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Health care priority setting: principles, practice and challenges

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Abstract

Background: Health organizations the world over are required to set priorities and allocate resources within the constraint of limited funding. However, decision makers may not be well equipped to make explicit rationing decisions and as such often rely on historical or political resource allocation processes. One economic approach to priority setting which has gained momentum in practice over the last three decades is program budgeting and marginal analysis (PBMA).

Methods: This paper presents a detailed step by step guide for carrying out a priority setting process based on the PBMA framework. This guide is based on the authors' experience in using this approach primarily in the UK and Canada, but as well draws on a growing literature of PBMA studies in various countries.

Results: At the core of the PBMA approach is an advisory panel charged with making recommendations for resource re-allocation. The process can be supported by a range of 'hard' and 'soft' evidence, and requires that decision making criteria are defined and weighted in an explicit manner. Evaluating the *process* of PBMA using an ethical framework, and noting important challenges to such activity including that of organizational behavior, are shown to be important aspects of developing a comprehensive approach to priority setting in health care.

Conclusion: Although not without challenges, international experience with PBMA over the last three decades would indicate that this approach has the potential to make substantial improvement on commonly relied upon historical and political decision making processes. In setting out a step by step guide for PBMA, as is done in this paper, implementation by decision makers should be facilitated.

Background

In most countries, health care is managed and administered by health organizations that have the responsibility to meet, as best they can within a limited funding enve-

lope, the health needs of a pre-defined population. This worldwide phenomenon has been brought into focus by various health care reforms and other system-level developments. In essence, as there are more claims on resources

than there are resources available, some form of priority setting must occur [1]. That is, resources are scarce and there is thus a need, regardless of how many resources are available in total, to make choices about what to fund and what not to fund. This may be in the form of commissioning services, as is done in the UK and elsewhere, or in dividing up a pool of resources within more integrated regional health authorities, as is the case, for example, in parts of Canada and Australia.

Recent work, however, has suggested that decision makers within health organizations may require assistance with priority setting [2,3]. In addition, the allocation of resources in health organizations tends to be conducted on the basis of historical or political patterns, which can lead to sub-optimal use of the limited resources [4]. In fact, it is clear that, at least in some jurisdictions, measuring the 'return on investment' and planning for how resources should best be spent are not always very far advanced [5]. This is worrying, given the plethora of health care reforms that have taken place around the world over the past ten years. It could be argued that no matter what reforms are undertaken, they are doomed to failure if decision makers are not confident enough to set priorities or are not aware of tools to help them in this regard. What is required, and indeed what decision makers seem to be asking for, is a systematic, explicit approach to priority setting which is fair and, where possible, evidence based.

A major question, then, becomes whether there is a process for priority setting which responds practically to the dilemma of resource scarcity. Such a process should be conducted in a manner which is as evidence based as possible, and at the same time must also encompass a range of challenges, such as incorporating the views of a wide set of stakeholders and operating within the often (and apparent) non-rational context of health organizations. Reviews of various tools for priority setting exist elsewhere in the literature [6,7]. This paper describes one particular economic approach to priority setting that has been used in health care over the last three decades, but which to date has not been presented in the literature in a step by step 'how to' manner. The approach described herein is based on the framework known as program budgeting and marginal analysis (PBMA). As those who have used this approach would likely attest, there is no one way of doing PBMA. Rather, the steps provided in this paper are offered as a guide for decision makers and other researchers, and most importantly serve as a means to operationalize the economic principles discussed in the next section.

Economic principles

There are two key economic principles that underlie health care priority setting. The first is that of opportunity cost, which carries with it the understanding that in investing resources in one way, some opportunity for benefit, through investing those resources elsewhere, has been lost. One of the keys in setting priorities, then, is to measure or weigh out the costs and benefits of doing one thing vis-à-vis another.

The other principle is that of the margin, which is about shifting or changing the resource mix. If the budget increases, one could reasonably ask how best the additional resources should be spent. Conversely, if the budget decreases, one would likely want to take resources from areas which are producing the least benefit. Lastly, if the budget was neither increasing nor decreasing, at least not continuously, the question remains as to whether resources should be re-allocated (with some areas cut back so that others can expand) so as to improve benefit to the population being served. The concept of the margin is crucial to the development of an economic approach to priority setting.

