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Are Patient and General Population Samples Fundamentally Different? An Exploration Using a Discrete Choice Experiment (DCE)

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Introduction and Aim of Study

Within the health economics literature, there is debate about the appropriateness of using patient versus general population samples in decisions about the allocation of health resources. An assumption behind this debate, is the existence of fundamental differences between a patient sample, that may be familiar the health condition, and a general population sample, who may have limited knowledge or experience of the health condition and associated treatments.

In this study, potential differences between these two samples are explored through a discrete choice experiment (DCE) used to understand what features are important to include in an assessment for chemotherapy induced peripheral neuropathy (CIPN). CIPN is a side effect to chemotherapy treatment that can affect up to 40% of cancer survivors.

This study also investigated whether providing additional information to the general population sample could mitigate any knowledge or experience differences between a general population and patient sample.

Figure 1: Example Choice Set

We would like you to imagine that you have been given a chemotherapy drug where peripheral neuropathy is a known side effect. Imagine that during the time you are undergoing chemotherapy, you will also be assessed for peripheral neuropathy. In addition to talking with your clinician, you may be asked to complete a questionnaire prior to your appointment and/or undergo some physical test/s during your appointment.

If these were your only options, which peripheral neuropathy assessment tool would you prefer? A or B?

	Assessment A	Assessment B
Symptoms and usual activities	The assessment asks about how your *symptoms impact on your usual activities*	The assessment asks about your *symptoms*
Level of detail	The assessment will pick up *minor and major nerve damage*, including *small changes* in your condition whether it is important or not	The assessment will pick up *minor and major nerve damage*, including *small changes* in your condition whether it is important or not
Questionnaire	12 questions to answer	20 questions to answer
Physical test/s	No physical test	Patient activity based test e.g. peg board test, sway test
Impact on clinic time	Usual clinic time plus 30 minutes extra	Usual clinic time plus 10 minutes extra
How will results influence care/treatment	The *doctor will discuss* the results with you, *and together* you can decide what they mean for you and your care/treatment	The *doctor may change your chemotherapy/cancer treatment* if there are significant changes in your condition over time
Which would you choose?	○ Assessment A	○ Assessment B

Results

The general population sample consisted of 167 respondents in Arm 1 and 168 respondents in Arm 2. There were 117 respondents in the patient sample. In order to investigate the aims of this study, this requires comparison of results across the arms of the general population sample and results between the patient and general population arms. However, parameter estimates from any models estimated may not be directly comparable due to the presence of scale heterogeneity (Vass et. al., 2018).

The S-MNL model can be used to detect the presence of scale differences through the inclusion of a scale factor (σ) in the utility function(Fiebig et al., 2010; Sarrias & Daziano, 2017). The scale factor (σ) can be influenced by individual specific characteristics, e.g. arm assignment or population type. If the parameter, δ, associated with the individual specific characteristic is significant, this indicates that it is a significant contributor to scale heterogeneity.

A S-MNL model is estimated to test whether the two general population arms can be combined for analysis. Arm 1 was entered as the base case. The δ_{arm} was not significant (p = 0.123) indicating that they can be combined together. A MNL model was estimated with a dummy variable for arm interacted with each of the attribute parameters. No significant interaction effects were found (p > 0.10) indicating no preference differences between the two general population arms. However, when asked to rate on a 5 point Likert scale the ease of identifying differences between assessment options, it was found that those in Arm 2 were significantly more likely to agree or strongly agree compared to those in Arm 1. This was tested through an asymptotic linear by linear association test (p < 0.01).

A S-MNL model was also estimated to test for scale differences between the patient sample and Arm 1 and Arm 2 of the general population arms, with the patient sample as the base case. Model results are presented in Table 2. δ_{arm1} and δ_{arm2} were significant (p <0.05) indicating presence of scale differences between the general population arms and the patient sample. The provision of extra information to the general population sample did seem to reduce scale differences, δ_{arm2} parameter estimate half that of the δ_{arm1} estimate. Results could not be formally combined for analysis of preference differences between these two population types.

Table 1: Attributes and Levels

Attribute	Levels
Symptoms and Usual Activities	The assessment asks about your symptoms
	The assessment asks about how your symptoms impact on your usual activities
Level of Detail	The assessment will only pick up major nerve damage and large changes in your condition
	The assessment will pick up minor and major nerve damage, including small changes in your condition whether it is important or not
Questionnaire	No questionnaire
	3 questions to answer
	12 questions to answer
	20 questions to answer
Physical Test/s	No physical test
	Clinician administered test e.g. sharp and dull test, tuning fork test
	Patient activity based test e.g. peg board test, sway test
	Technical test e.g. nerve conduction studies
Impact on Clinic Time	During usual clinic time
	Usual clinic time plus 10 minutes extra
	Usual clinic time plus 30 minutes extra
	You require a separate appointment, which can take up to 60 minutes
How will results influence care/treatment	The doctor will discuss the results with you, and together you can decide what they mean for you and your care/treatment
	The doctor may change your general care (e.g. medications to help relieve symptoms, physiotherapy, walking aids) if there are significant changes in your condition over time
	The doctor may change your chemotherapy/cancer treatment if there are significant changes in your condition over time

Methods

Attributes and levels are listed in Table 1. Figure 1 provides an example choice set seen by respondents. Attributes and levels were refined through consultation with clinicians, 6 cognitive interviews with breast cancer patients and through a feedback session with a group experienced with DCEs. A patient and general population sample were recruited. The patient sample were all volunteers. To participate, they had to have had a cancer diagnosis and experience with chemotherapy treatment. The general population sample were recruited through an online panel with quotas for age and gender to be representative of the Australian population. The general population was split into two arms. Arm 1 received the same introductory information as the patient sample. The Arm 2 received extra information in the form of moving GIFs and a short video about CIPN.

Scaled-multinomial logit (S-MNL) models were estimated to test for scale differences between Arms 1 and 2 and to compare Arms 1 and 2 to the patient sample. Analyses were conducted in R Studio using the gmnl package.

Table 2: Testing for scale differences between the patient sample and general population arms

S-MNL	Estimate	P-value
S&Q 2 (symptoms & usual activities)	0.205	0.011**
Det 2 (minor and major changes)	1.195	0.000***
Q 2 (3 questions to answer)	0.129	0.254
Q 3 (12 questions to answer)	0.246	0.031*
Q 4 (20 questions to answer)	0.165	0.183
PhyT 2 (clinician administered test)	0.883	0.000***
PhyT 3 (patient activity based test)	0.840	0.000***
PhyT 4 (technical test)	0.884	0.000***
CT 2 (usual clinic time + 10 mins)	0.090	0.397
CT 3 (usual clinic time + 30 mins)	−0.049	0.634
CT 4 (separate appointment, takes up to 60 mins)	−0.304	0.004**
Res 2 (doctor may change your general care)	−0.540	0.000***
Res 3 (doctor may change your chemo/cancer treatment)	−0.607	0.000***
τ	0.994	0.000***
$\delta_{arm\ 1}$	−0.685	0.000***
$\delta_{arm\ 2}$	−0.337	0.036*

*p-value < 0.05 **p-value < 0.01 *** p-value < 0.001

Conclusions

It was found that those in the general population sample that received extra information in the form of moving images, and extra video, had a better understanding of the DCE. And this did not come at the expense of influencing preferences exhibited by the general population sample.

Findings this study also support previous literature, providing evidence that there are differences between patient and general population samples, in this case, in the form of scale heterogeneity.

References

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