile).

EQ-5D
The EQ-5D defines five dimensions of health: mobility, self-care, usual activities, pain/discomfort, and anxiety or depression.[3] In the original version of the EQ-5D, currently referred to as EQ-5D-3L, each dimension is categorised into three levels of burden: 1) no problem, 2) a moderate problem, and 3) an extreme problem. The respondents first indicate the level of burden that applies to their situation and then record their perception of their general health state on the EQ-VAS (EQ-visual analogue score). The EQ-5D is available in more than 170 languages[4]

and is being used in many clinical and economic studies as well as population surveys all over the world. Over the years, the measure has evolved and now two other versions are available – the EQ-5D-5L (Figure 1) and the EQ-5D-Y. The EQ-5D-5L was introduced in 2009 to increase sensitivity and reduce ceiling effect over the EQ-5D-3L. It contains two intermediate categories of burden: slight and severe. The EQ-5D-Y targets children and adolescents aged 8 to 15 years and is also available as a proxy measure. All EQ-5D measures can be administered as a paper or electronic version.[5] To use any of EQ-5D measures, a planned study or project needs to be registered at https://euroqol.org/support/how-to-obtain-eq-5d/, and the conditions of use agreed upon with the EuroQol EuroQol Research Foundation Office.

SF-36

The SF-36 measures physical and mental health as well as provides assessment of general health.[6] Physical health includes physical functioning (10 items), physical role functioning (4 items), bodily pain (2 items), and general health (6 items). Mental health includes vitality (4 items), emotional role functioning (3 items), social role functioning (2 items), and mental health (5 items). For most items, Likert's scale is used. The SF-36 is available in shorter versions, such as SF-6D, SF-12, and SF-20, of which the SF-6D is used primarily in health economic evaluations. These measures are in the public domain and free-of-charge, although certain legal conditions are imposed, for example, proper acknowledgement. They can be downloaded from https://www.rand.org/health/surveys_ tools.html. Following the instructions for calculating the scores is crucial because items for physical and mental health are constructed in opposite directions. The raw scores from the SF-36 can be standardised on a 100-point scale, assuming equal weighting for each item. For some countries, such as Germany, country-specific weights are available and should be used for national data.[7] Overall, a lower score denotes poorer HR-QoL.

Nottingham Health Profile

The NHP (Figure 2) is another example of a generic measure. It focuses on feelings and emotions, rather than physical performance, and is includes 38 items (statements) in six dimensions, as explained in the accompanying article "Measuring Quality of life – theoretical background" in this issue of *Medical Writing* (page 8).[8] The respondent selects "yes" or "no" according to whether a certain problem applies. The score is calculated by adding the number of "yes" answers (i.e., the number of recognised problems). Thus, a higher score denotes poorer HR-QoL. Galen Research is the copyright holder and should be contacted at http://www.galen-research. com to request permission for its use.

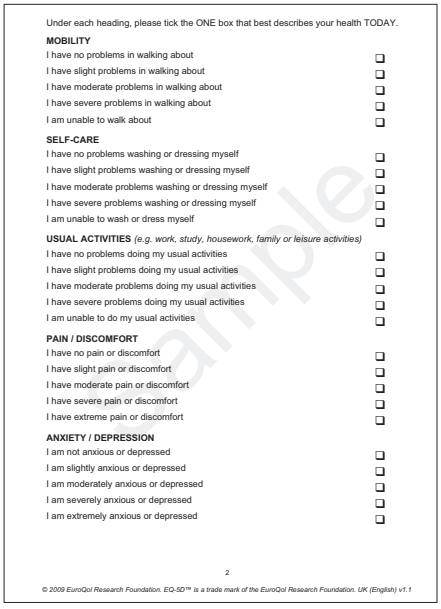
Disease-specific measures are developed to address the need to monitor patients with increased accuracy and to provide enough sensitivity to detect features of specific conditions.

Disease/population-specific measures

Disease-specific measures are developed to address the need to monitor patients with increased accuracy and to provide enough sensitivity to detect features of specific conditions. Currently, many disease-specific measures targeting various patient populations are available.

