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Eeny, meeny, miny, moe; Catch a patient by the toe; To whom should the treatments go?

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In every public health system in the world there are never enough so-called 'elective' (or non-emergency) services available for everyone who could potentially benefit from them. This article discusses how patients are prioritised for elective services in New Zealand,[1] and outlines a new process for creating 'points systems' developed in New Zealand that is now being exported to other countries.

Elective health services are ones for which patients are capable of waiting to be treated (in contrast to *emergency* services). Examples include hip and knee replacements, some kinds of heart surgery, cataract surgery, infertility treatments, plastic surgery, and so on. New Zealand's health system is a predominantly *public* system (in contrast to *private* or *social insurance* systems).[2] This means that the elective services available (and 'non-elective' services too) are funded from general taxation, so that patients are charged nothing when they are treated.

1   For a discussion of prioritisation across the health system as a whole and an introduction to cost-utility analysis, see an earlier *EcoNZ@Otago* article, Devlin & Hansen (1999).
2   Other countries with public health systems include: Australia, Canada, United Kingdom, Ireland, the Scandinavian countries, the former communist countries, and many so-called developing countries.

INSIDE THIS ISSUE

This combination of elective services being 'free' to patients and patients being capable of waiting (albeit they would prefer not to) ensures there will always be more potential patients who could benefit from treatment (even if just a little) than there are elective services available. This phenomenon can be represented in the demand and supply diagram in Figure 1 (for the example of hip replacements). When hip replacements are free to patients (price = 0), the quantity demanded equals, say, 800 and the quantity supplied equals, say, 600, and so there is 'excess demand' of 200.

The dreaded R word!

This excess demand means that the 600 hip replacements must be *rationed* amongst the 800 potential patients. In other (more genteel) words, 600 of these 800 potential patients must be *prioritised* to receive the 600 hip replacements (compared to the 200 potential patients who will miss out). Because these 'lucky' 600 patients cannot be treated all at once, their order of treatment must also be determined. If you were in charge, how would you go about making these prioritisation decisions?

Figure 1: Demand and supply for an elective service (e.g., hip replacements)
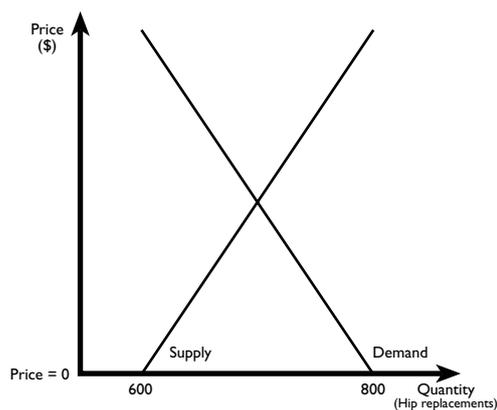
Who and in what order?

There are many possible approaches for prioritising patients in theory. At one extreme, for example, patients could be chosen arbitrarily or randomly. Doctors could treat patients they like, in any order. Or they could toss a coin: heads you get a hip replacement, tails you don't. Most people, however, would prefer prioritisation decisions to be made in a more consistent and impartial fashion, based on relevant information and an explicit and transparent process.
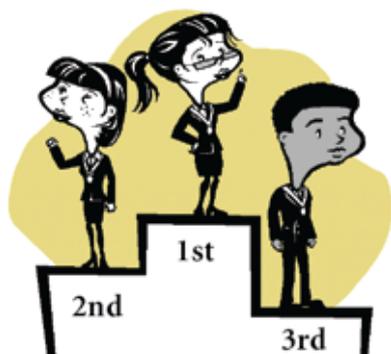
New Zealand's waiting lists were described in 1993 as being "a diverse mix of patient cases - placed and kept on the list for a number of different reasons, and with no agreed criteria for admission to the list." (Fraser et al., 1993). As a cardiologist quoted in Hadorn & Holmes (1997b) put it: "Manipulation by referring doctors, friends in high places, MP letters, or just persistent nagging, and just slight exaggeration of symptoms, is rampant, and the poor benign patient simply sits on the list and is leap frogged." And so a new approach, implicitly based on Multi-Criteria Decision Making (MCDM), was introduced to promote greater consistency and transparency.

