

<p><b>Institution: City University London</b></p>
<p><b>Unit of Assessment: 18 Economics and Econometrics</b></p>
<p><b>Title of case study: International impact on the measurement of patient health and its use in health care decision-making</b></p>
<p><b>1. Summary of the impact</b></p> <p>Methods for valuing quality of life developed by Professor Devlin at City University London are used internationally to help governments make healthcare decisions. Her research focuses on a widely-used questionnaire for measuring patient reported health, the European Quality of Life 5-Dimensions (EQ-5D). Government organisations routinely use the EQ-5D to judge whether new medicines work and are cost-effective. Over 15 countries are undertaking EQ-5D studies using Professor Devlin’s methods to inform decisions on pricing and provision of new medicines. These developments have been achieved through active dissemination to the academic community and governments and through Professor Devlin’s scientific leadership of the European Quality of Life (EuroQol) Group. The impact of this research is highly significant in improving health and health care decision-making and has had wide reach throughout the UK and in many other countries.</p>
<p><b>2. Underpinning research</b></p> <p>Because health budgets are limited, new medicines can be funded only by diverting money from existing treatments. Ensuring that health budgets produce maximum health benefits for all patients and that services are delivered efficiently requires governments to measure health. The EQ-5D is a widely used questionnaire for measuring patients’ self-reported health and it is applicable to a wide range of health conditions and treatments.</p> <p>Professor Devlin’s research focuses on how best to translate EQ-5D answers into health valuations (value sets). To put this in context, EQ-5D answers generate health state valuations on a scale from 1 (= full health) to 0 (= dead) and negative values (&lt; 0) are given to states worse than being dead. Professor Devlin’s work in this area has produced methodological advances and has influenced health care decision-making (e.g., judgements on the funding of new medicines and the quality of surgeons’ operations).</p> <p>Professor Devlin’s original research highlighted some EQ-5D data quality issues and yielded the first EQ-5D scoring system (which translates EQ-5D data into health valuations) for New Zealand. It is still used in all decisions about pricing and access to new drugs.</p> <p>This research was further pursued in her work after joining City University London in 2002 (Devlin <i>et al.</i> 2004) and identified ways that valuation methods could be improved and how health valuations equal to 0 (‘being dead’) are handled (Devlin <i>et al.</i> 2005).</p> <p>During her years at City, Devlin’s research identified fundamental theoretical considerations related to how health state valuations of worse than being dead (negative values) should be handled. The standard method, “Time Trade Off” (TTO), generated problematic outcomes (Buckingham and Devlin 2006 &amp; 2009). In 2007, her research led to Devlin being invited to join a newly-formed EuroQol Group taskforce and to lead a research programme to develop a new approach. This allowed the identification of the new method ‘lead time TTO’ (Tilling <i>et al.</i> 2010, Devlin <i>et al.</i> 2010) which provides a simple and consistent approach.</p> <p>In 2010 Professor Devlin joined the Office of Health Economics (OHE) but has maintained links with City University London as an honorary professor and active research collaborations with City health economists Dr Patricia Cubí-Mollá, Professor Mireia Jofre-Bonet and Dr Victoria Serra-Sastre. At the OHE, Devlin leads an extensive research programme to refine further the lead time TTO method (Devlin <i>et al.</i> 2012) which has been piloted in eight countries in 2011 (Devlin and Krabbe, 2013). This programme of methodological and piloting work culminated in the EuroQol</p>

Group (the EQ-5D copyright holder) adopting the new method for use in all countries. Studies are underway in over 15 countries (with others planned) to produce country-specific values to inform future healthcare decision-making.

In 2012 the Department of Health (DH) commissioned research led by Professor Devlin to obtain new EQ-5D UK values, which will be used by the National Institute for Health and Care Excellence (NICE) in its Health Technology Appraisal (HTA) programme; the DH's new Value-Based Pricing of medicines; and in the NHS routine monitoring of patient outcomes in elective surgery, long term conditions, mental health and cardiothoracic surgery.

Simultaneously, Professor Devlin has pursued a programme of work on using EQ-5D in assessing quality of health care (Devlin and Appleby 2010) and measuring hospital and doctor performance. In addition to this highly-relevant methodological work (Gutacker *et al.* 2013; Devlin *et al.* 2010; Parkin *et al.* 2010), she advises Government health care organisations in Sweden, Singapore, England, China and Canada on the use of patients' reported outcome data to monitor quality of care.

