Men’s treatment preferences for prostate cancer: results from a discrete choice experiment

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PCOS - Patient recruitment & data collection: 2000 - 2008

3195 eligible cases identified by NSW Ca Registry
83% of pt’s clinicians (n=264) consented to contact pts
2658 patients written to by registry
2021 (76%, 64%) consent for researchers to contact them
1993 (99%, 62%) consent to telephone interview, baseline HRQOL
1901 (95%, 59%) HRQOL 1 yr post diagnosis
1798 (95%, 56%) HRQOL 2 yr post diagnosis
1728 (96%, 54%) HRQOL 3 yr post diagnosis

Reason for Dr “No”
336 Blanket “No”
152 case by case
49 pending at close

Reason for pt refusal
246 non contactable
32 no time
30 don’t like surveys
16 sick or dead
10 wish to forget

Stratified (by tmt group) random sample of 510 Treatment Preferences Survey

Initial primary therapy

- Radical prostatectomy 57%
- External beam radiotherapy 19%
- Brachy (HDR wires) 3%
- Brachy (LDR seeds) 2%
- Hormone therapy 8%
- Active surveillance 11%
- Initial primary therapy 8%
Background

- A number of treatment options for localised prostate cancer
  - Surgery
  - Radiotherapy
  - ‘watchful waiting’
- Each one has significant morbidity
  - Differs b/n tmts
  - Affects different aspects of HRQOL
- No clear survival advantage
- Patient preference should be an important factor in treatment decisions
Aim

Patients’ views of:
- relative tolerability of side effects
- survival gains needed to make persistent treatment side-effects worthwhile

Discrete Choice Experiments

- Based on economic theory of consumer demand
- DCE is a “stated” preference method
  - Marketing, transport, environmental econ, health
- Two main components
  - the use of “experiments” to generate the required data
  - the use of discrete choice analysis to model preferences from the generated data
- Allow to model the influence and relative importance of several attributes on the choices
Which side-effects to include?

Collaborated with clinicians:

- **7 side-effects:**
  - impotence, libido, urinary leakage and blockage, bowel symptoms, fatigue and hormonal effects
  - 3 levels: none, mild, severe

- **Life expectancy**
  - 4, 8, 12 years

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<table>
<thead>
<tr>
<th>Option A</th>
<th>Option B</th>
</tr>
</thead>
<tbody>
<tr>
<td>With this treatment option you will experience the following:</td>
<td>With this treatment option you will experience the following:</td>
</tr>
<tr>
<td>Never able to achieve an erection when you want one</td>
<td>No problems achieving an erection when you want one</td>
</tr>
<tr>
<td>Less sexual desire</td>
<td>Less sexual desire</td>
</tr>
<tr>
<td>Severe problems with leaking urine (no urinary control whatsoever)</td>
<td>Occasional problems with leaking urine</td>
</tr>
<tr>
<td>Some problems with urine blockage (have a weak urine stream but get some relief or comfort afterwards)</td>
<td>Some problems with urine blockage (have a weak urine stream but get some relief or comfort afterwards)</td>
</tr>
<tr>
<td>No bowel problems</td>
<td>Occasional loose bowel movements with discomfort/pain</td>
</tr>
<tr>
<td>Severe tiredness and loss of energy</td>
<td>Some tiredness and loss of energy</td>
</tr>
<tr>
<td>Severe hot flushes and moodiness</td>
<td>No hot flushes or moodiness</td>
</tr>
</tbody>
</table>

Most people who have this option live between 3 and 21 years, but on average for 12 years

Most people who have this option live between 3 and 5 years, but on average for 4 years

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Would you choose option A or B?