EORTC QlQ-C30

One of the first disease-specific HR-QoL



Under each heading, please tick the ONE box that best describes your health TODAY.

MOBILITY
I have no problems in walking about
I have slight problems in walking about
I have moderate problems in walking about
I have severe problems in walking about
I am unable to walk about

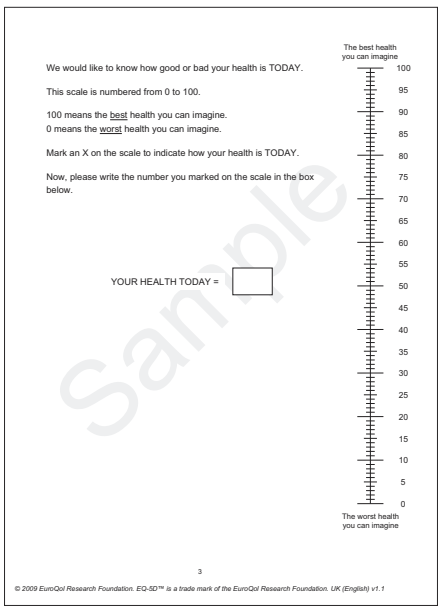
SELF-CARE
I have no problems washing or dressing myself
I have slight problems washing or dressing myself
I have moderate problems washing or dressing myself
I have severe problems washing or dressing myself
I am unable to wash or dress myself

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*
I have no problems doing my usual activities
I have slight problems doing my usual activities
I have moderate problems doing my usual activities
I have severe problems doing my usual activities
I am unable to do my usual activities

PAIN / DISCOMFORT
I have no pain or discomfort
I have slight pain or discomfort
I have moderate pain or discomfort
I have severe pain or discomfort
I have extreme pain or discomfort

ANXIETY / DEPRESSION
I am not anxious or depressed
I am slightly anxious or depressed
I am moderately anxious or depressed
I am severely anxious or depressed
I am extremely anxious or depressed

2



We would like to know how good or bad your health is TODAY.

This scale is numbered from 0 to 100.

100 means the best health you can imagine.
0 means the worst health you can imagine.

Mark an X on the scale to indicate how your health is TODAY.

Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY =

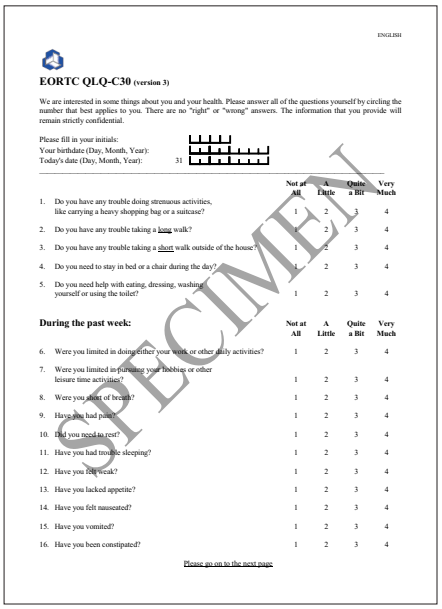
The best health you can imagine
100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0
The worst health you can imagine

3

Figure 1. EQ-5D-5L – sample

Figure 2. Nottingham Health Profile (NHP) – sample

Accessed from http://www.galen research.com/content/measures/NHP%20UK%20-%20First%20page%20sample.pdf. Reprinted with permission from Galen Research.



ENGLISH

EORTC QLQ-C30 (version 3)

We are interested in some things about you and your health. Please answer all of the questions yourself by circling the number that best applies to you. There are no "right" or "wrong" answers. The information that you provide will remain strictly confidential.