### 3. References to the research

Devlin N., Buckingham K., Tsuchiya A., Shah K., Tilling C., Wilkinson G., & van Hout B. (2013). A comparison of alternative variants of the lead and lag time TTO. *Health Economics* 22(5), 517-532. [10.1002/hec.2819](https://doi.org/10.1002/hec.2819)

Devlin N., Tsuchiya A., Buckingham K., & Tilling C. (2010). A uniform Time Trade Off method for states better and worse than dead: feasibility study of the 'lead time' approach. *Health Economics* 20(3), 348-361. [10.1002/hec.1596](https://doi.org/10.1002/hec.1596)

Parkin D., Rice N., & Devlin N. (2010). Statistical analysis of EQ-5D profiles: Does the use of value sets bias inference? *Medical Decision Making* 30(5), 556-565. [10.1177/0272989X09357473](https://doi.org/10.1177/0272989X09357473)

Devlin N., Parkin D., & Browne J. (2010). Patient Reported Outcome Measures in the NHS: new methods for analyzing and reporting EQ-5D data. *Health Economics* 19(8), 886-905. [10.1002/hec.1608](https://doi.org/10.1002/hec.1608)

Buckingham K. & Devlin N. (2006). A theoretical framework for TTO valuations of health. *Health Economics* 15(10), 1149-1154. [10.1002/hec.1122](https://doi.org/10.1002/hec.1122)

Devlin N., Hansen P., Kind P., & Williams A. (2003). Logical inconsistencies in survey respondents' health state valuations – a methodological challenge for estimating social tariffs. *Health Economics* 12(7), 529-544. [10.1002/hec.741](https://doi.org/10.1002/hec.741)

#### Grants relating to the research:

2008 to 2009 "An exploration of TTO methods for states worse than dead" EuroQol Foundation PI: Nancy Devlin; CIs: Aki Tsuchiya & Carl Tilling (Sheffield University); Ken Buckingham (University of Otago, NZ) £35k.

Substantial funding was also provided from the Department of Health through its Policy Research Programme (2010 to 2011 PRP 070/0065 £325k; 2012 to 2014 PRP 070/0073 £475k) and from the Medical Research Council (2010 to 12 £480k).

The quality of the research is evidenced by its impact and relevance; the publication of key papers in high calibre journals such as *Health Economics* and *Medical Decision-Making*; success in winning substantial grants to support the work across an extensive period of time; and by the judgments of peer reviewers on the deliverables from those grants. For example, peer reviewers on the final report on grant NIHR PRP 070/0065 unanimously rated the overall project as excellent value for money and as having high relevance to policy or practice.

### 4. Details of the impact

The impact of Professor Devlin's work in this area includes (a) impact on the way health outcomes are 'scored' and used to inform a wide range of healthcare; and (b) increased use of the measurement of health outcomes in many health care systems to monitor and improve the performance of health care providers, quality of services and patient health.

The main pathway to impact has been via the EuroQol Group, a not-for-profit organisation promoting the measurement of patient reported health to improve health-care decision-making globally. It holds the EQ-5D copyright, licensed to governments and pharmaceutical companies. Professor Devlin has held several senior roles in the EuroQol Group and since 2010 is the organisation's scientific Chair. Following Devlin's methodological work and its international piloting, the EuroQol Group assumed her suggested approach for use in all countries (Oppe *et al.*, 2013) and will replace the EQ-5D value sets currently in use, giving a maximum impact to Devlin's research.

The EQ-5D is required by NICE in evidence submitted on new technologies. It is used in the English NHS Patient Reported Outcome Measures (PROMs) survey on all NHS patients before and after elective surgery and other medical procedures and in the GP Patient Survey which assesses patients' experiences of the access and quality of care they receive from their local GPs, dentists and out-of-hours doctor services. Other health care systems also use EQ-5D to measure patient health and its use expands further as countries such as China and Brazil move toward universal health.

Value sets based on Devlin's research while she was at City and subsequently are being produced in the following countries: China, Hong Kong, Singapore, Korea, Thailand, Taiwan, Japan, United Arab Emirates (UAE), Uruguay, Canada, US, Spain, Germany, The Netherlands, New Zealand, Denmark, Sweden and Norway as well as in the UK. In addition to her role as Principal Investigator on the value set studies in England, the wider UK and UAE, Professor Devlin is also an advisor to other studies around the world via her role on the Value Set Working Group, providing technical support and ensuring consistently high standards.