For example, if a focus on health gain is taken, this goal is reached when no further reallocation of resources from one service to another will result in an increase of total benefit. In theory, this is the point where the ratio of marginal costs to marginal benefits across services is equal. Marginal analysis is concerned with the last unit of production of any two or more given programs; the best mix of services is determined by examining the relative costs and benefits of the various options, *at the margin*. This type of analysis highlights trade offs, which can help decision makers to weigh up proposals for change on the basis of the marginal costs and benefits of the given options.

Without explicit adherence to these two economic principles, resources will unlikely be allocated in the best manner possible. For this reason decision makers are not well served when setting priorities on the basis of historical and political allocation processes, and it is on these economic grounds that other approaches, such as needs assessment and defining core services, have been criticized [6,7]. Of course, economics alone will only move the discussion ahead so far. This point of drawing on other disciplines is returned to following a detailed presentation of the PBMA framework.

PBMA process

PBMA is an approach for setting priorities which has been reported to be used in health organizations mainly in Britain, Australia, New Zealand and Canada. The approach is based on the same principles as economic evaluation, but has been argued to be more pragmatic and is applicable at

Table 1: Stages in a PBMA priority setting process

PBMA Stages
<ol style="list-style-type: none"> 1) Determine the aim and scope of the priority setting exercise 2) Compile a program budget (i.e. map of current activity and expenditure) 3) Form marginal analysis advisory panel 4) Determine locally relevant decision making criteria <ol style="list-style-type: none"> a. Decision maker input b. Board of Director input c. Public input 5) Advisory panel to identify options in terms of: <ol style="list-style-type: none"> a. areas for service growth b. areas for resource release through producing same level of output (or outcomes) but with less resources c. areas for resource release through scaling back or stopping some services 6) Advisory panel to make recommendations in terms of: <ol style="list-style-type: none"> a. funding growth areas with new resources b. decisions to move resources from (5b) into (5a) c. trade-off decisions to move resources from (5c) to (5a) if relative value in (5c) is deemed greater than that in (5a) 7) Validity checks with additional stakeholders and final decisions to inform budget planning process

various levels within health organizations. For example, PBMA can be applied in individual programs of care, across a set of programs within the same general service area, or more broadly, across major service areas. The approach can also be used when weighing out funding decisions for new technologies or drug formularies. Regardless of the context, the key is in ensuring that opportunity cost and the margin are brought to the fore of the decision making process.

Typically, a PBMA process relies upon an advisory panel which is charged with identifying, for a given budget planning cycle, areas of service growth, and, in order to fund the proposed growth, areas for resource release [8]. Resource releases can come in the form of operational efficiency gains (achieving the same outcomes at less cost) and service reductions or disinvestments (where a service which is effective, but in only a small way, may be 'cut back', at the margin, to release resources for a more effective service development).

It also follows that if new monies are received into a health organization (from, say, additional government allocation or revenue generation), some of those resources will probably be put into new services and growth areas. At some point, however, it is likely that no more resources will be available for growth, but unfunded growth options will still exist. Released resources can then be allocated towards these additional growth options. As such, PBMA, and its central concept of resource *re*-allocation, has merit in instances when budgets are not always truly fixed.

Scope and program budget

The general stages of a PBMA process are outlined in Table 1. The first step is to determine the aim and scope of the priority setting activity. For example, this may be to determine optimum investment of resources across all programs within a health authority, or alternatively, to determine how best to spend resources within a specific hospital service, or further still, to identify priorities for new technologies. The next step is to develop a program budget. This is a map of the current activity and expenditure in the health organization or program (or set of programs) under consideration. In essence, the program budget provides a starting point from which resource re-allocation and service re-design options can be considered. Once the mapping is underway, stage 3 is reached and an advisory panel can be formed.

Advisory panel

For the advisory panel, the balance is in obtaining a representative group, but also in not being overly large so as to make the decision making process unmanageable. The specific composition will be dependent on the question under consideration and the scope of the exercise. The panel may be composed of a mix of clinical personnel and managers, and could include lay membership. The key is in ensuring that all relevant stakeholders are represented. For application at a fairly broad level, the core advisory panel might simply be the senior management team of the health organization. For applications within program areas, program administrators and relevant clinical staff can be involved. In addition, data and financial personnel are key people to have on hand, to provide support for the decision making process. One advantage of PBMA is that it helps to draw out disparate stakeholder values and

makes these explicit; a well constituted advisory panel should rely upon explicit, evidence based judgment as the basis for informing priority setting decisions. It is also critical, at an early stage in the process, to review with relevant decision makers the basic economic principles, outlined in brief above, on which the PBMA process is based.

