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# Societal Preferences (Utilities) for Advanced Melanoma Health States in the UK and Australia

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## Introduction

- Melanoma is a potentially fatal cancer caused by the proliferation of abnormal melanocytes (pigment-containing cells found predominantly in the skin).
- The incidence of melanoma varies geographically from approximately 12 cases per 100,000 population in the UK, to 34 cases per 100,000 population in Australia.[1–3] This variability is thought to be caused by differences in exposure to environmental ultraviolet radiation.
- The incidence of melanoma increases with age,[1] from 7.5 per 100,000 in those aged 15–39 years, to 42.5 per 100,000 in those aged 80 years and over.
- Once advanced (stage III or IV) melanoma is diagnosed, progression to death is rapid: the median survival time is 8 months, regardless of therapy.[4]
- Focus of therapy for advanced melanoma is primarily palliative, aiming to maximize symptom control, minimize toxicity, and optimize health-related quality of life.[5]
- Utility assessment is used to quantify preferences for health outcomes and, ultimately, to estimate quality-adjusted life expectancy.
- Studies of preferences for melanoma treatment have not typically considered an individual's treatment response status.
- Utility measurement in melanoma has largely focused on evaluating toxicity health states associated with therapy with interferon-alpha (IFN-α) only.[6–9]
- Little work in the area of preference-based utilities has been conducted that captures both of the intended (response) and unintended (toxicity) effects of treatment.
- The objective of this study was to estimate general public preference-based utilities in Australia and the UK for standardized health states that include common responses and toxicities observed during treatment of advanced melanoma.

## Methods

- Standard gamble utility values for melanoma-related health states were elicited in a convenience sample of persons from Australia and the UK; participants were recruited according to the age and sex distributions of Australia and the UK.
- Standardized health state descriptions were developed based on World Health Organization response definitions, Common Toxicity Criteria for Adverse Events V3, and feedback from five clinical experts and three quality of life researchers.
- Four melanoma treatment-related response-based health states were developed
  - Partial response
  - Stable disease
  - Progressive disease, and
  - Best supportive care (addressing those patients who choose not to undergo treatment).
- Standardized descriptions were also developed to evaluate 10 common grade I/II and grade III/IV melanoma treatment-related toxicities.
- The health states were elicited by trained interviewers following a standardized interview script.
- Mean utilities and standard errors were calculated for each health state.
- Utility decrements for the toxicity health states were calculated based on the difference between the measured value (relative to partial response), and the base state (partial response)
  - i.e. the measured utility for the health state 'partial response' (0.88) was subtracted from the measured utility for 'partial response with hair loss' (0.85) to determine the decrement for hair loss alone (–0.03).

## Results

- Utilities were elicited from a total of 140 participants, 77 in Australia and 63 in the UK.
- The mean age was 46 years, and 48% were male (Table 1)
  - A higher proportion of UK participants, compared to Australian participants, had achieved at least a university degree (44% vs 27%)
  - A higher proportion of UK participants were married (70% vs 54%); more Australians were single (21% vs 11%)
  - More UK participants were employed full- or part-time (68% vs 47%); more Australians were classified as retired or students (31% vs 15.8%).
- Mean utilities for the base response health states are presented in Table 2
  - All health states were associated with decreased preference values compared to full health
  - Partial response was consistently ranked as the most preferred of the base response health states, followed by stable disease, progressive disease, and best supportive care

**Table 1.** Demographic characteristics of Australian and UK respondents from whom standard gamble utilities were elicited.

| Characteristic | Respondents Australia (N=77) n (%) | UK (N=63) n (%) | All (N=140) n (%) |
|---|---|---|---|
| Male sex | 37 (48.1) | 30 (47.6) | 67 (47.9) |
| Mean (SD) age, years | 47.3 (16.3) | 43.1 (11.6) | 45.5 (14.4) |
| Race | | | |
| White | 72 (93.5) | 58 (92.1) | 130 (92.9) |
| Asian | 3 (2.9) | 1 (1.6) | 4 (2.9) |
| Black | 0 (0.0) | 2 (3.2) | 2 (1.4) |
| Other | 2 (2.6) | 2 (3.2) | 4 (2.9) |
| Marital status | | | |
| Married | 42 (53.8) | 44 (69.8) | 86 (61.0) |
| Single | 16 (20.5) | 7 (11.1) | 23 (16.3) |
| Partnership | 11 (14.1) | 9 (14.3) | 20 (14.2) |
| Divorced | 4 (5.1) | 2 (3.2) | 6 (4.3) |
| Widowed | 5 (5.1) | 1 (1.6) | 5 (3.5) |
| Employment category | | | |
| Full-time employed/self-employed | 22 (28.6) | 25 (39.7) | 47 (33.8) |
| Part-time employed/self-employed | 22.1 (18.0) | 18 (28.6) | 35 (25.0) |
| Retired | 13 (16.9) | 6 (9.5) | 19 (13.6) |
| Stay at home spouse/parent | 10 (13.0) | 9 (14.3) | 19 (13.6) |
| Student | 11 (14.3) | 4 (6.3) | 15 (10.7) |
| Seeking work | 2 (2.6) | 1 (1.6) | 3 (2.1) |
| Unemployed | 1 (1.3) | 0 (0.0) | 1 (0.7) |
| Education category (Australia) | | | |
| Grade school | 4 (5.2) | | |
| Some high school | 25 (32.5) | | |
| Completed high school | 20 (26.0) | | |
| Completed college/university | 22 (27.3) | | |
| Education category (UK) | | | |
| Less than 5 GCSEs grade A–C or O level equivalents | | 9 (14.3) | |
| 5 GCSEs grade A–C or O level equivalents | | 7 (11.1) | |
| Completed higher education | | 17 (27.0) | |
| Degree/postgraduate degree | | 28 (44.4) | |
| No answer | | 2 (3.2) | |
| Live alone | 12 (15.6) | 7 (11.1) | 19 (13.6) |
| Mean # (SD) of children | 0.6 (1.0) | 1.2 (1.2) | 0.9 (1.1) |
| Comorbidities | | | |
| Cancer | 1 (1.3) | 0 (0.0) | 1 (0.7) |
| Frequent headaches | 2 (2.6) | 2 (3.2) | 4 (2.9) |
| Respiratory conditions | 5 (6.5) | 6 (9.5) | 11 (7.9) |
| Heart disease | 6 (7.8) | 0 (0.0) | 6 (4.3) |
| HIV/AIDS | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Gastrointestinal problems | 6 (7.8) | 4 (6.3) | 10 (7.1) |
| Psychological problems | 8 (10.4) | 9 (14.3) | 17 (12.1) |
| Vision problems | 8 (10.4) | 1 (1.6) | 9 (6.4) |
| Other chronic condition | 11 (14.3) | 11 (17.5) | 22 (15.7) |
| No chronic medical conditions | 45 (58.4) | 41 (65.1) | 86 (61.4) |