MCDM and points systems

Multi-Criteria Decision Making is the name for methods for arriving at rankings of alternatives that are described on (multiple) criteria relevant to the decision being considered. MCDM is used in literally thousands of applications – e.g., from deciding who to admit to law school, to selecting immigrants, to thinking about where to hold the 2016 Olympic Games.

With respect to prioritising patients, MCDM involves arriving at a ranking based on explicit criteria – usually associated with patients' relative 'needs' and their 'capacities to benefit' from the treatment. Each criterion, comprising two or more levels, is worth a range of 'point values' (or 'weights') intended to reflect the relative importance of the criteria. These point values are commonly known as a 'points system' (see Figure 2 for an example). Each patient is 'scored' to get a 'total score', the sum of the patient's point values across the criteria. The ranking of patients' total scores determines who gets treated and in what order.

Figure 2: Points system for hip replacements (illustrative only)

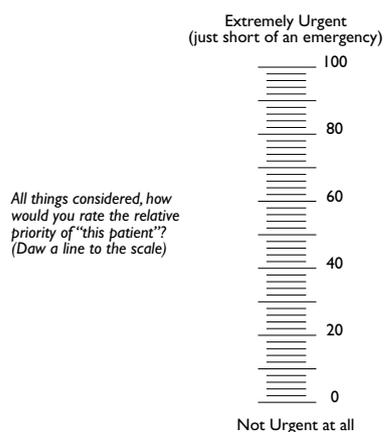| Criteria	Points	Score
Pain		
No pain	0	
Intermittent activity-related pain	7	
Regular pain with weight-bearing activity	15	
Significant pain with activity & at rest	24	
Dominates life & regularly interferes with sleep	31	☐
Personal functional limitation due to orthopaedic condition		
No limitation	0	
Mild limitation	4	
Moderate limitation	13	
Severe limitation	24	☐
Potential benefit from surgery (for patient, dependents, etc)		
Small improvement likely	0	
Moderate improvement likely	15	
Return to near normal likely	27	☐
Consequence of delay > 6 months		
Unlikely to deteriorate	0	
Likely to deteriorate & result in increased disability	12	
Likely to progress to major complications	18	☐
Total Score =		☐

First in the world

On 1 July 1998 points systems, also referred to as 'National Clinical Priority Assessment Criteria' (CPAC), were formally adopted in the New Zealand public health system for at least seven elective services, including coronary artery bypass graft (CABG) surgery, cataract surgery, hip and knee replacements, and infertility treatments (Hadorn & Holmes, 1997a,b).

A few years later the public health systems of Canada's western provinces followed New Zealand's lead and introduced points systems for a similar range of services (Noseworthy et al., 2003). Points systems are also used in the UK, and their adoption across the UK's National Health System has been debated (e.g., Derrett et al., 2002).

New Zealand's and Canada's points systems were created using 'group consensus methods', with their point values 'fine tuned' by having participating clinicians rate hypothetical patient descriptions on 'visual analogue scales' (VAS) with respect to urgency for treatment (e.g., see Figure 3). These VAS ratings were then 'regressed' (a common statistical technique) against the patients' characteristics in terms of the points system's criteria, with the point values derived from the regression coefficients.[3]

Figure 3: Visual analogue scale (where "this patient" would be appropriately described)

Extremely Urgent
(just short of an emergency)

100

80

60

All things considered, how would you rate the relative priority of "this patient"? (Daw a line to the scale)

40

20

0

Not Urgent at all

Unfortunately, not long after being introduced, several of New Zealand's points systems were criticised for being essentially invalid and resulting in significant numbers of patients being mistakenly denied treatment (sometimes with fatal consequences).[4] In 2004, following a review, the Ministry of Health launched a project to revise New Zealand's points systems. Given the original points systems were widely considered to have been failures – and so too, by implication, were the methods used to create them – a new process for creating points systems was needed.

A new process for creating points systems

The process is fully supported by Internet-based software known as 1000Minds (available from the author or www.1000minds.com). Space limitations prevent the process from being fully explained here,[5] but its key elements may be summarised as follows.