Decision making criteria

Prior to examining options for change, the panel must determine a set of decision making criteria on which the activity will be based (stage 4 of Table 1). These criteria may reflect the values of the given organization, the health care system, or more broadly, society at large. Examples from the literature would include criteria such as health gain, access, innovation, sustainability, staff retention/recruitment, and system integration, to name just a few. The criteria can be identified in various ways. One option would be for the decision makers to do this on their own, which may include a review of relevant business plans and other internal documents. Alternatively, input from other stakeholders, such as the Board of Directors of the health organization can be obtained. The public can also be consulted, through survey work or focus groups. Regardless of the source, it is important that the criteria be specified a priori and, if possible, that they are weighted, to reflect their relative importance. If criteria are not explicitly weighted, the absence of such weighting implies equal weights across the criteria, which may or may not be reflective of the underlying values of the advisory panel or other relevant stakeholders.

Identifying options for change

Once the advisory panel is set and the criteria have been identified, a prioritized list of service growth options can be developed (stage 5). As well, current expenditure can be examined to determine means of improving operational efficiency, and options for service reduction can be identified. While not without challenges, as discussed below, these processes are perhaps best supported through the use of standardized business cases. In the case of setting priorities across all programs in the given organization, each senior manager would be required to put forth top priority areas for service growth in their own program areas, as well as identification of efficiency opportunities and options for service reduction. If the application is within a specific program area, the steps are the same conceptually, but potential re-designs will likely be of a smaller scale and middle or frontline managers would be involved.

Rating options for change

Importantly, each option for growth and reduction should be explicitly rated against the pre-defined criteria, using available supporting evidence. For example, if health gain is a criterion, the business case should contain

information on how proposed service growth items will impact health outcomes for the relevant population. Similarly, if sustainability is a criterion, the short and long term expected costs of implementing a new service, including potential transition costs, must be outlined. A business case template can be designed in a manner which readily facilitates scoring against the selected criteria.

Once the rating of each option against the criteria is completed and relevant supporting information and details are inputted into the business cases, scores can then be vetted by the advisory panel. As per steps 6a–c in Table 1, recommendations would be made by the advisory panel to first move resources from efficiency gains into growth areas, and then to examine trade-offs between items on the service growth and service reduction lists. For the latter, it is useful to construct a single combined ranking of remaining service growth options and proposed service reduction options based on the business case assessments, according to the pre-defined criteria.

Rating of the service options against the criteria can be based on qualitative or quantitative scales, and should be done a priori. If desired, this process may include quite sophisticated methods such as conjoint analysis [9], or can be done directly through survey work and group consensus. The idea is that each criteria weight would be multiplied by the score given to the option under consideration. For example, option A might score 85/100 on health gain and 95/100 on access. If both health gain and access were weighted equally (i.e., given a weight of 0.5 each), this would result in option A receiving a total score of 90 out of 100.

Assume service growth items A, B and C are assessed scores of 90, 80 and 70 (out of 100) respectively, while proposed service reduction options X, Y and Z have scores of 85, 75 and 65 respectively. Thus, the combined listing in order of preference, according to the criteria and subsequent scores, would be: A, X, B, Y, C, Z. Ranking in this manner indicates that A is the preferred option, and in order to pursue A, resources could be released from lowest ranked service reduction option(s) currently receiving funding. As option Z is the lowest ranked item, logically, resources should first be freed from this item and put towards the highest ranked option.

This process of comparing service growth and service reduction options should continue until it is decided that no more gain would be had by switching resources between options. Multi-attribute decision analysis software can be used within the decision making framework once criteria have been selected and weighted [10]. Using such software does not alleviate the need for decisions to

be made, but can help to organize the options and facilitate the decision making process.

The notion of freeing resources through improving operational efficiency is common place in health organizations. The much more challenging task is to obtain resource releases through actual service reductions and disinvestments. As stated above, however, the logic is clear: if service growth options cannot be wholly funded through new monies and revenue generation, and operational efficiency gains have been exhausted, then some services must be scaled back or stopped in order for additional growth items to be pursued. It is also the case that proposed service reduction items are not necessarily 'bad' in their own right, and indeed may be producing some value (e.g., option X above, having received a score of 80/100, obviously has merit). The point here though is that if a service reduction option is producing less value than a service growth option *at the margin*, resources should be shifted accordingly.

