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A review and meta-analysis of health state utility values in breast cancer

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INTRODUCTION

Health-related quality of life is an important issue in the treatment of breast cancer and health-state utility values (HSUVs) are essential for cost-utility analysis.

This study aimed to systematically identify HSUVs for early (EBC) and metastatic (MBC) breast cancer in the current literature and provide a pooled estimate of HSUVs for identifiable health states. The feasibility of generating a definitive list of HSUVs to be used in future economic evaluation was explored.

METHODS

Thirteen databases were searched in March 2009.[1] Utility values were summarized for six categories: screening related states, preventative states, adverse events in breast cancer and its treatment, non-specific breast cancer, metastatic breast cancer (MBC) states and early breast cancer (EBC) states. The large number of values identified for MBC and EBC states enabled data to be synthesised by meta regression. Mean utility estimates were pooled using ordinary least squares with utilities clustered within study group and weighted by both number of respondents and inverse of the variance of each utility. Regressions included controls for disease state, utility assessment method and other features of study design.

Table 1: Early and metastatic breast cancer utility values

VARIABLES	Frequency (%) MBC (n=117)	Frequency (%) EBC (n=230)
Who valued		
Community	48 (41.03%)	51 (22.17%)
Clinician	42 (35.90%)	19 (8.26%)
Patients own health	13 (11.11%)	100 (43.48%)
Patients scenario	14(11.97%)	60 (26.09%)
Method of valuation		
Standard Gamble	71 (60.68%)	67 (29.13%)
TTO top full health	8 (6.84%)	30 (13.04%)
TTO top not full health	5 (4.27%)	5 (2.17%)
VAS worst-best	6 (5.13%)	43 (18.70%)
VAS dead-full	19 (16.24%)	35 (15.22%)
EQ-5D UK	8 (6.84%)	38 (16.52%)
Other	0	12 (5.22%)
Time since diagnosis		
Under 1 year	0	50 (21.74%)
1-5 years	0	30 (13.04%)
Time not mentioned	0	150 (65.22%)

TTO = time trade off , VAS = visual analogue scale

Table 2 ***Metastatic breast cancer regression models, dependent variable mean utility***

VARIABLES	Model (1)	Model (2)	Model (3)
Treatment type (ref: chemotherapy)			
Starting treat.	0.165 (.023)*	0.234 (.000)**	0.213 (.213)**
Hormonal	0.134 (.001)**	0.134 (.000)**	0.140 (.005)**
Radiotherapy	-0.105(.014)*	-0.112(.008)**	-0.153(.000)**
Treatment N.S.	-0.015(0.695)	0.017 (0.528)	0.016 (0.629)
Response to treatment (ref: stable)			
Response	-0.0149 (.001)**	0.0167 (.001)**	0.0162 (.008)**
Progression	-0.126 (.159)	-0.205(.000)**	-0.197(.001)**
Terminal	-0.352 (.000)**	-0.390 (.000)**	-0.461 (.000)**
Response N.S.	-0.187(.013)*	-0.267(.000)**	-0.244(.000)**
Side-effects (ref: no side-effects mentioned)			
Peripheral neuropathy	-0.085(.063)	-0.138(.004)**	-0.142(.010)**
Oedema	-0.017 (.755)	-0.011(.664)	-0.015(.519)
Febrile N.		0.192(.000)**	0.172(.002)**
Sepsis	-0.228(.009)**	-0.160(.001)**	-0.192(.005)**
Hypercalcaemia	-0.628(.000)**	-0.672(.000)**	-0.856(.000)**
Other side-effect	0.172(.125)	0.194(.003)**	0.176(.021)**
Whose values (ref: community)			
Clinician	0.033(.655)	0.000 (.997)	0.016 (.717)
Patients own health	0.240 (.000)**	0.243(.000)**	0.209(.000)**
Patients scenario	0.156(.000)**	0.126(.001)**	0.138(.003)**
Valuation method (ref: SG)			
VAS worst-best	0.045(.436)	0.066 (.107)	Na
VAS dead-full	-0.068 (.155)	-0.060 (.062)	Na
VAS rescaled dead-full	0.107 (.105	0.160(.062)*	Na
EQ-5D	-0.0519(.470)	0.0173 (.593)	0.0464 (.337)
TTO top not FH	0.205(.013)**	0.257(.000)**	Na
TTO top FH	0.087 (.233)	0.143(.000)**	0.173(.003)**
Constant	0.614(.000)**	0.640(.000)**	0.632(.000)**
Observations	77	117	86
R-squared	0.844	0.848	0.883

*Robust p values in parentheses.** p<0.01, * p<0.05* BCS= breast conserving surgery, SG= standard gamble, TTO= time trade off NS= not specified

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RESULTS

The systematic review identified 49 articles, providing 476 unique utility values. A full list of included studies is reported elsewhere.[2] From these, 117 values for MBC and 230 values for EBC were extracted and analysed by regression analysis. The few studies with utility values for the other four states were summarised but failed to present a consistent picture.