The value sets being produced in each country have multiple uses: firstly in health technology appraisal (HTA) decisions about new medicines. NICE 2013's Methods Review specifically refers to the new value set study led by Professor Devlin as relevant to NICE technical appraisal for cost-effectiveness analyses. The UK value sets are accordingly being awaited with interest by academics, industry and decision-makers. Secondly in the UK EQ-5D data based on the value sets will be used as evidence to set prices for all new medicines under Value-Based Pricing which will be introduced in 2014.

Examples of the new EQ-5D uses abroad:

- The government of Abu Dhabi is supporting a study to establish a mapping, specific to the Middle East, of EQ-5D answers to health valuations for use in HTA decision-making about new medicines. The Health Authority will also require all Arab Emirate nationals to complete the EQ-5D yearly as part of its public health screening programme (Weqaya).
- Professor Devlin has been working with Alberta Health Services in Canada, which wishes to make routine use of EQ-5D in its health care system. This agency is co-funding a value set study.
- Professor Devlin runs EQ-5D workshops for the Health Authority of Abu Dhabi; Alberta Health Services; PHARMAC in New Zealand; the Chinese National Health Development Centre (introducing EQ-5D to monitor the quality of rural hospitals); officials in the Ministry of Health in Sweden (EQ-5D is used in patient registries); a group of Asian countries' Government officials in Singapore (developing HTA processes to include the EQ-5D); and health care officials in the Philippines.

Professor Devlin also works extensively with Government organisations to support their use of EQ-5D and value sets. She contributed to the 2012 NICE methods review on measuring health

outcomes; advises Monitor on how to take into account patients' evidence when regulating the quality of health care providers in England; and has a role in the advisory group to the English DH's PROMs programme.

The impact of this research is highly significant in improving health and health care decision-making and has had wide reach throughout the UK and in many other countries.

### 5. Sources to corroborate the impact

- a. The use of Devlin et al (2003)'s value set in the health technology appraisal process of New Zealand's Pharmaceutical Management Agency (PHARMAC) is documented in: [PHARMAC \(2012\) Prescription for Pharmacoeconomic Analysis: Methods for Cost Utility Analysis. Wellington: PHARMAC.](#)
- b. The report from peer reviewers on the NIHR PRP grant 070-0065 referred to on p.3 can be obtained upon request to the Policy Research Programme Central Commissioning Facility (PRP CCF) of the Department of Health.
- c. Documentation for the EQ-VT is available to any research team wishing to undertake a value set study; whilst the EQ-VT user guide and related materials are not in the public domain, they can be provided upon request to the **EuroQol Group**: [www.euroqol.org](http://www.euroqol.org).
- d. Examples of Nancy Devlin's work with overseas government and health care organisations on their use of EQ-5D referred to in section 4 can be verified as follows:
  - NICE International workshop on EQ-5D in Beijing – referred to in this [NICE International blog](#)
  - Alberta Health Services/Alberta Health Quality Council workshop on EQ-5D – presentations available on this Institute of Health Economics (Alberta) website: [www.ihe.ca/research/knowledge-transfer-initiatives/--methodology-forum/patient-reported-outcome-measurement-in-alberta-potential-of-the-eq-5d-symposium](http://www.ihe.ca/research/knowledge-transfer-initiatives/--methodology-forum/patient-reported-outcome-measurement-in-alberta-potential-of-the-eq-5d-symposium).
- e. The EuroQol Group's adoption of the methods developed by Professor Devlin is evidenced in a key paper setting out how such studies should be performed internationally: Oppe M, Devlin N, van Hout B and de Charro F (2013) *An international protocol for the valuation of EQ-5D-5L (Value in Health - forthcoming)*.
- f. Section 4 refers to a suite of international pilot studies undertaken in 2011 to test and further explore variants of the TTO methods developed by Nancy Devlin. The results are about to be published in a special issue of the *European Journal of Health Economics*, which may be verified by contacting the editor in chief.
- g. Professor Nancy Devlin's role as the elected Chair of the EuroQol Group may be verified via the EuroQol Group's website: [www.euroqol.org/euroqol-group/executive-committee.html](http://www.euroqol.org/euroqol-group/executive-committee.html).
- h. The list of countries currently undertaking value set studies using the protocol based on Professor Devlin's methods may be verified by contacting the EuroQol Group's Value Sets Working Group.