



School of Business  
Te Kura Pakihi

ISSN 1178-2293 (Online)

University of Otago  
Economics Discussion Papers  
No. 1104

July 2011

---

## **Who's next? A new process for creating points systems for prioritising patients for elective health services**

**Alison Barber**, PGDip Health Mgmt

Leader of Clinical Prioritisation Team

Elective Services Programme, Ministry of Health, Auckland 1061, New Zealand

**Paul Hansen**, PhD

Associate Professor

Department of Economics, University of Otago, Dunedin 9054, New Zealand

**Ray Naden**, FRACP

Clinical Director

Synergia, P.O. Box 147 168, Auckland, New Zealand

**Franz Ombler**, BA

Managing Director

1000Minds, 19 Edinburgh Terrace, Wellington 6023, New Zealand [www.1000minds.com](http://www.1000minds.com)

**Ralph Stewart**, FRACP

Cardiologist and Associate Professor

Green Lane Cardiovascular Service, Auckland 1003; and University of Auckland, Auckland 1142, New Zealand

## **Abstract**

We describe a new process for creating points systems for prioritising patients for elective health services. Beginning in 2004, the authors were closely involved in a project to develop the process, initially for coronary artery bypass graft surgery and then successively for other elective services. The project was led by New Zealand's Ministry of Health in collaboration with the relevant clinical professional organisations. The objective was to overcome the limitations of earlier methodologies and to create points systems that are valid and reproducible and based on a consensus of clinical judgements. As the project progressed and the process was refined, other points systems were successively created (and clinically endorsed) for hip and knee replacements, varicose veins surgery, cataract surgery, gynaecology, plastic surgery, otorhinolaryngology, and heart valve surgery. Other points systems are planned for the future. Since 2008 the process has also been used in the public health systems of Canada's western provinces. The process is explained in a step-by-step manner so that others are able to follow it to create their own points systems if desired.

## **Introduction**

In public health systems worldwide there is insufficient capacity to be able to treat all patients for elective (i.e. scheduled or non-urgent) services immediately. Patients must therefore be prioritised for treatment. One approach, as employed in New Zealand,<sup>1-6</sup> Canada's western provinces<sup>7</sup> and parts of the UK<sup>3,8</sup> for example, is to rank patients for access to treatment via points systems (also known as 'scoring' or 'point-count' systems).

A points system consists of explicit criteria for deciding patients' relative priorities for treatment, where the categories within each criterion are each worth a certain number of points that are intended to represent the relative importance of the criteria and categories. An example of a point system for prioritising patients for coronary artery bypass graft (CABG) surgery appears in Figure 1. Patients are prioritised by 'scoring' each patient on the criteria and summing the corresponding point values to get a 'total score' for each patient by which patients are ranked relative to each other.

Beginning in 2004, a new process for creating points systems – i.e. determining appropriate criteria and point values – was developed and applied in New Zealand. The objective was to overcome the limitations of earlier methodologies (discussed below) and to create points systems that are valid and reproducible and based on a consensus of clinical judgements. The process was initially applied to CABG and then successively to other elective services. Since 2008 the process has also been used in the public health systems of Canada's western provinces.

This discussion paper describes this process, which the authors were closely involved in developing and applying (AB and RN were the project manager and clinical advisor respectively, PH and FO created the software used, and RS was the 'clinical champion' for CABG). The process is explained in a step-by-step manner so that others are able to follow it to create their own points systems if desired. As discussed in the Conclusion, studies reporting the outcomes from applying the process are reported elsewhere. Because the process was developed in New Zealand, as background we begin by briefly discussing the use of points systems in that country.

