



Including quality attributes in efficiency measures consistent with net benefit: Creating incentives for evidence based medicine in practice

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ABSTRACT

Evidence based medicine supports net benefit maximising therapies and strategies in processes of health technology assessment (HTA) for reimbursement and subsidy decisions internationally. However, translation of evidence based medicine to practice is impeded by efficiency measures such as cost per case-mix adjusted separation in hospitals, which ignore health effects of care.

In this paper we identify a correspondence method that allows quality variables under control of providers to be incorporated in efficiency measures consistent with maximising net benefit. Including effects framed from a disutility bearing (utility reducing) perspective (e.g. mortality, morbidity or reduction in life years) as inputs and minimising quality inclusive costs on the cost-disutility plane is shown to enable efficiency measures consistent with maximising net benefit under a one to one correspondence. The method combines advantages of radial properties with an appropriate objective of maximising net benefit to overcome problems of inappropriate objectives implicit with alternative methods, whether specifying quality variables with utility bearing output (e.g. survival, reduction in morbidity or life years), hyperbolic or exogenous variables. This correspondence approach is illustrated in undertaking efficiency comparison at a clinical activity level for 45 Australian hospitals allowing for their costs and mortality rates per admission. Explicit coverage and comparability conditions of the underlying correspondence method are also shown to provide a robust framework for preventing cost-shifting and cream-skimming incentives, with appropriate qualification of analysis and support for data linkage and risk adjustment where these conditions are not satisfied.

Comparison on the cost-disutility plane has previously been shown to have distinct advantages in comparing multiple strategies in HTA, which this paper naturally extends to a robust method and framework for comparing efficiency of health care providers in practice. Consequently, the proposed approach provides a missing link between HTA and practice, to allow active incentives for evidence based net benefit maximisation in practice.

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Introduction

The proportion of Gross Domestic Product (GDP) devoted to health care services has been increasing in each country in the OECD (Organisation for Economic Co-Operation and Development) in recent decades, and overall has increased from 4% in 1960, when the OECD was founded, to more than 9% across OECD countries in 2008 (OECD, 2010). The proportion of GDP varies considerably across health systems. In particular, it is significantly higher in the health care system in the USA where, despite lack of universal coverage, health expenditure was estimated as 16.0% of GDP in

2008. Higher health expenditure has however not necessarily been reflected in better health outcomes, with the USA again most notably lying 26th in life expectancy amongst the 34 OECD countries in 2008. Common to all health systems is an increasing concern over performance, efficiency and more generally the accountability and incentives of providers such as hospital. Such concerns have lead to various governments and private agencies having a particular focus on analysis of efficiency of hospitals within and across health systems, where Hollingsworth (2003, 2008) has documented a proliferation of efficiency studies.

However, one important drawback of many hospital efficiency measurement studies is that they exclude quality measures and hence produce incentives for reduction in resource use at the expense of quality of care, an issue highlighted by Newhouse (1994) and Eckermann (1994) in critiquing hospital efficiency measures.

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The desirability of taking into account the quality of services is reinforced when considering the impact of quality of hospital services on expected outcomes beyond discharge. Health systems are characterised by incomplete integration across health services (Evans, 1981) and hence if hospitals are not held accountable for their quality of care impacts beyond discharge, perverse economic incentives are created for hospitals and their administrators to undertake practices such as quicker-sicker care, cost-shifting and quality-skimping (Eckermann, 2004; Smith, 2002). Such practices can reduce costs within admission, but beyond discharge have expected negative effects on health outcomes (outcome shifting) and consequently can increase expected demands for, and use of, health care post-discharge (cost-shifting). Cost-shifting may manifest in increasing rates of readmission to hospitals, treatment in other institutional settings (general practice, specialist and aged care services), or informal care. In general, appropriately including quality in hospital efficiency measurement would appear necessary to avoid perverse incentives for cost and outcome-shifting and to create incentives for health provider and health system quality of care.

Despite this, only a handful of studies have attempted to account for quality in models of hospital efficiency, as noted by Hollingsworth (2003). Studies attempting to model quality have previously proposed exogenous variables (Zuckermann, Hadley, & Lezzoni, 1994) and utility bearing output variables (Dawson et al., 2005; Newhouse, 1970; Puig-Junoy, 1998). More recently, Arocena and Garcia-Prado (2007) included quality as a “bad output” variable, while Prior (2006), Eckermann (2004) and Morey et al. (1992) have specified quality as disutility bearing input variables.