Please fill in your initials:
Your birthdate (Day, Month, Year):
Today's date (Day, Month, Year): 31

	Not at All	A Little	Quite a Bit	Very Much
1. Do you have any trouble doing strenuous activities, like carrying a heavy shopping bag or a suitcase?	1	2	3	4
2. Do you have any trouble taking a long walk?	1	2	3	4
3. Do you have any trouble taking a short walk outside of the house?	1	2	3	4
4. Do you need to stay in bed or a chair during the day?	1	2	3	4
5. Do you need help with eating, dressing, washing yourself or using the toilet?	1	2	3	4

During the past week:	Not at All	A Little	Quite a Bit	Very Much
6. Were you limited in doing either your work or other daily activities?	1	2	3	4
7. Were you limited in pursuing your hobbies or other leisure time activities?	1	2	3	4
8. Were you short of breath?	1	2	3	4
9. Have you had pain?	1	2	3	4
10. Did you need to rest?	1	2	3	4
11. Have you had trouble sleeping?	1	2	3	4
12. Have you felt weak?	1	2	3	4
13. Have you lacked appetite?	1	2	3	4
14. Have you felt nauseated?	1	2	3	4
15. Have you vomited?	1	2	3	4
16. Have you been constipated?	1	2	3	4

Please go on to the next page

Figure 3. European Organisation for Research and Treatment of Cancer (EORTC) QlQ-C30 – sample

Accessed from: http://www.eortc.org/app/uploads/sites/2/2018/08/Specimen-QLQ-C30-English.pdf
Reprinted with permission from the European Organisation for Research and Treatment of Cancer. For permission to use, contact the Quality of Life Department at EORTC (http://qol.eortc.org/)

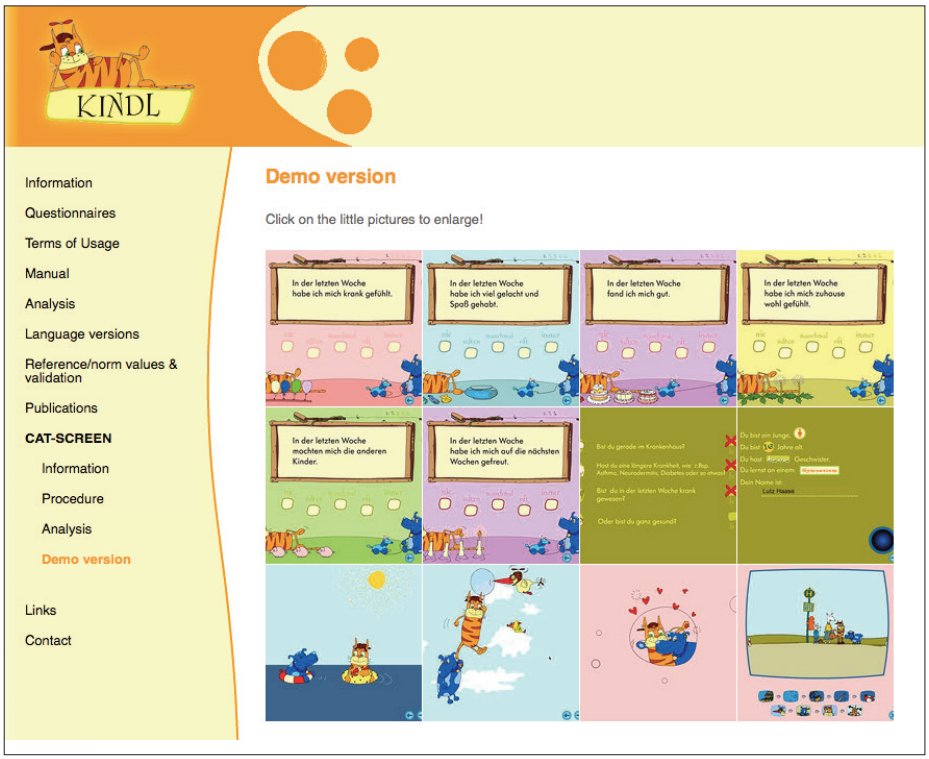


Figure 4. CAT screen

Accessed from https://www.kindl.org/english/cat-screen/demo-version/. Reprinted with permission from KINDL.