## **Points systems in New Zealand**

New Zealand's waiting lists were criticised in 1993 for being "a diverse mix of patient cases – placed and kept on the list for a number of different reasons, and with no agreed criteria for admission to the list."<sup>9</sup> With the aim of increasing the transparency, consistency and fairness

**Figure 1. An example of a points system for prioritising patients for CABG surgery**

<b>Coronary anatomy (where LAD = left anterior descending artery)</b>	Score	
1 vessel $\geq$ 50%	0	
2 vessels $\geq$ 50%, or proximal LAD $\geq$ 50%	1	
3 vessels $\geq$ 50%, or proximal LAD $\geq$ 70%	7	<input type="text"/>
2 or 3 vessels $\geq$ 50%, including proximal LAD $\geq$ 70%	11	
Left main stem $\geq$ 50-69%	22	
Left main stem $\geq$ 70%	74	
<b>Troponin (where STEMI = ST elevation myocardial infarction)</b>		
Troponin negative, or STEMI	0	<input type="text"/>
Non-STEMI Troponin positive	52	
<b>Recent Acute Coronary Syndrome (ACS) during last 2 weeks</b>		
No ACS	0	
ACS: STEMI or No ST depression ( $\geq$ 1mm)	20	<input type="text"/>
ACS: ST depression ( $>$ 1mm $<$ 2 mm)	42	
ACS: ST depression ( $\geq$ 2mm), or transient ST elevation	73	
ACS: Haemodynamic instability, or serious arrhythmia due to ischaemia	115	
<b>Severity of angina / anginal equivalent</b>		
No angina / Class I	0	
Class II	11	<input type="text"/>
Class III	22	
Class IV	53	
<b>Treadmill exercise / Perfusion imaging / Territory at Risk</b>		
Negative / mildly positive, or small territory at risk / akinetic	0	
Positive, or moderate territory at risk	20	<input type="text"/>
Very positive, or large territory at risk	28	
Markedly positive (not scored for territory at risk)	42	
<b>Left ventricular ejection fraction (EF)</b>		
EF $<$ 30%, no / mild reversible ischaemia or viability	0	
EF $>$ 50%	4	<input type="text"/>
EF = 30-50%	27	
EF $<$ 30% with reversible ischaemia / viability	35	
<b>Predicted benefit to quality of life after surgery</b>		
No / Small benefit	0	<input type="text"/>
Moderate benefit	27	
Large benefit	35	
<b>Left ventricular failure (LVF) due to ischaemia</b>		
No	0	<input type="text"/>
Yes	22	
		Total Score: <input type="text"/>

of how patients are prioritised for access to treatment, points systems were adopted nationwide in 1998.<sup>1</sup> Referred to as ‘National Clinical Priority Assessment Criteria’ (CPAC), they were introduced for CABG, cataract surgery, hip and knee replacement, prostatectomy for benign enlargement, infertility treatments, cholecystectomy, and tympanostomy tubes with otitis media with effusion.<sup>1</sup>

Consistent with international best practice at the time,<sup>3</sup> these early point systems were created using an iterative modified-Delphi consensus process involving clinical leaders. For each elective service concerned, the clinicians first agreed on the criteria, representing clinical factors associated with the severity of the disease, and then they directly specified the point values for the categories within the criteria. Finally, these point values were ‘fine tuned’ based on the results from regressing clinicians’ ratings of patients’ urgency for treatment (expressed on a visual analogue scale) against the patients’ characteristics in terms of the criteria.<sup>1,2</sup>

Unfortunately, within a year of points systems being adopted in New Zealand, concerns arose about the construct and outcome validity of the points systems for CABG,<sup>4</sup> cataract surgery,<sup>5</sup> and cholecystectomy.<sup>6</sup> A 2004 review of the CABG points system commissioned by the Ministry of Health found substantial geographical variations in its use and in prioritisation processes nationally (Diana North, Fiona Doolan-Noble. *CABG Prioritisation Project: Final Report*, unpublished). The CABG points system was criticised for comprising criteria that poorly reflected patients’ risks of surgery and capacities to benefit respectively and for having point values that were considered to be essentially arbitrary. Given the original points systems were widely judged to have been failures – and, by implication, the methods used to create them – a new process was needed.

