Resource allocation among cardiovascular specialists and trainees: A pilot survey

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OBJECTIVE: To assess the relative importance that cardiovascular specialists assign to new technologies.

METHODS: A pilot survey of practising cardiologists in one tertiary hospital and cardiology trainees from two university programs. Respondents were asked to distribute a hypothetical budget among several new technologies.

RESULTS: A total of 28 responses (response rate of 62%) were analyzed. In the hypothetical situation described, doctors appeared willing to spend approximately equal amounts on implantable cardiac defibrillators (median 25%, interquartile range 5% to 30%) and bare metal coronary stents (median 28%, interquartile range 20% to 40%). Physicians were more restrained in their allocation for refinements of these two technologies, including drug-eluting stents and biventricular pacing. Wide individual variations in technology use were noted.

CONCLUSIONS: There is considerable uncertainty among cardiovascular specialists regarding the relative value of new technologies. Further work is required to better quantify this uncertainty and its determinants.

Key Words: *Cardiovascular medicine; Health economics; Technology evaluation*

Affectation des ressources parmi les spécialistes en médecine cardiovasculaire et les stagiaires : Enquête pilote

BUT : L'enquête avait pour but d'évaluer l'importance relative que les spécialistes en médecine cardiovasculaire accordent à la nouvelle technologie.

MÉTHODE : Une enquête pilote a été menée chez des cardiologues pratiquant dans un centre de soins tertiaires et chez des stagiaires en cardiologie provenant de deux programmes universitaires. On demandait aux participants de répartir un budget fictif entre différentes nouvelles techniques.

RÉSULTATS : Vingt-huit réponses au total (taux de réponse de 62 %) ont été analysées. Les résidents, dans la situation fictive décrite, ont semblé disposés à dépenser à peu près la même somme d'argent pour les défibrillateurs implantables (médiane : 25 %; intervalle interquartile : 5 % – 30 %) que pour les endoprothèses coronariennes métalliques, sans élution de médicaments (médiane : 28 %; intervalle interquartile : 20 % – 40 %). Quant aux médecins, ils se sont montrés plus réservés dans l'affectation des ressources à l'égard d'une amélioration de ces deux techniques, soit les endoprothèses à élution de médicaments et la stimulation biventriculaire. Des écarts individuels importants ont été relevés en ce qui concerne le recours à la nouvelle technologie.

CONCLUSIONS : Les spécialistes en médecine cardiovasculaire entretiennent des doutes importants à l'égard de la valeur relative de la nouvelle technologie. Il faudrait étudier davantage la question pour mieux quantifier les doutes et les facteurs déterminants.

The cost of medical care in general, and cardiovascular medical care in particular, is increasing exponentially (1). Physicians are confronted not only with novel clinical indications, efficacy and safety of new technologies, but increasingly, they must be cognizant of their costs (2,3). While the systematic evaluation of new clinical information, through the vehicle of evidence-based medicine, has become de rigueur, less attention has been paid to the economic implications (4). However, health care budgets are not increasing at the same rate as the availability of new technologies, and difficult allocation decisions, preferably well-informed ones based on sound economic principles, need to be made. Both patients and hospital administrators depend on medical specialists for their interpretation not only of the clinical but also the economic value of new technologies.

In the present pilot survey, practising cardiologists in a tertiary hospital and cardiology trainees from two university programs were presented with a hypothetical budget and asked to distribute it among several new competing technologies. While this is a fictitious case, it does reflect the reality of competing or 'opportunity' health costs that medical practitioners in our health care system regularly face. The present study quantitatively assessed local cardiovascular specialists' integrated clinical and economic opinions of new technologies.