Supporting evidence and information

In order to support the PBMA process, information can be obtained from available sources including evidence from the literature such as outcomes studies, economic evaluations or health technology assessments, quality reports from the Internet, regional or state policies and guidelines, local utilization data, informal input from staff, clinicians and members of the public, and reports from government health departments, to name just a few. In some cases, efforts may be warranted to collect primary evidence as part of the PBMA process [11]. If obtaining specific information from the public is of particular interest, eliciting such information through public consultation can also be carried out and inputted into the process again through the use of the business cases. Guidelines can be drawn up within the organization providing details on the various sources of information available, and how this information is best used. As a final check, as per Table 1, the last stage of PBMA is to conduct a round of consultations with a wider group of relevant stakeholders, including clinicians or members of the public, in order to test the validity of the recommendations. At this point, any concerns can be taken back to the advisory panel and final decisions made.

No matter how much or how little actual evidence is available, in the end the members of the advisory panel are responsible for making recommendations as to whether resources should be shifted [12]. Where evidence is lacking, group members can base recommendations on their own 'expert' opinion. Decisions in most health organizations are currently being made implicitly and in lieu of formal evidence. The PBMA approach, as described herein, makes the process transparent, enables explicit

comparison of options based on set criteria, and provides a forum through which various pieces of information can be considered by the relevant decision makers. One of the advantages of the approach is that it can be as sophisticated or as crude as is required (or as practically possible in the time required to reach a decision), but is still based on the same principles. A number of additional practical points for conducting a PBMA process, based on the application of the approach in health authorities in Canada, are outlined in Table 2.

Process evaluation

PBMA can be thought of as providing the 'nuts and bolts' for priority setting activity. Through this, outputs such as resource re-allocation to improve population health can arise. However, focusing only on the outputs is inadequate. This is because it is important to also weigh out whether the process itself, irrespective of allocation recommendations, is fair and transparent. One framework which has gained some attention in recent years is 'Accountability for Reasonableness' [13,14]. This framework enables the priority setting process that is applied in a given organization to be evaluated against four ethical conditions, outlined in Table 3.

Conducting an evaluation of the priority setting process can provide important insight into how the process can be improved. This evaluation can take place through one-on-one interviews or focus group work with a broad range of stakeholders impacted through priority setting activity in an organization. A secondary benefit to conducting this type of evaluation and subsequent process revision is that key stakeholders are more likely to buy-in to a process that has been shown to be inherently 'fair'. Using a framework like Accountability for Reasonableness in conjunction with PBMA enables both ethics and economics – two disciplines with a keen interest in priority setting – to come together to inform decision makers in a comprehensive manner.

Challenges to priority setting

As with any approach to priority setting in health care, there are a number of challenges which arise when using PBMA. For example, it is the case that data are required to carry out priority setting activity [15], and further, that such activity will take time [16]. As alluded to above, though, decisions have to be made with or without data, and current practices will also no doubt have a draw on managerial time. PBMA provides a framework for discussing options for change and helps to ensure that values are incorporated directly into the decision making process.

It is also the case that obtaining resource releases can be difficult [17], particularly when incentives for change, such as fiscal pressure, are not present. In fact, this alone

Table 2: Specific points to consider when applying PBMA

Point to consider	Ideal time to address	Rationale
Strategically select the first PBMA exercise in a health organization in an area where there is a confirmed champion and an 'easy-win'	Prior to specific applications being selected	Need champion for group buy-in and follow-through of recommendations; early success will aid in the organizational uptake of the approach
Use an introductory session to communicate underlying economic concepts and specifically what the application plan is	At the outset of the process	Panel members have to understand opportunity cost for buy-in; provides opportunity to adjust the plan early on
Advisory panel meetings held at 2–4 week intervals	Throughout the PBMA process	Need adequate time to review literature and do background work but do not want a drawn out process; complete in < 6 months
Consider using one-on-one meetings with advisory panel members to identify options for resource release	When discussing options for resource release	Not all members will feel comfortable presenting a view in the larger group
Put less emphasis on having all the 'data' to support a decision and more on drawing out opinions from the expert group	Particularly in the later sessions of the process	Data can only take the group so far and can be used as a crutch not to make a decision; ultimately group need to have confidence in making their own recommendations
Earmark resources (i.e. staff time) to enact the panel recommendations	Stated at the outset, carried out following the exercise	Recommendations by themselves will not see action without dedicated resources to move them forward
Reliance on 'softer' forms of evidence to support process such as expert opinions and qualitative research, particularly when 'hard' evidence is not available	Throughout PBMA process	This is the type of information decision makers are familiar with and which is often available in practice
Tap into public for development of criteria on which decisions are to be based	At the outset of the process	Public may not have technical knowledge to make specific trade-offs but certainly can offer valuable insight on values and specific criteria