In 2004 a project to develop a new process, initially to create a new CABG points system, was launched. The project was led by the Ministry of Health, initially in collaboration with the New Zealand region of the Cardiac Society of Australia and New Zealand (CSANZ). Advice was received from the National Ethics Advisory Committee, the Medical Council, the Health & Disability Commission, the Human Rights Commission, and Māori (New Zealand’s indigenous people) representatives. As the project progressed and the process was refined, via collaborations with the relevant clinical professional organisations other points systems were successively created (and clinically endorsed) for hip and knee replacements, varicose veins surgery, cataract surgery, gynaecology, plastic surgery, otorhinolaryngology, and heart valve surgery. Other points systems are planned for the future.

## **Figure 2. Seven steps for creating a points system for prioritising patients**

Performed by participating clinicians (and, potentially, patients and other stakeholders) and supported by Internet-based software.

1. Rank patient case vignettes using individual clinical judgements and then by consensus
2. Draft the criteria and the categories within each criterion for prioritising patients
3. Pre-test the criteria and categories and refine them
4. Consult with patient groups and other clinicians
5. Determine the point values for the criteria and categories
6. Check the test-retest reliability and face validity of the points system
7. Revise the points system as new evidence emerges or clinical judgements change

## **The process**

The process consists of the seven steps explained below (summarised in Figure 2) performed by a working group of clinical leaders for the elective service concerned in consultation with patient groups and other clinicians (Step 4). The process is supported by 1000Minds Internet-based software which enables the group to work together remotely and with teleconferencing and face-to-face meetings to assist group work when needed. Developed by two of the authors (PH and FO), 1000Minds is available for free for unfunded academic use from them or [www.1000minds.com](http://www.1000minds.com); other applications of the software include health technology prioritisation,<sup>10</sup> classifying individuals' risks of suffering from rheumatoid arthritis<sup>11</sup> and measuring responses in clinical trials for chronic gout.<sup>12</sup>

### ***1. Rank patient case vignettes using individual clinical judgements and then by consensus***

The process begins with the participating clinicians individually using their clinical judgements to prioritise a dozen or so patient case 'vignettes' representative of the relevant condition (or conditions) presenting for treatment. Each vignette is a detailed description of all potentially-relevant patient information, including symptoms, clinical findings, relevant investigations, co-morbidities and risk factors, as well as psycho-social impacts.

The purpose is to demonstrate the variability of individual clinical decision-making. In our experience, clinicians are often surprised at the extent of this variability, which promotes greater engagement in the process. The mean ranking of the vignettes is used as the starting

point to engage the group in a discussion to reach a ranking agreed to by consensus. This consensus ranking serves as a ‘standard’ that can be compared at Step 6 against the ranking produced by the points system that is ultimately created.

## ***2. Draft the criteria and the categories within each criterion for prioritising patients***

The ranking exercises at the previous step stimulate discussion of the clinically and morally relevant criteria influencing judgements about priority for treatment. These are typically related to clinical indicators of risk and potential to benefit and patient-reported measures of quality of life. Informed by the available clinical evidence and guidelines from literature reviews, the clinicians then draft specific definitions of these criteria and the categories within each criterion. For example, the illustrative CABG points system in Figure 1 is consistent with guidelines from the American College of Cardiology and American Heart Association.<sup>13</sup>

## ***3. Pre-test the criteria and categories and refine them***

The clinicians individually apply the criteria and categories drafted at the previous step to the patient vignettes from Step 1. The purpose is to check that the criteria and categories adequately differentiate between the vignettes and to identify any ambiguities in the language used. If necessary, the criteria and categories can be further refined.

## ***4. Consult with patient groups and other clinicians***

Feedback and advice is then sought from patient groups and other clinicians (e.g. through their professional organisations) about the appropriateness of the criteria and categories. If any problems are discovered, the clinicians participating in the process can further refine the criteria and categories – in effect, iteratively repeating Steps 2-4 until the criteria and categories are widely accepted.

