Australian utility weights for the EORTC QLU-C10D, a multi-attribute utility instrument derived from the cancer-specific quality of life questionnaire, EORTC QLQ-C30

PharmacoEconomics

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Online Resource 3

Appendix 3 QLU-C10D scoring algorithm

Instructions for calculating EORTC QLU-C10D scores from EORTC QLQ-C30 responses

To calculate the QLU-C10D score from QLQ-C30 responses of a particular patient p, first determine their QLU-C10D level l for each dimension d, following the mapping of QLQ-C30 items to QLU-C10D levels provided in Table 1. A utility score of 1 is assigned to patients whose QLQ-C30 scores indicate they are at level 1 of all 10 dimensions of the QLU-C10D. For all other health states, the utility score is 1 minus each the utility decrement (w_{dl}) for each level down from no problems in each of the 10 QLU-C10D dimensions.

$$\text{QLU-C10D}_p = 1 - \sum_{d=1}^{10} w_{dl} \mid \text{QLU-C10D}_{dlp}$$

STATA code to calculate EORTC QLU-C10D scores from EORTC QLQ-C30 responses, based on the Australian utility weights

```
********************************************************************************
* Example code for converting EORTC QLQ-C30 data into QLU-C10D utility scores  *
* Written by Richard Norman, October 2017                                      *
*
*
* For further details of the QLU-C10D, see the following papers:              *
*
* King MT, et al Derivation of the health state classification system for the *
* QLU-C10D, an internationally-valid cancer-specific multi-attribute utility *
* instrument derived from the EORTC core quality of life questionnaire, QLQ-C30.
* Quality of Life Research. 2016; 25(3): 625-636. DOI 10.1007/s11136-015-1217-y
*
* Norman R, et al. Using a discrete choice experiment to value the QLU-C10D:
* Feasibility and sensitivity to presentation format. Quality of Life Research.
* 2016; 25(3): 637-649. DOI 10.1007/s11136-015-1115-3
*
* The utility algorithm reported in this code is based on Model 2 results for an
* Australian general population sample, as reported by King MT, et al.
* Australian utility weights for the EORTC QLU-C10D, a multi-attribute utility
* instrument derived from the cancer-specific quality of life questionnaire,
* EORTC QLQ-C30. Pharmacoeconomics DOI 10.1007/s40273-017-0582-5.
*
* This code is written for STATA users, and notes are added throughout to allow*
* conversion to other software as required.
*
* Any questions / comments on the instrument or code should be sent to         *
* madeleine.king@sydney.edu.au and richard.norman@curtin.edu.au                 *
********************************************************************************

********************************************************************************
* Stage 1: Derive of the QLU-C10D dimension levels from the corresponding EORTC*
* QLQ-C30 item responses.                            *
********************************************************************************

********************************************************************************
* Assumption: For this code to work, it is assumed that the EORTC QLQ-C30 code *
* is set up as thirty columns, labelled qlq1-qlq30, each of which can take one *
* of four values 1-4, where 1 = "Not at all", 2 = "A little", 3 = "Quite a     *
* bit", and 4 = "Very much". To derive the QLU-C10D, we only need 13 of these  *
* items, as described in Table 3 of King et al.(2016) and Table 1 of King et al,
* Pharmacoeconomics DOI 10.1007/s40273-017-0582-5.
*                   *
* Seven of QLU-C10D items are single items from the EORTC QLQ-C30, and three   *
* (PF, SF, BO) are composite, combined as described below.                     *
********************************************************************************

* Generate the QLU-C10D  level for Physical Functioning from QLQ-C30 item 2
* (long walk) and item 3 (short walk)

gen pf=.
replace pf=1 if qlq2==1
replace pf=2 if qlq2>1
replace pf=3 if qlq3>1
replace pf=4 if qlq3>2

*PF note: Level 1 is no problems in a long walk (and logically also in a short
* walk). Level 2 is any problem taking a long walk but no problem taking a short *
walk. Level 3 is a little problem with
 a short walk (and a logically a little * or more problem with a long walk), and
level 4 is higher level problems (quite * a bit or very much) with both short and
long walk.

* Generate the QLU-C10D level for Role Functioning from QLQ-C30 item 6