METHODS

In spring 2004, before a lecture on cost-effectiveness in cardiology, residents from the cardiology programs of McGill University and University of Montreal (both in Montreal, Quebec) completed the following questionnaire on the distribution of the health care budget for a tertiary cardiology department, at which each is, hypothetically, the director. There was no specific preparation given for this survey, and it was completed in approximately 15 min. The general cardiology staff of one of the McGill University Health Centre hospitals (Royal Victoria Hospital) were also sent the questionnaire at the same time. Comparisons between groups were evaluated by the Mann-Whitney test.

The exact scenario was as follows:

It's your call: You are the director of cardiology for a university hospital. You have an interventional budget of \$10,000,000. Your department treats 500 heart failure cases, 250 with an ejection fraction <35%, 100 with an ejection fraction <35% and QRS >0.12 s, and 15 on the transplant list. Also, there are 3000 patients a year with coronary artery disease, 750 of whom are admitted with acute coronary syndromes.

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TABLE 1
Allocation percentages for eight individual technologies for the entire sample of cardiovascular specialists (n=28)

Technology	
Implantable cardiac defibrillators	25.5 (15.0–30.0)
Implantable cardiac defibrillators with biventricular pacing	8.5 (4.8–15.0)
Biventricular pacing alone	4.5 (0.0–6.0)
Bare metal stents	28.5 (20.0–35.5)
Drug-eluting stents	10.3 (5.0–20.0)
Abciximab	5.0 (0.9–7.6)
Other glycoprotein IIb/IIIa inhibitors	7.4 (3.6–15.0)
Ventricular assist devices	5.0 (3.0–6.2)

Values reported as median (interquartile range)

Approximate costs are:

Electrophysiology	
Implantable cardiac defibrillators (ICD)	20,000
ICD with biventricular pacing (CRT)	30,000
Biventricular pacing (alone)	12,000
Stents	
Bare metal stents	650
Drug-eluting stents	2,600
GP IIb/IIIa inhibitors (cath lab use only)	
Abciximab	1,650
Other	375
Ventricular assist devices (VAD)	100,000

Respondents were then asked to allocate a percentage of their budget to each of these activities so that the total was 100%. The budget was deliberately limited so that if physicians felt these hypothetical resources were insufficient to meet their projected clinical needs, they were instructed to prioritize treatments according to their individually perceived best use. Budget overruns were not permitted.

Ethics approval was not required for this project. No external funding was used, and there are no real or perceived conflicts of interest to report.

RESULTS

A total of 28 responses were received and analyzed – 12 of 18 McGill residents (66%), eight of 12 University of Montreal residents (75%) and eight of 15 staff from one McGill teaching hospital (53%), for an overall response rate of 62%. The allocation of the eight different technologies for all respondents is presented in Table 1 and shown graphically in Figure 1. In the hypothetical situation prescribed, doctors appeared willing to spend approximately equal amounts on implantable cardiac defibrillators (ICDs) (median 25% of budget) and bare metal coronary stents (median 28% of budget). Interestingly, the total budget allocated for electrophysiological interventions (ICDs and biventricular pacing) was equal to that spent on combined drug-eluting stents (DES) and bare metal stents (median 45% versus 44%, respectively).

Of note, physicians were only willing to allocate one-third of their spent budget to DES. Similarly, only one-third of the budget specified for glycoprotein IIb/IIIa inhibitors was designated for abciximab.

The wide individual variation for allocation of each technology is also of interest. For example, the interquartile range (IQR) for the median budgetary allocation of bare metal stents and ICDs varied from 2.5% to 55% and 5% to 70%, respectively. Even the IQR for combined coronary stents, whether bare metal or drug-eluting, varied from 25% to 50%, with a range from 5% to 65%. Using the supplied costs, these data may be transformed to determine the variation in the number of patients treated with separate technologies. For example, the IQR for the ICD budget expense translates into 100% variability

Figure 1 Percentage of budget allocated for each new technology (residents and staff, n=28). The solid box refers to the interquartile range and the white bar inside represents the median. The whiskers are 1.5 times the interquartile range. The solid bars represent individual outliers. ABC Abciximab; BMS Bare metal stent; CRT Cardiac resynchronization therapy; DES Drug-eluting stents; GP Glycoprotein; ICD Implantable cardiac defibrillator; VAD Ventricular assist device

in the number of hypothetical patients referred for implantation (75 to 150). Similarly, the IQR suggests a 400% variation in the number of patients receiving DES (192 to 769).