Option A……………….. OR  Option B………………..
Piloted the questionnaire first

- Developed script for HVRF
  - experienced group of telephone interviewers already working on quality of life interviews for the PCOS
- Pilot sample selection
  - PCOS participants (approx 1900) were stratified by treatment group
  - 21 randomly selected to participate in the pilot
  - 18 consented & recruited by Cancer Council

Pilot Results

- All 18 pilot participants completed the survey
  - one participant found it a lengthy exercise
  - another found it quite confronting
  - Took 15-45 mins to complete
- General feedback from both the interviewers and participants very positive
- Recommendations incorporated into the main DCE
Full survey

- Random sample of PCOS participants
  - Stratified by treatment
  - Approx 3 years post-diagnosis
- Data collection as per pilot
  - Questionnaire in post, CATI one week later
- 510 contacted
- 440 consented (86%)
- 422 completed (83%)
  - 1 completed only 2 scenarios – excluded
  - 2 completed 14, 17 respectively – included
  - Total choice observations = 7,573

Analysis & Interpretation

- Statistical Model
  - Conditional logit model
  - $P(\text{choose } A | \text{ Side Effect profiles } A, B)$
- What will the results tell us?
  - Side effect coefficients tell us about how each SE influences men’s choices
    - Sign & size of these coefficients
    - Relative tolerability of side-effects
  - Combine with survival coefficient
    - Survival gains needed to make these worthwhile
We asked a group of clinicians: *What do you think about relative tolerability of side-effects? From your patients’ perspective ...*

Which of the following severe side-effects do you think is WORST ... from your patients’ perspective

- **9%** 1. Impotence – never able to achieve an erection when you want
- **7%** 2. Loss of libido – complete loss of sexual desire
- **33%** 3. Urinary leakage – severe problems with leaking urine – no urinary control whatsoever
- **9%** 4. Urinary blockage – continually feeling the need to urinate but passing very little with no relief afterwards
- **37%** 5. Bowel symptoms – very frequent loose bowel movements with discomfort/pain & leakage
- **0%** 6. Fatigue – severe tiredness & loss of energy
- **5%** 7. Hormonal effects – severe hot flushes & moodiness
What the PCOS sample said:

<table>
<thead>
<tr>
<th>Rank</th>
<th>Side-Effect &amp; Severity</th>
<th>Model estimate (SE ~ 0.04)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Severe Leakage</td>
<td>-0.79</td>
</tr>
<tr>
<td>2.</td>
<td>Severe Bowel symptoms</td>
<td>-0.73</td>
</tr>
<tr>
<td>3.</td>
<td>Severe Blockage</td>
<td>-0.62</td>
</tr>
<tr>
<td>4.</td>
<td>Severe Fatigue</td>
<td>-0.40</td>
</tr>
<tr>
<td>5.</td>
<td>Severe Hormonal effects</td>
<td>-0.33</td>
</tr>
<tr>
<td>6.</td>
<td>Mild Bowel symptoms</td>
<td>-0.22</td>
</tr>
<tr>
<td>7.</td>
<td>Mild Hormonal effects</td>
<td>-0.20</td>
</tr>
<tr>
<td>8.</td>
<td>Mild Urinary Blockage</td>
<td>-0.15</td>
</tr>
<tr>
<td>9.</td>
<td>Severe Impotence</td>
<td>-0.14</td>
</tr>
<tr>
<td>10.</td>
<td>Mild Fatigue</td>
<td>-0.13</td>
</tr>
<tr>
<td>11.</td>
<td>Severe Libido loss</td>
<td>-0.10</td>
</tr>
<tr>
<td>12.</td>
<td>Mild Leakage</td>
<td>-0.07</td>
</tr>
<tr>
<td>13.</td>
<td>Mild Impotence</td>
<td>0.14</td>
</tr>
<tr>
<td>14.</td>
<td>Mild Libido loss</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Did men’s treatment experience affect their preferences?