measures was the EORTC QlQ-C30, developed by the European Organisation for Research and Treatment of Cancer (EORTC) for patients with cancer (Figure 3).[9] The EORTC QIQ-30 is multidimensional and encompasses five functional scales (physical, role, cognitive, emotional, and social); three symptom scales (fatigue, pain, and nausea/vomiting); a global health status/HR-QoL scale, a number of single items such as dyspnoea, loss of appetite, insomnia, constipation, and diarrhoea; and an assessment of economic impact of the disease. Responses are given on Likert's scale, with a different number of choices for different items. The EORTC QIQ-C30 is copyrighted by EORTC (http://groups.eortc.be/qol/eortc-qlq-c30).[10] A manual is provided for computing and standardising scores, but in general, the scores for all scales and single items range from 0 to 100, with a higher score corresponding to greater response. Practically, this means that a higher score for a functional scale and for global health status/HR-QoL correspond to better function and HR-QoL; however, a higher score for symptoms indicates more or more severe symptoms or problems.[11] The EORTC QLQ-C30 is modular: the core addresses the issues generally encountered by patients with any cancer, and specific modules are included for different types of cancer or their treatment.

AcroQoL

Another example of a disease-specific measure is the AcroQoL (Acromegaly Quality of Life Questionnaire).[12] It contains 22 items describing problems experienced by patients with acromegaly. The items cover three dimensions: physical, psychological/appearance, and psychological/personal relations. Responses are based on Likert's scale, and depending on the item, choices for frequency or the degree of agreement with the problem described, are coded from 1 to 5. The raw scores for each item are summed and then standardised to a scale of 22 to 110, with a higher score corresponding to a better HR-QoL.

HR-QoL in children and adolescents: KINDL and CAT-SCREEN

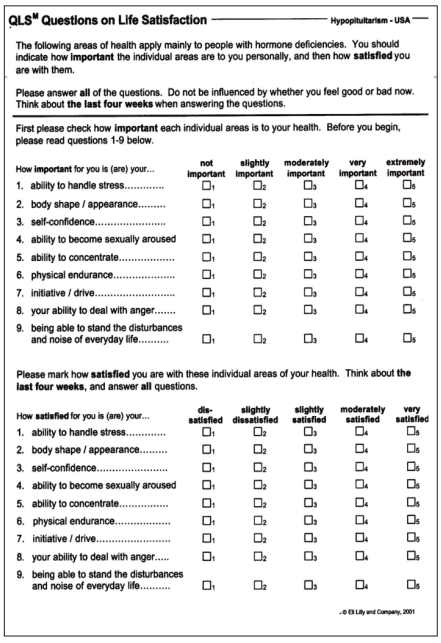
Interest in HR-QoL measures for the paediatric population is growing, and many measures have been or are being developed. KINDL®, originally developed by Monika Bullinger in 1994 assesses HR-QoL in healthy or diseased children and adolescents aged 3 to 17 years.[13,14] In addition to the core generic module, several disease-specific modules have been developed, such as for paediatric patients with asthma, epilepsy, cancer, diabetes, or obesity. The core measure contains 24 items and is provided in three versions for different age groups (4-6, 7-13, and 14-17 years), each of which can be completed by a child or adolescent and their caregiver. KINDL is available as a paper-pencil version and an electronic version called CAT-SCREEN (Figure 4).[15] All versions are copyrighted.

Dimension-specific measures

Dimension-specific measures focus on certain HR-QoL domains, such as pain, fatigue, and anxiety and depression. Examples include HADS (Hospital Anxiety and Depression Scale),[16] the McGill Pain Questionnaire,[17] and the MFI (Multidimensional Fatigue Inventory).[18] The structure and principles of dimension-specific measures are similar to those of disease-specific ones, as described above. Depending on the nature of the items, these measures can be used for any diseased population or even for a general population and thus could be considered generic.

Individualised measures

Individualised measures aim at evaluating HR-QoL from respondents' own perspective and allow them to either include items of their choice



QLS™ Questions on Life Satisfaction — Hypopituitarism - USA

The following areas of health apply mainly to people with hormone deficiencies. You should indicate how **important** the individual areas are to you personally, and then how **satisfied** you are with them.