Table 3: Conditions of Accountability for Reasonableness framework

Condition	Description
Publicity	Limit-setting decisions and their rationales must be publicly accessible.
Relevance	These rationales must rest on evidence, reasons, and principles that fair-minded parties (managers, clinicians, patients, and consumers in general) can agree are relevant to deciding how to meet the diverse needs of a covered population under necessary resource constraints.
Appeals	There is a mechanism for challenge and dispute resolution regarding limit-setting decisions, including the opportunity for revising decisions in light of further evidence or arguments.
Enforcement	There is either voluntary or public regulation of the process to ensure that the first three conditions are met.

can be the reason why the thinking behind PBMA never really bites in some organizations. If decision makers are not willing to look at the 'sacred cows', service growth will have to be funded solely by new monies and/or revenue generation. Certainly the former can lead to spiraling health costs and ever increasing demand on government resources at the expense of other societal goals (i.e., education, defense, etc.). One way to foster identification of service reduction options is to do so outside of advisory panel meetings through one-on-one meetings with key personnel. This alleviates the social desirability bias of the larger group setting and can generate ideas for moving forward.

Another challenge is obtaining relevant health outcomes and assessing the benefit of services [18], particularly when setting priorities across broad service areas. Eco-

nomics techniques such as willingness to pay and discrete choice experiments hold some promise for quantifying benefit [9], but whether these approaches will have merit in practice, and whether they can be incorporated into an approach like PBMA, requires further investigation. What information is relevant to obtain from the public, and how this is best captured, is another important aspect for continued study [19].

One further challenge to setting priorities in health care is organizational behavior. In considering the barriers and facilitators to priority setting, decision makers need to think about whether the right factors are in play in their organization to embark on a process that is both explicit and informed. Based on research in Australia and Canada, a number of key factors have been identified with respect to conducting PBMA [12,20], and are highlighted in Table

Table 4: Barriers and facilitators for explicit priority setting

Barriers	Facilitators
<ul style="list-style-type: none"> - lack of trust between stakeholders - physicians not on board - advisory panel lacking health economic knowledge and/ or allocation experience - politics preventing program evaluation - discontinuity of personnel - too many administrative demands leaving priority setting as a low priority activity 	<ul style="list-style-type: none"> - senior level managerial and clinical champions - strong leadership - culture to learn and change - integrated budgets - resources earmarked for process itself and follow-up on recommendations - built in incentives for appropriate and efficient spending

4. A key aspect of this is in developing personal and organizational incentives that can aid in fostering an environment in which resource re-allocation becomes part of routine planning and various stakeholders, including physicians, become more directly involved in the process.

Practical recommendations

To assist in moving explicit priority setting forward, it may be that health organizations would find it useful to develop a priority setting team, which could be re-assigned from current tasks, to carry out the type of activity described in this paper. Such a team should have clear links to the finance department (but generally should not be finance-department driven) and include or at least overlap with areas charged with program evaluation. Further, the team would be well served to have literature review and other research skills, and be able to provide practical guidance in relation to operationalizing the economic principles outlined above. Although it may be difficult in practice, ideally team members would be 'non-vested', and could thus serve as neutral entities when guiding priority setting activity. The priority setting team could also provide education on the economics and ethics behind priority setting, and might be expected to map out medium range plans for systematic roll out of a PBMA-like approach for priority setting both within and across program areas.