* (work and daily activities)
gen rf=.
replace rf=1 if qlq6==1
replace rf=2 if qlq6==2
replace rf=3 if qlq6==3
replace rf=4 if qlq6==4

* Generate the QLU-C10D  level for Social Functioning from QLQ-C30 item 26
* (family life) and item 27 (social activities)
gen sf=.
replace sf=1 if qlq26==1 & qlq27==1
replace sf=2 if qlq26==2 | qlq27==2
replace sf=3 if qlq26==3 | qlq27==3
replace sf=4 if qlq26==4 | qlq27==4

* SF note: SF in the QLU-C10D effectively uses the maximum value of either
* qlq26 or qlq27. So if qlq26 is 4 and qlq27 is 1, the utility dimension is at
* level 4.  The vertical bar in the code signifies OR.

* Generate the QLU-C10D level for Emotional Functioning from QLQ-C30 item 24
* (depressed)
gen ef=.
replace ef=1 if qlq24==1
replace ef=2 if qlq24==2
replace ef=3 if qlq24==3
replace ef=4 if qlq24==4

* Generate the QLU-C10D level for Pain from QLQ-C30 item 9 (pain)
gen pa=.
replace pa=1 if qlq9==1
replace pa=2 if qlq9==2
replace pa=3 if qlq9==3
replace pa=4 if qlq9==4

* Generate the QLU-C10D level for Fatigue from QLQ-C30 item 18 (tired)
gen fa=.
replace fa=1 if qlq18==1
replace fa=2 if qlq18==2
replace fa=3 if qlq18==3
replace fa=4 if qlq18==4

* Generate the QLU-C10D level for Sleep from QLQ-C30 item 11 (trouble sleeping)
gen sl=.
replace sl=1 if qlq11==1
replace sl=2 if qlq11==2
replace sl=3 if qlq11==3
replace sl=4 if qlq11==4

* Generate the QLU-C10D level for Appetite from QLQ-C30 item 13 (lack appetite)
gen ap=.
replace ap=1 if qlq13==1
replace ap=2 if qlq13==2
replace ap=3 if qlq13==3
replace ap=4 if qlq13==4

* Generate the QLU-C10D level for Nausea from QLQ-C30 item 14 (nauseated)
gen na=.
replace na=1 if qlq14==1
replace na=2 if qlq14==2
replace na=3 if qlq14==3
replace na=4 if qlq14==4

* Generate the QLU-C10D level for Bowel Problems from QLQ-C30 item 16 (constipated)
and item 17 (diarrhea)
gen bo=.
replace bo=1 if qlq16==1 & qlq17==1
replace bo=2 if qlq16==2 | qlq17==2
replace bo=3 if qlq16==3 | qlq17==3
replace bo=4 if qlq16==4 | qlq17==4

* BO note: BO in the QLU-C10D effectively uses the maximum value of either
* qlq16 or qlq17. So if qlq16 is 4 and qlq17 is 1, the utility dimension is at
* level 4.


********************************************************************************
* Stage 2: Generate utility decrements and sum to estimate utility scores      *
* The utility decrements (e.g. pfdec is the utility decrement for Physical     *
* Functioning dimension) are derived from Table 4 of the current paper under   *
* review, and are derived from a conditional logit constrained to be monotonic *
* within each dimension.                                                       *
********************************************************************************

gen pfdec=0
replace pfdec=-0.081 if pf==2
replace pfdec=-0.151 if pf==3
replace pfdec=-0.250 if pf==4

gen rfdec=0
replace rfdec=-0.024 if rf==2
replace rfdec=-0.090 if rf==3
replace rfdec=-0.139 if rf==4

gen sfdec=0
replace sfdec=0.000 if sf==2
replace sfdec=-0.064 if sf==3
replace sfdec=-0.091 if sf==4

gen efdec=0
replace efdec=-0.020 if ef==2
replace efdec=-0.066 if ef==3
replace efdec=-0.133 if ef==4

gen padec=0
replace padec=-0.053 if pa==2
replace padec=-0.129 if pa==3
replace padec=-0.155 if pa==4

gen fadec=0
replace fadec=-0.023 if fa==2
replace fadec=-0.029 if fa==3
replace fadec=-0.037 if fa==4
```

```
gen sldec=0
replace sldec=-0.033 if sl==2
replace sldec=-0.039 if sl==3
replace sldec=-0.039 if sl==4

gen apdec=0
replace apdec=-0.028 if ap==2
replace apdec=-0.050 if ap==3
replace apdec=-0.050 if ap==4

gen nadec=0
replace nadec=-0.047 if na==2
replace nadec=-0.068 if na==3
replace nadec=-0.107 if na==4

gen bodec=0
replace bodec=-0.047 if bo==2
replace bodec=-0.078 if bo==3
replace bodec=-0.094 if bo==4

* Generate the QLU-C10D utility score
gen qluc10d = 1+pfdec+rfdec+sfdec+efdec+padec+fadec+sldec+apdec+nadec+bodec

replace qluc10d=. if pf==.|sf==.|ef==.|pa==.|fa==.|sl==.|ap==.|na==.|bo==.

*******************************************************************************
* The new variable qluc10d is a utility score where full health (i.e. level 1 *
* in each of the utility levels) is scored at 1, and the minimum score (i.e.  *
* each utility level is at 4) is -0.095. These data can now be used to        *
* construct quality-adjusted life years (QALYs) for cost-utility analysis.
*******************************************************************************
```