Please answer **all** of the questions. Do not be influenced by whether you feel good or bad now. Think about **the last four weeks** when answering the questions.

First please check how **important** each individual areas is to your health. Before you begin, please read questions 1-9 below.

How **important** for you is (are) your...	not important	slightly important	moderately important	very important	extremely important
1. ability to handle stress	☐1	☐2	☐3	☐4	☐5
2. body shape / appearance	☐1	☐2	☐3	☐4	☐5
3. self-confidence	☐1	☐2	☐3	☐4	☐5
4. ability to become sexually aroused	☐1	☐2	☐3	☐4	☐5
5. ability to concentrate	☐1	☐2	☐3	☐4	☐5
6. physical endurance	☐1	☐2	☐3	☐4	☐5
7. initiative / drive	☐1	☐2	☐3	☐4	☐5
8. your ability to deal with anger	☐1	☐2	☐3	☐4	☐5
9. being able to stand the disturbances and noise of everyday life	☐1	☐2	☐3	☐4	☐5

Please mark how **satisfied** you are with these individual areas of your health. Think about **the last four weeks**, and answer **all** questions.

How **satisfied** for you is (are) your...	dis-satisfied	slightly dissatisfied	slightly satisfied	moderately satisfied	very satisfied
1. ability to handle stress	☐1	☐2	☐3	☐4	☐5
2. body shape / appearance	☐1	☐2	☐3	☐4	☐5
3. self-confidence	☐1	☐2	☐3	☐4	☐5
4. ability to become sexually aroused	☐1	☐2	☐3	☐4	☐5
5. ability to concentrate	☐1	☐2	☐3	☐4	☐5
6. physical endurance	☐1	☐2	☐3	☐4	☐5
7. initiative / drive	☐1	☐2	☐3	☐4	☐5
8. your ability to deal with anger	☐1	☐2	☐3	☐4	☐5
9. being able to stand the disturbances and noise of everyday life	☐1	☐2	☐3	☐4	☐5

© Eli Lilly and Company, 2001

Figure 5. QLS-H, an example of an individualised HR-QoL measure

From: Blum et al. J Clin Endocrinol Metab. 2003;88(9):4158-4167. Available from: https://academic.oup.com/jcem/article/88/9/4158/2845714. Reprinted with permission from the Endocrine Society.

and allocate weights or to only allocate weights for predefined items. In the case where respondents include items of their own choice, they first select the most important issues relating to their HR-QoL (step 1) and then self-rate the level of problems they face (step 2). After this, they allocate weights to them (step 3). In the case where respondents use predefined items, only steps 2 and 3 are followed. The SEIQoL (Schedule for the Evaluation of Individual Quality of Life)[19] and PGI (Patient Generated Index),[20] which use all three steps, laid the groundwork for individualised measures. The administration manual for the SEIQoL, published in 1993 by O'Boyle and colleagues, describes the whole process in detail.[21] In principle, the scores for each item are calculated by multiplying self-ratings by allocated weights. The sum of calculated scores for each item comprises the final score (index). The QLS-H (Questions on Life Satisfaction Modules-Hypopituitarism), developed for adult patients with growth hormone deficiency, is an example of a disease-specific, individualised measure containing predefined items (Figure 5).[22]

Preference-based (utility) measures

Preference-based measures emerged from decision-making theory and are mainly used in pharmacoeconomic evaluations, also known as cost-utility analyses. The basic requirement is to incorporate patient or general population weights (utilities) for different health states assigned under uncertainty.[23] Utilities range from 0 (death) to 1 (perfect health), although negative numbers are possible for states considered worse than death. Utilities are used to derive QALY (quality-adjusted-life-years). A number of techniques are used to generate utilities,[24] such as time trade-off, as used in EQ-5D, referred to as the EQ-VT approach;[25] standard gamble, as used in the SF-6D (Short Form 6D);[26] or VAS with relevant anchors. Briefly, Time trade-off asks respondents to decide how many years of life in a described (given) condition they are prepared to give up in order to live in full health. In other words, they are asked if they prefer to live shorter in full health instead of living a certain number of years longer in a given health state or condition. Standard gamble presents alternative treatments with probabilities of better and poorer outcome to life in given health state or condition. Responders provide the highest acceptable risk of treatment failure (e.g. death). Standard gamble and time trade-off are the gold standards for measuring health utilities, but they can also be generated using a combination of standard gamble and multi-attribute scaling analysis,[24] as in the HUI2 and HUI 3 (Health Utilities Index 2 and 3), or based on the SF-6D and the EQ-5D.