<table>
<thead>
<tr>
<th>Side Effect</th>
<th>RP</th>
<th>EBR</th>
<th>HDB</th>
<th>LDB</th>
<th>Ho</th>
<th>WW</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>S Urinary leakage</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S Bowel symptoms</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>S Urinary blockage</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>S Fatigue</td>
<td>4</td>
<td>3</td>
<td>-</td>
<td>-*</td>
<td>-</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>S Hormonal effects</td>
<td>5</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>-*</td>
</tr>
<tr>
<td>S Impotence</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>5</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>M Impotence</td>
<td>+*</td>
<td>+</td>
<td>5</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>M Bowel</td>
<td>-*</td>
<td>-</td>
<td>6</td>
<td>4</td>
<td>-</td>
<td>-*</td>
<td>-</td>
</tr>
</tbody>
</table>
Survival benefit required to make persistent side-effects worthwhile

- In welfare economics, valuation of attributes is done in monetary units – compensating variation (CV)
- CV is the amount of money the individual would be willing to pay to secure an improvement in attributes.
- Adapted this to find the valuation of side-effects in terms of survival benefit – analogous to QALYs

Example & interpretation

- Severe urinary leakage
  \[ \beta_{\text{SevUL}} = -0.79, \beta_{\text{Surv/yr}} = 0.1845 \rightarrow CV = 3.6 \text{ years} \]
  - A man with an average life expectancy of 8 years would need an additional 3.6 years of survival to be compensated for persistent, severe problems, i.e., no urinary control
  - He would be indifferent between 8 years with no problems with leaking urine and 11.6 years with severe problems with leakage
Survival benefit required to make persistent side-effects worthwhile

Conclusions

- Urinary dysfunction (leakage and blockage) and bowel symptoms - least tolerable
- Then fatigue & hormonal symptoms (e.g., moodiness and hot flushes)
- Sexual dysfunction (impotence and loss of libido) - relatively benign in comparison
- The first empirical estimates of survival benefits needed to make treatment side effects worthwhile

? how will these compare with survival benefits conferred …
Patients’ views of relative tolerability of side effects & survival gains needed to make persistent treatment side-effects worthwhile

Technical details
CHERE Working Paper 2006/14
CHERE, Sydney, 2006
www.chere.uts.edu.au

Thank you

Random utility theory
The utility that individual \( i \) derives from alternative \( j \) in scenario \( s \) is composed of systematic and random components denoted by

\[
U_{isj} = X'_{isj} \beta + \varepsilon_{isj} \quad \cdots (1)
\]

- where \( X_{isj} \) is a \( K \times 1 \) vector of explanatory variables and \( \beta \) is a conformable vector of coefficients.
Statistical model

In choosing between 2 alternatives in each scenario, it is assumed that person $i$ chooses the alternative that gives him the maximum utility. Then, the probability of choosing alternative 1 in scenario $s$ is:

$$P_{is1} = P(U_{is1} > U_{is2})$$

Assuming that the random components () are identically and independently distributed (IID) as extreme value, the probability of the choice can be estimated by the binary logit model:

$$(4) \quad P_{is1} = \frac{\exp(X'_{is1} \beta)}{\exp(X'_{is1} \beta) + \exp(X'_{is2} \beta)}$$

CV - worked example

For two mutually exclusive choices, the CV function can be represented by

$$CV = \frac{1}{\mu} \left[ \ln \left( 1 + e^{V^0} \right) - \ln \left( 1 + e^{V^1} \right) \right] \quad \ldots(1)$$

Where $V^0$ and $V^1$ are the initial and new health state respectively and $\mu$ is the marginal utility of “income” (ie, survival).
Our current estimations of CVs are based on changing one attribute at a time. Thus:

\[ V^0 = \beta_1 + \beta_3 S \]

\[ V^1 = V_0 + \beta_2 = \beta_1 + \beta_2 + \beta_3 S \]

\[ \mu = \beta_3 \]

where \( S \) is survival (years).

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Calculating CV (cont.)

Equation (1) can be rewritten as

\[ CV = \frac{1}{\beta_3} \left[ \ln \left( 1 + e^{\beta_1 + \beta_3 S} \right) - \ln \left( 1 + e^{\beta_1 + \beta_2 + \beta_3 S} \right) \right] \quad \ldots (2) \]

Substitute parameter estimates to get CV.