## ***5. Determine the point values for the criteria and categories***

Having confirmed the criteria and categories, the next step is to determine their point values, representing their relative importance. The 1000Minds software supporting the process implements the PAPRIKA method,<sup>14</sup> a type of choice-based conjoint analysis (also known as ‘discrete choice experiments’).<sup>15</sup> Other methods are surveyed in a book by Valerie Belton and Theodor Stewart.<sup>16</sup>

Using clinical judgement, the participating clinicians are asked to pairwise rank a series of hypothetical patients, presented as diads in random order, with respect to their relative

priority. The hypothetical patients are defined on two criteria at-a-time such that there is a trade-off between them (see Figure 3 for an example). “The advantage of choice-based methods [such as this] is that choosing ... is a natural human task at which we all have considerable experience, and furthermore it is observable and verifiable.”<sup>17</sup>

**Figure 3. Example of a pairwise-ranking question (for CABG surgery)**

**Which of these 2 (hypothetical) patients has greater priority for surgery within 6 months? (Left, Right or equal?)**

(given they're identical in all other respects)

(Left)		(Right)
a Severity of angina or anginal equivalent No angina / Class I	or	a Severity of angina or anginal equivalent Class III
b Coronary anatomy (where LAD = left anterior descending artery) Left main stem $\geq$ 50-69%		b Coronary anatomy (where LAD = left anterior descending artery) 3 vessels $\geq$ 50%, or proximal LAD $\geq$ 70%
<input type="button" value="this one"/>	<input type="button" value="they're equal"/>	<input type="button" value="this one"/>
<input type="button" value="this one is impossible"/>	<input type="button" value="skip this question for now"/>	<input type="button" value="this one is impossible"/>

Although the clinicians may individually answer the pairwise-ranking questions (with their results, in effect, ‘averaged’), our experience is that, when there are disagreements, a process of reaching consensus ensures greater face validity. Thus, the clinicians, who may be geographically dispersed, vote (anonymously at first) on each question via the software. Votes that are not unanimous can be handled in several possible ways. For example, with just one dissenter, he or she can either accept the majority ranking or join in a group discussion in pursuit of consensus; with more dissenters there can be discussion and consensus. On the rare occasions (in our experience) when consensus cannot be reached a majority decision can determine the final pairwise ranking.

The clinicians continue voting until all possible questions involving trade-offs between two criteria at-a-time are answered. The PAPRIKA method ensures the answers are consistent so that an overall ranking of all hypothetically possible patients (i.e. all combinations of the criteria and categories) is defined. The number of questions asked (and the burden on clinicians) is minimised because each time a question is answered the method eliminates all other possible questions that are implicitly answered as corollaries of those already answered. For the illustrative CABG points system in Box 1, for example, the clinicians were required to answer 53 questions (in a session lasting 72 minutes), of which 17 (32%) votes were unanimous, with the remainder resolved via a discussion and consensus. From the answers the software calculates the point values via mathematical method.<sup>14</sup>



### ***6. Check the test-retest reliability and face validity of the points system***

The reliability of the clinicians' answers to the questions at the previous step can be checked by having the clinicians re-answer the questions sometime later. If necessary, some of the answers can be revised (via the software). Having confirmed the answers, the face validity of the resulting points system can then be investigated. First, the clinicians assess the intuitive plausibility of the relative importance of the criteria and categories implied by the point values. Second, the consensus ranking of patient vignettes from Step 1 is compared with the ranking produced by the points system using the clinicians' ratings of the vignettes from Step 3. Based on these assessments, the points system can be further refined (some of the steps revisited) or it can proceed to pilot-testing.

### ***7. Revise the points system as new evidence emerges or clinical judgements change***

Because all the data from the process are stored electronically by the software, the points system can be revised relatively easily on a regular or ad-hoc basis without repeating the entire process. Particularly when new evidence emerges – perhaps in response to areas identified at the earlier steps where the evidence is inadequate or clinical judgements disagree – further criteria can be added or old criteria deleted without influencing criteria unaffected by such changes. If clinical judgement changes, clinicians are only required to answer the affected questions at Step 5, resulting in revised point values.