Conclusion

HR-QoL is an important construct widely used in daily patient management, clinical trials, health economics and medical decision making. Each of these applications imposes different requirements on the HR-QoL measures. Clinical use usually requires a measure that captures specific changes within a certain disease, within a patient population (in clinical trials), or for individual patients (in daily clinical practice). Pharmacoeconomic evaluation often requires that health status is expressed as a single summary score (a health status index) capable of identifying and quantifying differences across diseases and aggregate changes in patient health status over time. This explains why so many HR-QoL measures have been developed.

When working with HR-QoL data and writing manuscripts or other documents, medical writers should keep in mind the following:

1. **Most scales used in HR-QoL measures are ordinal, meaning that categories are not equally spaced**. For example, the distance from "not important at all" (1) to "little important" (2) is not necessarily the same as between "little important" (2) to "important" (3) That means that the change from (1) to (2) is not equal to the change from (2) to (3). An ordinal scale (e.g. Likert's scale) only indicates a direction of a change; it does not indicate magnitude.
2. **Responses and thus scores are subjective, meaning that the values behind them differ between respondents**. This depends on many different factors, such as personality, health and overall life experiences, and cultural norms.
3. **Understanding how a measure is constructed and how answers (choices) are coded is important when writing about them**. For example, is a higher numerical score better or worse, and does an increase in score indicate improvement or deterioration?

When writing, be sure to explain how to interpret the scores.

4. **When comparing results originating from different HR-QoL measures, check whether they are based on working scores or scale scores**.
5. **Make sure that the researchers used a legal version of a measure and that proper acknowledgement is included**. If a measure is publicly available (i.e. no licence needed), be sure to state so and acknowledge the source of the measure. Also, include information about the version number and the mode of administration needs.
6. In cases where a translation of a measure is used, confirm that it was properly translated and validated, and provide a few lines about it in the manuscript.
7. For manuscripts, follow the 2013 CONSORT-PRO extension[27] while presenting data from clinical trials that include patient-reported outcome measures.

Acknowledgements

I would like to thank Claire Gudex and Diarmuid De Faoite for their helpful comments on the first draft of this article. I also would like to thank Phil Leventhal for all his linguistic corrections and edits in my article.

Conflicts of interest

The author declares no conflicts of interest.