Conclusion

PBMA provides an explicit mechanism for operationalizing the economic principles of opportunity cost and the margin. This approach helps to ensure a transparent priority setting process, allows for stakeholder consultation of allocation recommendations, enables public input to be incorporated and is driven jointly by local opinion and available evidence. Coupling PBMA with an ethical framework to examine the fairness of the process is important in and of itself and also will likely foster buy-in if the process is viewed to be credible.

While it is recognized that there are other approaches to priority setting in health care, and indeed a literature has been growing around the application of PBMA in practice, the focus in this paper has been on providing a step by step guide on how specifically the PBMA framework can be enacted. Although not without challenges, perhaps most notably that of the behavior of organizations, international experience with PBMA over the last three decades would indicate that this approach has the potential to make substantial improvement on commonly relied upon historical and political decision making processes.

Authors' Contributions

Both authors participated in the development, drafting and editing of this paper.

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References

1. Farrar S, Ryan M, Ross D, Ludbrook A: **Using discrete choice modelling in priority setting: an application to clinical service developments.** *Social Science and Medicine* 2000, **50**:63-75.
2. Lomas J, Woods J, Veenstra G: **Devolving authority for health care in Canada's provinces: 1. An introduction to the issues.** *Canadian Medical Association Journal* 1997, **156(3)**:371-377.
3. Mitton C, Donaldson C: **Setting priorities in Canadian regional health authorities: a survey of key decision makers.** *Health Policy* 2002, **60(1)**:39-58.
4. Birch S, Chambers S: **To each according to need: a community-based approach to allocating health care resources.** *Canadian Medical Association Journal* 1993, **149**:607-612.
5. Donaldson C, Mitton C, Currie G: **Managing Medicare: the prerequisite to spending or reform.** *The Health Papers No. 157.* Toronto: CD Howe Institute 2002.
6. Mitton C, Donaldson C: **Tools of the trade: a comparative analysis of approaches to priority setting in health care.** *Health Services Management Research* 2003, **16**:96-105.
7. Mooney G, Gerard K, Donaldson C, Farrar S: **Priority Setting in Purchasing: Some Practical Guidelines.** (Research paper number 6) Scotland: National Association of Health Authorities and Trusts 1992.

8. Cohen D: **Marginal analysis in practice: an alternative to needs assessment for contracting health care.** *British Medical Journal* 1994, **309**:781-785.
9. Shackley P, Ryan M: **Involving consumers in health care decision making.** *Health Care Analysis* 1995, **3(3)**:196-204.
10. Mabin V, King G, Menzies M, Joyce K: **Public sector priority setting using decision support tools.** *Australian Journal of Public Administration* 2001, **60(2)**:44-59.
11. Astley J, Wake-Dyster W: **Evidence-based priority setting.** *Australian Health Review* 2001, **24(2)**:32-39.
12. Peacock S: **An Evaluation of Program Budgeting and Marginal Analysis Applied in South Australian Hospitals.** Melbourne: Center for Health Program Evaluation, Monash University 1998.
13. Daniels N: **Accountability for reasonableness.** *British Medical Journal* 2000, **321(7272)**:1300-1.
14. Singer P, Martin D, Giacomini M, Purdy L: **Priority setting for new technologies in medicine: qualitative case study.** *British Medical Journal* 2000, **321**:1316-1318.
15. Ruta DA, Donaldson C, Gilray I: **Economics, public health and health care purchasing: the Tayside experience of programme budgeting and marginal analysis.** *J Health Serv Res Policy* 1996, **1(4)**:185-193.
16. Donaldson C, Mooney G: **Needs assessment, priority setting, and contracts for health care: an economic view.** *British Medical Journal* 1991, **303**:1529-1530.
17. McIver S, Baines D, Ham C, McLeod H: **Setting Priorities and managing demand in the NHS.** Birmingham: Health Services Management Centre 2001.
18. Ratcliffe J, Donaldson C, Macphée S: **Programme budgeting and marginal analysis: a case study of maternity services.** *Journal of Public Health medicine* 1996, **18(2)**:175-182.
19. Litva A, Coast J, Donovan J, Eyles J, Shepherd M, Tacchi J, Abelson J, Morgan K: **'The public is too subjective': public involvement at different levels of health-care decision making.** *Social Science and Medicine* 2002, **54**:1825-37.
20. Mitton C, Donaldson C: **Setting priorities and allocating resources in health regions: lessons from a project evaluating program budgeting and marginal analysis (PBMA).** *Health Policy* 2003, **64**:335-348.

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