## **Conclusion**

Our experience (beginning in 2004) with using the process to create the points systems referred to earlier reveals it is acceptable to clinicians and their professional organisations as well as to patient groups (consulted with at Step 4). The National Ethics Advisory Committee commented that points systems created using the process have “potential ethical advantages over alternative approaches, because [they emphasise] explicit rather than implicit bases for prioritisation, and [they aim] to prioritise amongst patients on nationally consistent grounds.”<sup>18</sup> The process was a finalist for the *2006 New Zealand Health Innovation Award*.<sup>19</sup>

The points systems for CABG,<sup>20</sup> hip and knee replacements, cataract surgery, and gynaecology have been endorsed by their professional organisations (e.g. New Zealand Orthopaedic Association<sup>21</sup>) and are in use nationwide. The points systems for plastic surgery and otorhinolaryngology (the two most recently completed) have been endorsed and are in the process of being implemented.<sup>22</sup>

With assistance from two of the authors (AB and RN), the process has also been used in the public health systems of Canada's western provinces since 2008.<sup>23</sup> A points system for rheumatology has been pilot-tested successfully,<sup>24</sup> and others for geriatrics, nephrology, and gastroenterology are being tested for reliability and validity (Step 6).<sup>25</sup>

As well as clinical expertise, prioritisation involves ethical judgements. It is likely that clinicians, patients and other stakeholders have different perspectives – including with respect to their judgements about need and potential to benefit. For the points systems for cataract surgery and plastic surgery referred to earlier, patients worked with clinicians to draft the criteria (Step 2) and determine their point values (Step 5). An area for future research is further investigation into the appropriateness and feasibility of involving patients and other stakeholders more fully in the process.

**Acknowledgements:** The New Zealand Ministry of Health funded the project described herein.

**Potential conflict-of-interest disclosure:** PH and FO own the 1000Minds software referred to which was created for the purpose of supporting the process explained herein. All other authors declare that they have no potential conflicts of interest.

## References

1. Hadorn DC, Holmes AC. The New Zealand priority criteria project. Part 1: Overview. *BMJ* 1997;314:131-4.
2. Hadorn DC, Holmes AC. The New Zealand priority criteria project. Part 2: Coronary artery bypass graft surgery. *BMJ* 1997;314:135-8.
3. MacCormick AD, Collecutt WG, Parry BR. Prioritizing patients for elective surgery: A systematic review. *ANZ J Surg* 2003;73:633-42.
4. Seddon ME, French JK, Amos DJ, Ramanathan K, McLaughlin SC, White HD. Waiting times and prioritisation for coronary artery bypass surgery in New Zealand. *Heart* 1999;81:586-92.
5. Halliwell T. How fair is cataract prioritisation? *N Z Med J* 1998;111:405-7.
6. Dennett ER, Kipping RR, Parry BR, Windsor J. Priority access for elective cholecystectomy: A comparison of three scoring methods. *N Z Med J* 1998;111:231-3
7. Noseworthy TW, McGurran JJ, Hadorn DC, and the Steering Committee of the Western Canada Waiting List Project. Waiting for scheduled services in Canada: Development of priority-setting scoring systems. *J Eval Clin Pract* 2003;9:23-31.
8. Ryan MD, Scott A, Reeves C, et al. Eliciting public preferences for healthcare: A systematic review of techniques. *Health Technol Assess* 2001;5:1-186.
9. Fraser G, Alley P, Morris R. *Waiting Lists and Waiting Times: Their Nature and Management*. Wellington: National Advisory Committee on Core Health and Disability Support Services, 1993.
10. Golan O, Hansen P, Kaplan G, Tal O. Health technology prioritization: Which criteria for prioritizing new technologies and what are their relative weights? *Health Policy*; [forthcoming] doi:10.1016/j.healthpol.2010.10.012.
11. Neogi T, Aletaha D, Silman AJ, et al. The 2010 American College of Rheumatology / European League Against Rheumatism classification criteria for rheumatoid arthritis: Phase 2 methodological report. *Arthritis Rheum* 2010;62:2582-91.
12. Taylor W, Singh JA, Saag KG, et al. Bringing it all together: A novel approach to the development of response criteria for chronic gout clinical trials. *J Rheumatol* 2011;38:1467-70.
13. Eagle KA, Guyton RA, Davidoff R, et al. ACC/AHA 2004 guideline update for coronary artery bypass graft surgery: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Update the 1999 Guidelines for Coronary Artery Bypass Graft Surgery). *Circulation* 2004;110:1168-76.