References

1. Food and Drug Administration (FDA) already in 2009 published the Guidance for Industry, Patient – Reported Outcome Measures: Use in Medical Product Development to Support Labeling Claims. U.S. Department of Health and Human Services Food and Drug Administration Center for Drug Evaluation and Research (CDER) Center for Biologics Evaluation and Research (CBER) Center for Devices and Radiological Health (CDRH); December 2009 [cited 2018 Sep 8]. Available from: https://www.fda.gov/downloads/drugs/guidances/ucm193282.pdf.
2. Brazier JE, Kolotkin RL, Crosby RD, Williams GR. Estimating a preference-based single index for the Impact of Weight on Quality of Life-Lite (IWQOL-Lite) Instrument from the SF-6D. Value Health 2004; 7(4):490–8.
3. Euroqol Group. EuroQoL – a new facility for the measurement of health-related quality of life. Health Policy 1990;16: 19–208.
4. EQ-5D-3L. 2018 [cited 2018 Sep 8]. Available from: https://euroqol.org/eq-5d-instruments/eq-5d-3l-about/.
5. EQ-5D Instruments. 2018 [cited 2018 Aug 12]. Available from: https://euroqol.org/eq-5d-instruments/ eq-5d-y-available-modes-of-administration/.
6. RAND Health 36-Item Short Form Survey (SF-36). 2018 [cited 2018 Aug 13]. Available from: https://www.rand.org/health/surveys_tools/mos/36-item-short-form.html.
7. Ellert U, Kurth B-M. [Methodological views on the SF-36 summary scores based on the adult German population]. Bundesgesundheitsblatt. Gesundheitsforschung. Gesundheitsschutz. 2004;47(11):1027–32.
8. Wiklund I. The Nottingham Health Profile – a measure of health-related quality of life. Scand J Prim Health Care Suppl. 1990;1:15–8.
9. Bjordal K, Kaasa S. Psychometric validation of the EORTC Core Quality of Life Questionnaire, 30-Item version and a diagnosis-specific module for head and neck cancer patients. Acta Oncol. 1992; 31(3):311–20.
10. EORTC Quality of life [cited 2018 Sep 13]. Available from: http://groups.eortc.be/qol/eortc-qlq-c30.
11. EORTC QLQ-C30 Scoring Manual [cited 2018 Sep 13]. Available from: http://qol.eortc.org/manuals/.
12. Badia X, Webb SM, Prieto L, Lara N. Acromegaly Quality of Life Questionnaire (AcroQoL). Health Qual Life Outcom. 2004;2:13.
13. Ravens-Sieberer U, Bullinger M. Assessing health related quality of life in chronically ill children with the German KINDL: first psychometric and content-analytical results. Qual Life Res. 1998:7(5): 399–407.
14. Ravens-Sieberer U, Bullinger M. News from the KINDL-Questionnaire – A new version for adolescents. Qual Life Res. 1999;7:653.
15. KINDL [cited 2018 Aug 14]. Available from: https://www.kindl.org/english/information/.
16. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983;67(6):361–70.
17. Melzack R. The McGill Pain Questionnaire: major properties and scoring methods. Pain. 1975;1(3):277–99.
18. Smets EM, Garssen B, Bonke B, De Haes JC. The Multidimensional Fatigue Inventory (MFI) psychometric qualities of an instrument to assess fatigue. J Psychosom Res. 1995;39(3):315–25.
19. McGee HM, O'Boyle CA, Hickey A, O'Malley K, Joyce CR. Assessing the quality of life of the individual: the SEIQoL with a healthy and a gastroenterology unit population. Psychol Med. 1991;21(3): 749–59.
20. Ruta DA, Garratt AM, Leng M, Russell IT, MacDonald LM. A new approach to the measurement of quality of life. The Patient-Generated Index. Med Care. 1994;32(11):1109–26.
21. O'Boyle C, McGee H, Hickey A, Joyce CRB, Browne J, O'Malley, Hiltbrunner B. The Schedule for the Evaluation of Individual Quality of Life (SEIQoL). Administration Manual. Dublin: Royal College of Surgeons in Ireland; 1993.
22. Herschbach P, Henrich G, Strasburger CJ, Feldmeir H, Marin F, Attanasio AM, Blum WF. Development and psychometric properties of a disease-specific quality of life questionnaire for adult patients with growth hormone deficiency. Eur J Endocrinol 2001;145:255–265.
23. Torrance GW. Utility approach to measuring health-related quality of life. J Chron Dis. 1987;40(6):593–600.
24. Marra CA, Woolcott JC, Kopec JA, Shojania K, Offer R, Brazier JE, Esdaile JM, Anis AH. A comparison of generic, indirect utility measures (the HUI2, HUI3, SF-6D, and the EQ-5D) and disease-specific instruments (the RAQoL and the HAQ) in rheumatoid arthritis. Soc Sci Med. 2005;60:1571–82.
25. EQ-5D 5L. Valuation: Standard value sets. [cited 2018 Sep 9]. Available from https://euroqol.org/eq-5d-instruments/eq-5d-5l-about/valuation-standard-value-sets/.