In this paper we demonstrate that specifying quality in efficiency measures with input variables framed from a disutility perspective has a number of attractive properties, which overcome problems of alternative specifications. First and foremost, specifying quality variables with this proposed approach is shown to allow economic efficiency measures consistent with net benefit maximisation, which many authors argue is the appropriate economic objective in public health care and the public sector more generally (Claxton & Posnett, 1996; Drummond, Sculpher, Torrance, O'Brien, & Stoddart, 2005; Eckermann, 2004; Eckermann, Briggs, & Willan, 2008; Eckermann & Willan, 2011; Graham, 1992; Stinnett & Mullahy, 1998; Willan & Briggs, 2006; Willan & Lin, 2001). Second, it allows allocative and technical efficiency decomposition consistent with maximising net benefit. Third, it allows shadow price calculations for the quality variables when prices of outputs are unobservable (as in public hospitals).

In Section 2 we introduce quality variables and establish criteria for specifying quality variables in economic efficiency measures across providers such as public hospitals, to reflect and create incentives for an underlying objective of maximising net benefit. Section 3 identifies the correspondence method allowing efficiency measures consistent with the net benefit criterion, and a robust framework to prevent cost-shifting and cream skimming incentives. In Section 4 we illustrate the net benefit specification of quality variables in comparing efficiency at a clinical activity level, highlighting appropriate qualification of efficiency measures to the extent coverage and comparability conditions are not satisfied, and steps to satisfy these conditions in practice. Section 5 discusses the relative merits of proposed methods relative to alternative methods, and their links to, and extension of, previous literature, and Section 6 draws conclusions.

Specifying quality variables in efficiency measures

Before examining how quality variables can be best incorporated into efficiency models we need to first consider what hospital quality could represent. There are many aspects to the quality of

hospital services one could consider including technical aspects, timeliness, comfort, and so on. In the empirical part of this study we focus our attention on a health outcome, mortality. However, the methods discussed in this paper can be applied to whatever cardinally measured quality variables are available. In the case of hospitals this may include other health outcomes (functional limitation, morbidity, reduction in quality adjusted life years etc.) or process variables (dissatisfaction, inappropriate medication, delay times etc.). It should be noted that whatever quality measure is employed, quality is by definition under the control of the service provider. Hence, exogenous influences such as differences between hospitals in clinical activity (DRG) mix and patient risk factors at admission should be accounted for. This is explicit with the comparability condition of the correspondence method derived in Section 3.

Specifying quality variables in economic efficiency measures to create appropriate economic incentives

Economic efficiency measures and their use in benchmarking and funding mechanisms are particularly important to creating appropriate incentives for quality in public hospitals given the extent to which transaction conditions diverge from those of a perfect market (Williamson, 1975). Providers are unlikely to be held accountable for quality of care by patients leading to the need for regulation of quality to create appropriate incentives which Donaldson and Gerard (1993) refer to as the ‘the visible hand’. This is the case given hospital patients will typically have bounded rationality (Simons, 1957) from high complexity, uncertainty and information search costs, leading to a-symmetry of information between patients and providers both ex-ante and ex-post given counterfactual outcomes of alternative treatment (Akerlof, 1970; Arrow, 1963). Hence, specifying quality variables in economic efficiency measures to reflect an appropriate underlying objective function allowing for quality in hospitals is critical to creating appropriate economic incentives for their quality of care, and the primary criteria for specifying quality variables. Concerns about specifying quality in efficiency measures relate to the appropriateness of the underlying objective function economic efficiency measures represent (Lovell, 1993) and creating appropriate economic incentives.

Net benefit as the underlying objective in health care

While an economic objective of cost minimisation is usually implicit when quality is not considered, when quality is considered an appropriate economic objective needs to allow for the value as well as cost of quality. Health economists stress the importance of evaluating strategies relative to a comparator and informing decision makers of incremental rather than average cost–effectiveness ratios, reflecting the incremental and non-tradable nature of health effects of care in treated populations (Drummond et al., 2005; McGuire, Henderson, & Mooney, 1988). Considering incremental health effects relative to the incremental cost of alternative strategies in processes of health technology assessment is equivalent to maximising the net value of incremental effects at a threshold value for effects minus incremental costs which reflect incremental net monetary benefit (Stinnett & Mullahy, 1998). Formally, incremental net monetary benefit (INMB) per patient, relative to a comparator (c), is:

$$INMB = \lambda(E - E_c) - (C - C_c), \quad (1)$$

where λ represents a threshold value per unit of effect, E is effect per patient, and C is cost per patient.

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