For each elective service concerned, the points system's criteria (and their levels) – based on patients' needs and capacities to benefit from treatment – are identified by a group of national clinical leaders. This is based on clinical evidence or, in its absence, the consensus of expert opinion, and also clinicians' ethical values. Other stakeholders are also consulted, including patient groups, Māori representatives, the National Ethics Committee, the Health and Disability Commissioner, and District Health Boards.

Having identified a points system's criteria, it is also important to specify the 'right' point values – reflecting the relative importance of the criteria. (If the points are wrong, then no matter how perfect the criteria, the ranking of patients will be inaccurate.) The 1000Minds software determines the point values by asking the participating clinicians a series of questions, involving tradeoffs between the criteria. An example is shown in Figure 4.

Analogous questions, all involving tradeoffs between the criteria, are repeated with different combinations of the criteria until sufficient information about the clinicians' preferences (i.e., their pairwise rankings) has been collected. From the pairwise rankings, the software estimates the point values for the criteria.
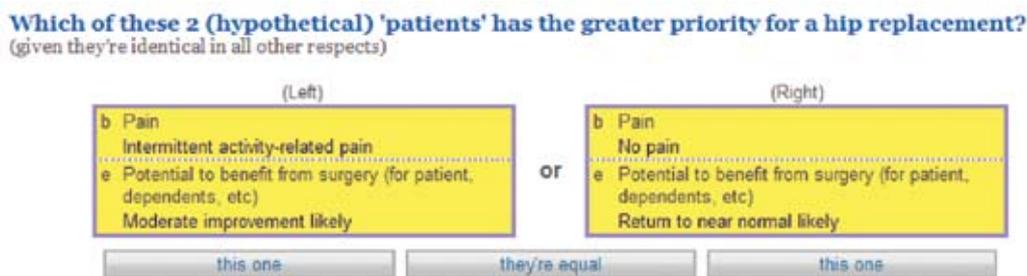
Figure 4: Example of a 1000Minds pairwise-ranking question

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3 For example, if patients with the pain characteristic "Dominates life and regularly interferes with sleep" (see Figure 2) received consistently high VAS ratings, regression analysis will assign a relatively large number of points to this.
4 References are available from the author.
5 Details are available from the author.

An important advantage of this approach is that it's based on the simplest possible type of decision in the universe – pairwise ranking (as in Figure 4): i.e., choosing one alternative ('patient') from just two options. This is a 'natural' activity that everyone has experience of (see question 2 below). It is less cognitively demanding than VAS ratings (see Figure 3 again), as were used to create New Zealand's original points systems. This means that clinicians' answers to pairwise-ranking questions - and the point values derived from them - are likely to have greater validity and reliability.

Conclusion

Since 2004 the new process described here has been used to re-create New Zealand's points systems as well as to create entirely new ones. These points systems are being used throughout New Zealand. The process and software have won several national and international innovation awards, and are now being exported to Canada and other countries.

Some questions to think about

1. As discussed above, the criteria included in points systems for prioritising patients are based on patients' relative 'needs' and their 'capacities to benefit' from the treatment. What is the difference between these concepts in general terms? How are they related? Why are both concepts relevant for prioritising patients?

2. Pairwise ranking, as used by the 1000Minds software (see Figure 4), is an example of a 'choice-based method', whereas VAS ratings, as used to create New Zealand's original points systems (see Figure 3), is an example of a 'scaling' method. According to Drummond et al. (2005, p. 145): 'The advantage of choice-based methods is that choosing, unlike scaling, is a natural human task at which we all have considerable experience, and furthermore it is observable and verifiable.' Do you agree? Why? / Why not?

Further reading

Gauld & Derrett (2000) discuss the development and implementation of New Zealand's points systems, and Derrett (2005) reviews the literature on them.

Useful websites

For more information about 1000Minds software, visit www.1000minds.com. The site includes an "education" section with non-technical information about Multi-Criteria Decision Making (MCDM) in general and points systems in particular.

An international survey of software for performing Decision Analysis, including MCDM, is available from www.lionhrtpub.com/orms/surveys/das/das.html.

Points systems are widely used internationally for decision making in most branches of medicine. Over 11,000 decision-making algorithms, many of which are points systems, are available from The Medical Algorithms Project via www.medal.org.

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