Putting a financial accounting and a health economic perspective face to face to inform public health management decision-making

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Evidence-based decision-making serves as a fundamental principle in public health management, particularly in resource allocation. Various economic frameworks have been devised to support these decisions, each grounded in distinct philosophies and objective functions. Nonetheless, public health managers increasingly face the complex task of balancing the needs and perspectives of diverse stakeholders, often leading to conflicting interests, significantly hindering optimal managerial decision-making and policy implementation. Indeed, depending on what benefits are considered and their relative value, choice of intervention may change. However, to date no empirical study has analytically examined this issue. This paper addresses this gap by applying a break-even analysis approach and utilizing a real-world case study in stroke treatment. We illustrate how patient volume requirements can vary significantly based on whether a financial accounting or a health economic perspective on the benefits of the intervention is adopted.

Keywords: financial accounting, break-even analysis, public health management, decision-making.

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S O M M A R I O

1. Introduction

Evidence-based decision making has become a cornerstone principle at the basis of public management accountability [1]. This principle signifies a governance model characterized by transparency, via a commitment to methodically incorporate scientific evidence into the decision-making process [2], transcending discipline, context, and sector. From the justice system in the US [3] to health care in Europe and beyond [4], authoritative institutions have issued guides to provide public managers with vetted methods and tools to better leverage diverse forms of evidence for more effective policy and practice. For health care, one of

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such examples is that by the World Health Organization which has presented a comprehensive, multidisciplinary framework to plan and implement evidence-to-policy processes, with an aim to foster better collaboration and create synergies among actors and workstreams of the evidence ecosystem in the clinical, public health and health system fields [5].

Dynamics between coexisting and diverging decision-making perspectives exist, however, which have been conceptualised by Borgonovi (2005) [6]. According to the framework proposed by Borgonovi (2005), three distinct yet interacting decision-making models underlie the management of public administrations: the political, the legal and the managerial model. At the basis of the political model there are the democratic legitimacy and representativeness of interest criteria, whereby political leaders make decisions based on a consensus that ought to balance the preferences and interests of the population and the often-conflicting interests of multiple stakeholders. The legal model is instead based on the rule of law, where any formal action taken by public administrations is subjected to compliance and control mechanisms which in turn constitute the fundamental pillars of this model. This implies that all public administrations operate in accordance with the law to protect all fundamental rights of citizens and to ensure equity, social justice, and transparency. Finally, the managerial model uses operational management tools and logic to ensure that public policies and actions are carried out efficiently and effectively. This enables the needs of citizens to be met in the long term by using public resources in a sustainable and socially acceptable way.

Public administration, particularly resource allocation decisions hence result from the interaction of three above models, which must be balanced against one another by public managers. This paper focuses on the managerial model of public sector management, specifically public health administrations where economics-based resource allocation criteria play a major role. Indeed, while managerial decisions are typically made at the public system level (e.g., the implementation of novel health services at essential levels of care [7], or drug reimbursement decisions [8]), they define downstream boundaries by imposing management system constraints, hence somewhat limiting local administrations' ability to reflect setting heterogeneity at the local level.

To support these decisions, several economic frameworks have been developed, each based on distinct philosophies and associated value judgements stemming from the different objective functions that ought to be optimise, such as the minimisation of costs [9], or the maximisation of individual utility [10]. In this respect, health economic evaluation provides a general analytical framework for the systematic comparison of the costs and benefits of mutually exclusive alternatives, which have been widely applied to support resource allocation decisions in taxpayer-based, public health care systems in many countries around the world [11]. Depending on the consequences required to be considered for assessment, several declinations of this framework exist, most notably cost-utility analysis, where quality-adjusted life year (QALY) – which accounts for both quantity (survival) and quality of

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life – remains the most commonly used measure of benefit [12]. However, public health management also requires budget planning which is based on financial accounting principles where expected costs need to be offset by expected revenues [13].

In making resource allocation decisions, public health managers are increasingly confronted with the difficult task of addressing the needs of multiple stakeholders and perspectives which may be at odds with one another [14]. For instance, in building their business cases for funding, hospital managers – who are also asked to contribute to the achievement of sustainable goals of improving population health [15] – have chiefly to consider the financial implications of implementing a new health service for their organisations. Local authorities, on the other hand, are tasked with maximising population health benefits from constrained resources allocated from the total budget.

In practice, divergent perspectives may heavily influence economic estimation and consequently managerial decision-making and policy implementation when a new health service and procedure is considered for adoption. This is the case, for instance, when a choice is to be based upon what additional benefits induced by the new intervention are to be considered and consequently perspectives to be taken. To date no empirical study has analytically examined this issue. The objective of this paper is therefore to illustrate how choice of intervention may change depending on what perspective is taken. We do so by applying a break-even analysis approach and utilizing a real-world example case study in stroke treatment. We estimate the additional patient treatment volume required under a decision-making scenario where the monetary value corresponding to the health benefits induced by the intervention (i.e., quality of life-adjusted years, QALYs) is considered – a health economic perspective – as opposed to the additional tariff income – a financial accounting perspective.