SPSS code to calculate EORTC QLU-C10D scores from EORTC QLQ-C30 responses, based on the Australian utility weights

```
********************************************************************************
* Example code for converting EORTC QLQ-C30 data into QLU-C10D utility scores  *
* Adapted for SPSS by Daniel Costa, October 2017                               *
*
*
* For further details of the QLU-C10D, see the following papers:             *
*
* King MT, et al Derivation of the health state classification system for the *
* QLU-C10D, an internationally-valid cancer-specific multi-attribute utility *
* instrument derived from the EORTC core quality of life questionnaire, QLQ-C30.
* Quality of Life Research. 2016; 25(3): 625-636. DOI 10.1007/s11136-015-1217-y
*
* Norman R, et al. Using a discrete choice experiment to value the QLU-C10D:
* Feasibility and sensitivity to presentation format. Quality of Life Research.
* 2016; 25(3): 637-649. DOI 10.1007/s11136-015-1115-3
*
* The utility algorithm reported in this code is based on Model 2 results for an
* Australian general population sample, as reported by King MT, et al.
* Australian utility weights for the EORTC QLU-C10D, a multi-attribute utility
* instrument derived from the cancer-specific quality of life questionnaire,
* EORTC QLQ-C30. Pharmacoeconomics DOI 10.1007/s40273-017-0582-5.
*
* This code is written for SPSS users, and notes are added throughout to allow*
* conversion to other software as required.
*
* Any questions / comments on the instrument or code should be sent to         *
* madeleine.king@sydney.edu.au and richard.norman@curtin.edu.au                 *
********************************************************************************
```

```
********************************************************************************
* Stage 1: Derive of the QLU-C10D dimension levels from the corresponding EORTC*
* QLQ-C30 item responses.                   *
********************************************************************************

********************************************************************************
* Assumption: For this code to work, it is assumed that the EORTC QLQ-C30 code *
* is set up as thirty columns, labelled qlq1-qlq30, each of which can take one *
* of four values 1-4, where 1 = "Not at all", 2 = "A little", 3 = ?Quite a     *
* bit?, and 4 = ?Very much". To derive the QLU-C10D, we only need 13 of these  *
* items, as described in Table 3 of King et al.                    *
* Seven of QLU_C10D items are single items from the EORTC QLQ-C30, and three   *
* (PF, SF, BO) are composite, combined as described below.                     *
********************************************************************************

* Generate the QLU-C10D  level for Physical Functioning from QLQ-C30 item 2
* (long walk) and item 3 (short walk).
compute pf=$sysmis.
if qlq2=1 pf=1.
if qlq2>1 pf=2.
if qlq3>1 pf=3.
if qlq3>2 pf=4.
exe.


*PF note: Level 1 is no problems in a long walk (and logically also in a short
* walk). Level 2 is any problem taking a long walk but no problem taking a short
* walk. Level 3 is a little problem with a short walk (and a logically a little
* or more problem with a long walk), and level 4 is higher level problems (quite
* a bit or very much) with both short and long walk.

* Generate the QLU-C10D level for Role Functioning from QLQ-C30 item 6
* (work and daily activities).
compute rf=$sysmis.
if qlq6=1 rf=1.
if qlq6=2 rf=2.
if qlq6=3 rf=3.
if qlq6=4 rf=4.
exe.


* Generate the QLU-C10D level for Social Functioning from QLQ-C30 item 26
* (family life) and item 27 (social activities).
compute sf=$sysmis.
if qlq26=1 & qlq27=1 sf=1.
if qlq26=2 | qlq27=2 sf=2.
if qlq26=3 | qlq27=3 sf=3.
if qlq26=4 | qlq27=4 sf=4.
exe.

* SF note: SF in the QLU-C10D effectively uses the maximum value of either
* qlq26 or qlq27. So if qlq26 is 4 and qlq27 is 1, the utility dimension is at