There was good agreement between the cardiology residents from the two separate university programs attributed the allocation of resources, with statistically significant differences observed only in the budgetary allocation of biventricular pacing (0.5% versus 8.0%, $P=0.048$) and ventricular assist devices (0.5% versus 5.0%, $P=0.005$). There were no statistical differences in budget allocation between residents and staff, except for a reduced allocation of abciximab by staff (median resident allocation 5.0% versus 0.3% for staff, $P<0.001$).

DISCUSSION

This is the first survey to assess how clinical specialists compare the value of new cardiovascular technologies under a hypothetical scenario that implicitly forces the consideration of relative opportunity costs. Under the constraint of a fixed budget, clinicians on average appear to allocate resources for the more basic of the new technologies, such as coronary stents and ICDs, and to eschew the more expensive refinements, such as biventricular pacing and DES. Although the exact reasoning behind these choices was not recorded, they do correspond to the published literature in which the cost-effectiveness and incremental benefits of these refinements have been less extensively studied and are therefore less certain. Another striking observation is the wide individual variation in the allocation of these different technologies. This uncertainty in the relative value of these technologies affected attending physicians and trainees from two university programs. This lack of uniformity may be problematic not only for bedside clinical decision making, but also in the provision of unbiased information and lobbying of hospital administrators, or in the acceptance of, and adherence to guidelines.

The study sample was deliberately not selected for any expertise in cost-effectiveness studies; it was chosen to be representative of practising clinicians and trainees. Increased uniformity might have been attained by providing a standardized evidence base and/or permitting a longer period of reflection before responding. On the other hand, the decision-making environment of time constraints and less-than-perfect knowledge does reflect current clinical realities.

Although the technologies considered herein are routinely used in tertiary cardiac centres, and have been the subject of numerous publications attesting to their efficacy (5,6) and, in some cases, their

cost-effectiveness (7,8), study quality is not always uniform and comparable (9). The simultaneous integration of efficacy, safety, cost, and ethical and social issues into clinical publications is often neglected. Moreover, there are few publications that directly compare the relative cost-effectiveness of different technologies. Clinicians rarely have the time to discuss these issues and reach consensus on the role of competing new technologies. Locally developed guidelines on the use of these new technologies were not available at the time of this survey.

Are there explanations beyond the availability of reliable data that may account for these variations? Local practice patterns and expertise may be a possible determinant. For example, cardiology trainees in the hospital with an active mechanical heart program were more likely to allocate budget to this activity than trainees in the other hospital. Also, the residents from the university with the more active electrophysiology program were more likely to attribute more funds to this activity. Among the cardiology staff, none of whom identified themselves as interventionists, the budget assigned for use of abciximab in the catheterization laboratory was lower than that assigned by the trainees, who have presumably had more recent direct exposure to this clinical activity and its adjunctive therapies, including the choice of glycoprotein IIb/IIIa inhibitor.

The small sample size, restricted questionnaire and absence of objective knowledge regarding individual awareness of the costs and benefits of these technologies limit the strength of any conclusions from the present study. However, these intriguing preliminary results suggest that a larger and methodologically more rigorous study into the allocation of new technologies is indicated. Moreover, because new technologies, such as cardiac magnetic resonance imaging and computed tomography, are continually being introduced, the importance of a clear appreciation of the relative worth of new technologies will only become more accentuated.

The observed variations in the perceived relative values of new technologies suggests that information beyond clinical efficacy, including health technology assessments and discussions of their social implications, may be helpful to clinicians to assure a consistent and optimal use of our limited resources.

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