2. Methods

2.1. Decision-making context

In light of the clinical and economic evidence emerged [16-21], several funding proposals have been put forward by comprehensive stroke centres in England to provide mechanical thrombectomy (MT) – a minimally-invasive surgical procedure which involves the removal of a blood clot in the cerebral arteries to restore the blood flow to the affected brain tissue – in place of standard care, that is intravenous thrombolysis [22]. Taking a financial accounting perspective, hospital managers have consequently developed business cases estimating patient volume requirements, to justify these decisions by considering the expected increase in hospital revenues deriving from tariff income [23], compared to the acquisition and implementation costs associated with MT. However, mounting pressure on public health managers exists for providing value for money services which need to consider the additional health benefits, and not simply hospital revenues, generated by treating patients with a new health technology [24].

2.2. Case study

To reflect a real-world service provision and avoid relying on structural assumption, especially in terms of med-

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ical protocol and resource requirements, which typically characterise these economic analyses, we analysed a relevant MT business case developed by the respective hospital managers which was made available confidentially for analysis. This provided key parameters relating to the additional resource capital and staffing-related requirements, and therefore costs.

2.3. Break-even analysis

A break-even analysis is commonly applied to identify the revenue level at which the costs are offset, or in other words the benefit-cost ratio is equal to one. To determine the break-even point in terms of number of stroke patients required to be treated with MT instead of intravenous thrombolysis (i.e., patient volume requirement) – the annual intervention costs were first estimated based on business case data made available from a comprehensive stroke centre. To enable a head-to-head comparison between the two perspectives – a financial accounting and a health economic perspective – the benefits were first calculated for the former, as the expected additional hospital revenues derived from national tariffs which are attributed to each individual administration of MT.

For the health economic perspective instead, the additional patient health benefits measured in terms of QALYs, with one QALY being valued in monetary terms at £20,000 [25], relative to IVT were estimated. A QALY combines both the quantity and quality of life lived, providing a way to evaluate the effectiveness of treatments in terms of how much they extend life and improve its quality. This is typically measured on a scale from 0 to 1, where 0 represents a health state equivalent to death and 1 represents perfect health. The QALY is calculated by multiplying the duration of time spent in a health state by the quality-of-life score for that health state. For example, one year spent in perfect health (quality of life score of 1) equals 1 QALY, while one year spent in a health state with a quality-of-life score of 0.5 equals 0.5 QALYs. This estimation was carried out by adapting a previously developed decision-analytic model used in a published cost-effectiveness analysis for the UK, comparing MT with IVT. We subsequently compared the number of patients required to be treated that would allow for the additional benefits of MT to offset the intervention costs from the two perspectives, by computing a break-even point: dividing the total fixed costs by the difference between the per patient benefit and variable cost. To align with the business case and findings from published economic analyses of MT [16-21], the time horizon considered was five years.

3. Results

Tab. 1 shows the breakdown between the estimated annual fixed (£ 832,827) and variable costs (£ 4,253 per patient treated) for implementing MT, by resource category (staffing, facility and equipment and MT procedure). Tab. 1 also compares the benefits generated under a financial accounting perspective, where the hospital revenues generated per MT treatment – which stand at £ 11,257 –, and a health economic perspective, where the per patient health benefits measured in terms of QALYs gained – the value of which was estimated at £ 7,560 (0.378 QALYs). This table shows that, in fact, there is a significant difference between the two per-

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Tab. 1 – Break-even analysis

			FTE	unit price	cost
Fixed costs	Staffing	Anaesthetist consultant	1.00	£ 124,321	£ 124,321
		Interventional staff	1.00	£ 113,904	£ 113,904
		Patient advice and support	1.60	£ 41,312	£ 66,099
		Radiographer	1.60	£ 41,312	£ 66,099
		Theatre support nursing	3.20	£ 33,929	£ 108,573
		Theatre support	3.20	£ 23,573	£ 75,434
		ITU Nursing	2.60	£ 43,003	£ 111,808
					£ 666,238
			N	**unit price**	**cost**
	Facility and equipment	MT machine lease payment	1	£ 108,589	£ 108,589
		IT and software licence	1	£ 34,000	£ 34,000
		Maintenance	1	£ 24,000	£ 24,000
					£ 166,589
				total fixed costs	**£ 832,827**
			N	**unit price**	**cost**
Variable costs	**MT procedure**	Interventional suite	1	£ 810	£ 810
		Catheter	0.57	£ 3,210	£ 1,830
		Stent retriever	0.72	£ 921	£ 663
		Support kits	1	£ 680	£ 680
		Consumables	1	£ 191	£ 191
		Anaesthesia	0.50	£ 159	£ 80
				total variable costs	**£ 4,253**
	Per patient benefits	hospital revenues	£ 11,257	**119**	**break-even point**
		QALYs	£ 7,560	**252**	

spectives in the number of additional patients to be treated to justify the implementation of MT. Indeed, the number of additional stroke patients more than doubles when the benefit function is defined in terms of patient health (n = 252), instead of hospital revenues (n = 119).