* level 4.  The vertical bar in the code signifies OR.

* Generate the QLU-C10D level for Emotional Functioning from QLQ-C30 item 24
* (depressed).
compute ef=$sysmis.
if qlq24=1 ef=1.
if qlq24=2 ef=2.
if qlq24=3 ef=3.
if qlq24=4 ef=4.
exe.

* Generate the QLU-C10D level for Pain from QLQ-C30 item 9 (pain).
compute pa=$sysmis.
if qlq9=1 pa=1.
if qlq9=2 pa=2.
if qlq9=3 pa=3.
if qlq9=4 pa=4.
exe.

* Generate the QLU-C10D level for Fatigue from QLQ-C30 item 18 (tired).
compute fa=$sysmis.
if qlq18=1 fa=1.
if qlq18=2 fa=2.
if qlq18=3 fa=3.
if qlq18=4 fa=4.
exe.

* Generate the QLU-C10D level for Sleep from QLQ-C30 item 11 (trouble sleeping).
compute sl=$sysmis.
if qlq11=1 sl=1.
if qlq11=2 sl=2.
if qlq11=3 sl=3.
if qlq11=4 sl=4.
exe.

* Generate the QLU-C10D level for Appetite from QLQ-C30 item 13 (lack appetite).
compute ap=$sysmis.
if qlq13=1 ap=1.
if qlq13=2 ap=2.
if qlq13=3 ap=3.
if qlq13=4 ap=4.
exe.

* Generate the QLU-C10D level for Nausea from QLQ-C30 item 14 (nauseated).
compute na=$sysmis.
if qlq14=1 na=1.
if qlq14=2 na=2.
if qlq14=3 na=3.
if qlq14=4 na=4.
exe.

* Generate the QLU-C10D level for Bowel Problems from QLQ-C30 item 16 (constipated)
and item 17 (diarrhea).
compute bo=$sysmis.
if qlq16=1 & qlq17=1 bo=1.
if qlq16=2 | qlq17=2 bo=2.
if qlq16=3 | qlq17=3 bo=3.
if qlq16=4 | qlq17=4 bo=4.
exe.

* BO note: BO in the QLU-C10D effectively uses the maximum value of either
* qlq16 or qlq17. So if qlq16 is 4 and qlq17 is 1, the utility dimension is at
* level 4. The vertical bar in the code signifies OR.


*******************************************************************************
* Stage 2: Generate utility decrements and sum to estimate utility scores      *
* The utility decrements (e.g. pfdec is the utility decrement for Physical     *
* Functioning dimension) are derived from Table 4 of the current paper under   *
* review, and are derived from a conditional logit constrained to be monotonic *
* within each dimension.                                                       *
*******************************************************************************

compute pfdec=0.
if pf=2 pfdec=-0.081.
if pf=3 pfdec=-0.151.
if pf=4 pfdec=-0.250.
exe.

compute rfdec=0.
if rf=2 rfdec=-0.024.
if rf=3 rfdec=-0.090.
if rf=4 rfdec=-0.139.
exe.
```

```
compute sfdec=0.
if sf=2 sfdec=0.000.
if sf=3 sfdec=-0.064.
if sf=4 sfdec=-0.091.
exe.

compute efdec=0.
if ef=2 efdec=-0.020.
if ef=3 efdec=-0.066.
if ef=4 efdec=-0.133.
exe.

compute padec=0.
if pa=2 padec=-0.053.
if pa=3 padec=-0.129.
if pa=4 padec=-0.155.
exe.

compute fadec=0.
if fa=2 fadec=-0.023.
if fa=3 fadec=-0.029.
if fa=4 fadec=-0.037.
exe.

compute sldec=0.
if sl=2 sldec=-0.033.
if sl=3 sldec=-0.039.
if sl=4 sldec=-0.039.
exe.

compute apdec=0.
if ap=2 apdec=-0.028.
if ap=3 apdec=-0.050.
if ap=4 apdec=-0.050.
exe.

compute nadec=0.
if na=2 nadec=-0.047.
if na=3 nadec=-0.068.
if na=4 nadec=-0.107.
exe.

compute bodec=0.
if bo=2 bodec=-0.047.
if bo=3 bodec=-0.078.
if bo=4 bodec=-0.094.
exe.

* Generate the QLU-C10D utility score
compute qluc10d = 1+pfdec+rfdec+sfdec+efdec+padec+fadec+sldec+apdec+nadec+bodec.

if (sysmis(pf) or sysmis(sf) or sysmis(ef) or sysmis(pa) or sysmis(fa) or
sysmis(sl) or sysmis(ap) or sysmis(na) or sysmis(bo)) qluc10d=$sysmis.
exe.

* Show all decrement values to 3 decimal places.
formats pfdec rfdec sfdec efdec padec fadec sldec apdec nadec bodec qluc10d (F6.3).

*******************************************************************************
* The new variable qluc10d is a utility score where full health (i.e. level 1 *
* in each of the utility levels) is scored at 1, and the minimum score (i.e.  *
* each utility level is at 4) is -0.095. These data can now be used to        *
* construct quality-adjusted life years (QALYs) for cost-utility analysis.
*******************************************************************************
```