26. Brazier J, Roberts J, Deverill M. The estimation of a preference-based measure of health from the SF-36. J Health Econ. 2002;21(2):271–92.
27. Patient-reported outcomes (CONSORT PRO) [cited 2018 Sep 9]. Available from http://www.consort-statement.org/extensions/overview/consort-pro.
28. The Economist Intelligence Unit's quality-of-life index. 2005 [cited 2018 Aug 11]. Available from: https://www.economist.com/media/pdf/QUALITY_OF_LIFE.pdf.
29. World Health Organization (WHO) 1948 World Health Organization constitution Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19 June – 22 July 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948; Basic Documents, Forty-fifth edition, Supplement. October 2006 [cited 2018 Aug 11]. Available from: http://www.who.int/governance/eb/who_constitution_en.pdf.
30. Berger ML, Bingefors K, Hedblom EC, Pashos CL, Torrance GW, Dix Smith M, editors. Health care, cost, quality and outcomes: ISPOR book of terms. 1st ed. Lawrenceville: International Society for Pharmacoeconomics and Outcomes Research; 2003.
31. Fayers PM, Machin D. Quality of life, assessment, analysis and interpretation. 1st ed. Chichester, New York, Weinheim, Brisbane, Singapore, Toronto: John Wiley and Sons Ltd; 2001.
32. Kind P. Methodological issues in the assessment of quality of life. In: Abs R, Feldt-Rasmussen U, editors. Growth Hormone Deficiency in Adults: 10 Years of KIMS. Oxford: Oxford PharmaGenesis; 2004. p. 189–98.
33. Ware JE, Jr. The status of health assessment. Annu Rev Public Health. 1995;16:327–54.
34. Wilson IB & Cleary PD. Linking clinical variable with health-related quality of life. JAMA. 1995;273(1):59–65.
35. Snyder AR, Parsons JT, Valovich McLeod TC, Curtis Bay R, Michener LA, Sauers EL. Using disablement models and clinical outcomes assessment to enable evidence-based athletic training practice, Part I: Disablement Models. J Athl Train. 2008;43(4):428–36.
36. Calman KC. Quality of life in cancer patients: an hypothesis. J Med Ethics. 1984;10:24–127.
37. Hunt SM, McKenna SP. The QLDS: a scale for the measurement of quality of life in depression. Health Policy. 1992; 22:307–19.
38. Galen Research, Measures Database [cited 2018 Aug 12]. Available from: http://www.galen-research.com/measures-database/.
39. Kołtowska-Häggström M, Mattsson AF, Shalet SM. Assessment of quality of life in adult patients with GH deficiency: KIMS contribution to clinical practice and pharmacoeconomic evaluations. Eur J Endocrinol. 2009;161:S51-S64.
40. Hunt SM, McKenna SP, McEwen J, Williams J, Papp E. The Nottingham health profile: subjective health status and medical consultations. Soc Sci Med. 1981;15:221–9.
41. Likert RA. Technique for the measurement of attitudes. Arch Psychol. 1932;140:1–55.
42. Priestman TJ, Baum M. Evaluation of quality of life in patients receiving treatment for advanced breast cancer. Lancet. 1976;1(7965):899–900.
43. Juniper EF, Guyatt GH, Jaeschke R. How to develop and validate a new health-related quality of life instrument. In: Spilker B, editor. Quality of life and pharmacoeconomics in clinical trials. Philadelphia, New York, 2nd ed. Lippincott-Raven Publishers; 1996.

Author information

Maria Kołtowska-Häggström, MD, PhD, a co-owner of Proper Medical Writing, the first Polish medical writing agency, earned her PhD at Uppsala University (2008) based on the dissertation "Quality of life in adult patients with growth hormone deficiency; bridging the gap between clinical evaluation and health economic assessment". Maria is author of over 70 peer-reviewed publications, many of them relating to research on patient-reported outcomes. She is also a member of the European Association of Scientific Editors, European Society of Endocrinology, and Growth Hormone Research Society; reviewer for a number of journals; and an Associate Editor for *BMC Endocrine Disorders*. A longtime EMWA member, Maria is a section editor for *Medical Writing*, workshop leader, and Chair of an Expert Seminar Series.