4. Discussion

This paper is concerned with empirically examining the decision-making

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implications of applying two different and often coexisting economic perspectives for resource allocation decision-making in public health care management. Based on a case study in stroke treatment, we estimated the break-even point defined as the number of additional patients to be treated to justify the adoption of a new health technology. Results indicated that, the monetary value derived from the health benefits induced by the new intervention is lower compared to that included in the tariff income. The analysis hence showed how applying a financial accounting, as opposed to a health economic perspective, affects the economic estimates - and therefore recommendations for budget planning and policy implementation. This highlights the relevance of such comparison which public health managers are increasingly confronted with in practice and often require order-of-magnitude estimates to conduct comprehensive and multifaceted evaluations such as those in health technology assessments, and strategic planning. To the best of our knowledge, this is the first study formally addressing this research objective in the context of public management and quantitively comparing a financial accounting and a health economic perspective.

5. Conclusions

This study contributes to the existing literature by building on previous methodological research and the theoretical framework developed by Borgonovi (2005) [6], aiming to spark an academic debate regarding optimal resource allocation decision making processes in public health. Whereas analytical frameworks exist such as multi-criteria decision analysis (MCDA) [26] allowing for different objectives and therefore perspectives to be weighed, these methods have been applied only to a relatively marginal degree.

Indeed, while MCDA and other similar decision-analytical methods may fit the purpose at hand, in practice, obtaining reliable and representative stated preferences regarding the different preferences that the several objectives ought to be achieved and evaluated (e.g., maximisation of health benefits, reduction of health inequalities) present methodological and practical challenges that are difficult to overcome [27]. This leads to a lack of a formally transparent evidence-based process whereby public health managers are tasked with making allocative decisions based on heuristic approaches and the public conferring greater level of agency. In turn, this inevitably involves significant value judgements and reaching deliberative conclusions based on political consensus, rather than economic evidence, hence undermining the very basic principles of evidence-based decision making.

5.1. Limitations

In interpreting the presented analysis, some considerations need to be taken into account. For calculating the break-even point under a health economic perspective, we employed a previously developed decision analytic model, and similar instances of such analyses can be found in the literature on physical activity and obesity. In particular, the study by Bates *et al.* (2020) [28] estimated the maximum justifiable cost for a weight loss maintenance intervention for individuals

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with varying BMI and type II diabetes risk. Similarly, Candio *et al.* (2023) [297] determined the level of behaviour change needed in terms of new regular cyclists for the investment in cycling infrastructure to be cost-neutral.

It is important to recognize that the implementation of a MT service may impact economic domains that were not captured in the presented analysis and that are inevitably intertwined with one another. On the demand side, there is potential for the MT treatment to yield benefits, for instance, in terms of reduced inpatient care and, consequently, shorter waiting lists. On the supply side, given the growing emphasis by policymakers on developing integrated care models [230], such as in England, the successful implementation and scaling up of MT service provision will necessitate structural changes at both the hospital organizational level and more broadly within the local health authority. Indeed, success will be contingent upon the difficult task of hiring specialized personnel, redefining clinical pathways, and ensuring effective coordination at both inter-hospital and regional levels for the prompt transfer and repatriation of treated patients.

Additionally, integrating services across various levels of the health and social care system will play a crucial role in determining service delivery feasibility. Furthermore, the analysis was essentially deterministic and based on data from a single MT business case study. Nonetheless, a deterministic approach aligns with that used in financial accounting and the case study illustrated had merely the purpose of supporting the argument presented with real-world empirical evidence and highlighting the associated managerial implications.

5.2. Implications

The constraints imposed by the legal model as conceptualised by Borgonovi (2005) means that, in evaluating the relative merits of the two perspectives, careful consideration needs to be given to the ensuring of equity and social justice upon which healthy social cohesion crucially depends. In fact, public health organisations are, either formally – as in the case of England [31], or informally as in the case of Italy, mandated to abide by social value judgements on what constitutes fair and just distribution of health and access to health care, which ought to be reflected in the organisations' institutional decision-making posture. This also has analytical implications for the respective social preferences for differential value assignments of health improvements (e.g., QALY gains) between population groups, which would require incorporating corresponding equity weights into economic analyses [32].

From a managerial standpoint, the analysis presented here highlights the importance of understanding the broader economic implications of adopting a new health intervention or service, beyond the due financial justification. By comparing the two perspectives, we believe that this paper has provided tangible evidence for the careful consideration that ought to be given when deciding whether or not to adopt a new intervention, and particularly under what circumstances an optimisation of the overall benefit function is achieved. This is particularly relevant given the increasing pressures that public health managers

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are facing, especially in terms of broader accountability.

Future research studies should consider replicating the analysis presented in this article for different decision-making settings and intervention context, to adequately inform healthcare management and ultimately support optimal resource allocation decision-making. The strengthening of this evidence base will support a transparent decision-making in public health and reducing reliance on intuition, biases, and anecdotal information, for more objective and reliable outcomes. For managers, this would enhance strategic planning and resource allocation by incorporating proven methodologies and data-driven insights, though this would require ongoing training and development in analytical skills, support by academic partners, investment in data management systems, and fostering a collaborative environment where evidence is shared and utilized effectively [33].

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