14. Hansen P, Ombler F. A new method for scoring multi-attribute value models using pairwise rankings of alternatives. *J Multi-Crit Decis Anal* 2009;15:87-107.
15. Ryan M, Gerard K, Amaya-Amaya M, eds. *Using Discrete Choice Experiments to Value Health and Health Care*. Amsterdam: Springer, 2008.
16. Belton V, Stewart TJ. *Multiple Criteria Decision Analysis: An Integrated Approach*. Boston: Kluwer, 2002.
17. Drummond MF, Sculpher MJ, Torrance GW, O'Brien BJ, Stoddart GL. *Methods for the Economic Evaluation of Health Care Programmes*. Oxford: Oxford University Press, 2005.
18. National Ethics Advisory Committee. *Ethical Issues in Elective Services: NEAC Report to the Minister of Health*. Wellington: National Ethics Advisory Committee, 2006. [www.neac.health.govt.nz/moh.nsf/pagescm/519/\\$File/ethicalissueselectiveservices.pdf](http://www.neac.health.govt.nz/moh.nsf/pagescm/519/$File/ethicalissueselectiveservices.pdf)
19. Day S. *Valid, Transparent and Fair Decision-Making Processes for Access to Elective Health Care*. Innovation Award 2006. [www.hiirc.org.nz/page/17863/valid-transparent-and-fair-decision-making/?tag=healthinnovations&tab=27&contentType=507](http://www.hiirc.org.nz/page/17863/valid-transparent-and-fair-decision-making/?tag=healthinnovations&tab=27&contentType=507)
20. Ministry of Health. *Cardiac Surgery Services in New Zealand – Cardiac Surgery Service Development Working Group Report*. Wellington: Ministry of Health, 2008. [www.moh.govt.nz/moh.nsf/indexmh/cardiac-surgery-services-in-nz-oct08](http://www.moh.govt.nz/moh.nsf/indexmh/cardiac-surgery-services-in-nz-oct08)
21. New Zealand Orthopaedic Association. *Introduction to the National Clinical Priority System (CPS) for Access to Publicly Funded Hip or Knee Joint Replacement Surgery*. Wellington: New Zealand Orthopaedic Association, 2007. [www.nzoa.org.nz/content/CPAC\\_Prioritisation\\_Guidelines.pdf](http://www.nzoa.org.nz/content/CPAC_Prioritisation_Guidelines.pdf)
22. Ministry of Health. *Annual Report for the Year Ended 30 June 2008*. Wellington: Ministry of Health, 2008. [www.health.govt.nz/publications/annual-reports/annual-report-year-ended-30-june-2008](http://www.health.govt.nz/publications/annual-reports/annual-report-year-ended-30-june-2008)
23. De Coster C, Noseworthy T. WCWL priority referral scores. In: Nason E, Roberts G. *Taming of the Queue VI: Improving Patient Flow, 6th National Invitational Conference on Wait Time Measurement, Monitoring & Management*, Ottawa, Canada. CPRN Research Report, June 2009. [www.cprn.org/documents/51431\\_EN.pdf](http://www.cprn.org/documents/51431_EN.pdf)
24. Fitzgerald A, De Coster C, McMillan S, et al. Relative urgency for referral from primary care to rheumatologists: The priority referral score. *Arthrit Care Res* 2010;63:231-9.
25. Noseworthy T, De Coster C, Naden R. Priority-setting tools for improving access to medical specialists. Abstract-poster presentation, 6<sup>th</sup> Health Technology Assessment International Annual Meeting, Singapore. *Ann Acad Med Singap* 2009;38:S78.