SD = standard deviation; GCSE = General Certificate of Secondary Education; HIV/AIDS = human immunodeficiency virus/acquired immunodeficiency syndrome

**Table 2.** Mean (SE) standard gamble utilities for four melanoma treatment-related response-based health states, among respondents from Australia and the UK.

| Health state | Australia Mean (SE) | UK Mean (SE) | All Mean (SE) | P value between countries |
|---|---|---|---|---|
| Partial response | 0.91 (0.01) | 0.85 (0.02) | 0.88 (0.01) | <0.001 |
| Stable disease | 0.83 (0.01) | 0.77 (0.02) | 0.80 (0.01) | 0.018 |
| Progressive disease | 0.47 (0.03) | 0.59 (0.02) | 0.52 (0.02) | 0.001 |
| Best supportive care | 0.46 (0.03) | 0.59 (0.02) | 0.52 (0.02) | <0.001 |

SE = standard error

- Mean health state utilities elicited for the response-based health states
  - Were higher among Australians, compared to those from the UK, for the more favored health states of partial response (0.91 vs 0.85; P<0.001) and stable disease (0.83 vs 0.77; P=0.018)
  - Were lower among Australians, compared to those from the UK, for the least favored health states of progressive disease (0.47 vs 0.59; P=0.001) or best supportive care (0.46 vs 0.59; P<0.001).

## Conclusions

- The general population in the UK and Australia provided utilities for a universal set of advanced melanoma health states, including toxicities associated with various treatments.
- Utilities for standardized health states developed in this study can be applied in future cost-effectiveness analyses of treatment for advanced melanoma.
- Country-specific differences exist for selected health states; more research is needed to determine if these between-country differences in mean health state utility values translate in to differences in cost effectiveness ratio estimates.

- The range in mean utility values for the four health states was substantially greater in Australian respondents (difference from partial response to best supportive care = 0.45) than UK respondents (difference = 0.26; P<0.0001).
- Mean utility decrements for toxicity-related health states are presented in Table 3
  - Toxicity-related health states were mostly rated worse in Australia than the UK
  - On average, hair loss was associated with the least utility decrement amongst respondents from both countries (–0.03), and hospitalization for grade III/IV toxicity, the greatest utility decrement (–0.17 [UK] vs –0.20 [Australia]).

**Table 3.** Mean (SE) utility decrements associated with toxicity health states, among respondents from Australia and the UK.

| Health state | Mean (SE) utility decrement Australia | UK | All |
|---|---|---|---|
| Diarrhea | –0.11 (0.01) | –0.06 (0.01) | –0.09 (0.01) |
| Skin reaction | –0.08 (0.01) | –0.01 (0.01) | –0.06 (0.01) |
| Nausea/vomiting | –0.12 (0.01) | –0.07 (0.01) | –0.10 (0.01) |
| Stomatitis | –0.14 (0.01) | –0.10 (0.02) | –0.13 (0.01) |
| Hair loss | –0.03 (0.01) | –0.03 (0.01) | –0.03 (0.01) |
| Symptomatic melanoma | –0.2 (0.02) | –0.11 (0.02) | –0.16 (0.01) |
| One day in/outpatient treatment for severe toxicity | –0.14 (0.01) | –0.11 (0.02) | –0.13 (0.01) |
| Two to 5 day hospitalization for severe toxicity | –0.20 (0.02) | –0.13 (0.02) | –0.17 (0.01) |
| Toxicity as an indication that treatment may be working | –0.08 (0.01) | –0.07 (0.02) | –0.08 (0.01) |
| Flu-like syndrome | –0.13 (0.01) | –0.09 (0.01) | –0.11 (0.01) |

## Discussion

- There were significant differences in mean health state utilities observed between countries, with Australians reporting a lower impact of less severe health states and a greater impact of more severe health states.
- The development process for these standardized health states for advanced melanoma can serve as a model for developing disease-specific health states that incorporate both intended treatment responses and adverse events.
- The method of decrementing utility values by subtracting toxicity utility weights holds promise for assigning utilities to serious diseases treated with toxic therapies.

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