Three models for EBC and MBC were explored (Table 2 and 3), where (1) was weighted by the inverse of the standard deviation, (2) was weighted by sample size using all available utility values and (3) was weighted by sample size but drops any values which may not be recognised as utility scores (VAS, and those which do not use full health as a top anchor). Model performance was fairly good with an adjusted R^2 ranging from 0.373 to 0.647 for EBC and 0.844 to 0.883 for MBC.

Table 3 ***Early breast cancer regression models, dependent variable mean utility***

Variables	Model (1)	Model (2)	Model (3)
Surgery (ref: BCS)			
Mastectomy & reconstruction	-0.020(.657)	-0.029(.468)	-0.049(.096)
Mastectomy only	0.041(.124)	0.003(.914)	0.017(.564)
Surgery type N.S.	0.036(.264)	0.000(.990)	0.023(.601)
Surgery N.S.	0.038(.165)	-0.010(.790)	-0.030(.508)
Non surgical treatments (ref: chemotherapy)			
Radiotherapy	0.078(.018)*	0.090(.003)**	0.104(.005)**
Chemotherapy with Tox or NV		-0.026 (.632)	
Hormonal	0.077(.017)*	-0.074(.013)*	0.074(.085)
Treatment N.S.	0.083(.030)*	0.087(.007)**	0.078(.048)*
Time period (ref: under 1 year)			
Over 1 year	0.100(.004)**	0.038(.096)	0.058(.019)*
Time N.S.	0.053(.123)	0.006(.844)	0.045(.322)
Whose values (ref: community sample)			
Clinician	0.164(.017)*	0.179(.010)**	0.130(.080)
Patients' own health	0.171(.001)**	0.209(.000)**	0.162(.007)**
Patients' scenario	0.085 (.119)	0.084 (.108)	0.077(.186)
Valuation method (ref: SG)			
VAS worst-best	-0.194(.002)**	-0.187 (.000)**	na
VAS dead-full	-0.205(.000)**	-0.181(.000)**	na
EQ-5D	-0.215(.000)**	-0.168(.001)**	-0.112(.026)*
TTO top not FH	0.074(.176)	0.099 (.073)	na
TTO different anchor	-0.014(.550)	0.008(.785)	0.016(.587)
TTO top FH	-0.157 (.021)*	-0.133(.002)**	-0.110(.023)*
HUI3	-0.248(.000)**	-0.188(.001)**	-0.132(.023)*
Constant	0.725 (.000)**	0.663 (.000)**	0.648(.000)**
Observations	163	230	145
R-squared	0.647	0.536	0.373

*Robust p values in parentheses.** p<0.01, * p<0.05*
BCS= breast conserving surgery, SG= standard gamble, TTO= time trade off NS= not specified

In the EBC models differences in valuation methods generated the greatest variation in utility values. Of the 230 valuations 38 (16.5%) were based on EQ-5D (from 6 papers). Using the EQ-5D valuation method in EBC gave a significantly lower utility, between -0.112 (model 3) and -0.215 (model 1) than standard gamble (SG). The highest values came from patients valuing their own health (an increase of 0.209 in EBC model 2). The impact of treatment or clinical state was not significant and this limits the usefulness of the findings.

For MBC utility values varied significantly by severity of condition, treatment and side effects. Disease state was important - compared to being stable, responding to treatment raises utility (0.085 to 0.094), and progression and terminal state lowers utility (-0.126 to -0.205 and -0.352 to -0.461, respectively). Of the 117 valuations in MBC only 8 (7%) were based on EQ-5D (from 3 papers); it is not significantly different to SG in the MBC models. Patients with MBC gave hypothetical scenarios significantly higher values than members of the public (0.126 in model 2).

Studies often did not adequately specify the time scale involved (since onset of a condition phase or a treatment) or the line of treatment. Details on the method used to derive the utility values were often limited. Methodological differences were found to impact strongly upon HSUV, indicating the need for increased detail when describing how values are derived.

CONCLUSION

Utilities were found to vary significantly by valuation method, and who conducted the valuation for EBC and MBC. For MBC values significantly varied by severity of condition, treatment and side-effects. Despite the numerous studies it is not feasible to generate a definitive list of HSUVs that can be used in future economic evaluations, due to the complexity of the health states involved and the variety of methods used to obtain values. Future research into quality of life in breast cancer should make greater use of validated generic preference-based measures for which public preferences exist.

REFERENCES

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