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# IDENTIFYING THE CAUSES OF INEFFICIENCIES IN HEALTH SYSTEMS

By: Jonathan Cylus, Irene Papanicolas and Peter C Smith

**Summary:** Persistent growth in health expenditures coupled with fiscal pressures have led to widespread calls for efficiency improvements. However, identifying the sources of inefficiencies in health systems remains challenging. In this article, we provide an analytic framework to facilitate better understanding and interpretation of common health system efficiency metrics. To demonstrate its potential, we apply the framework to a simple efficiency metric comparing per capita health care expenditure to amenable mortality rates in the EU-28 Member States. This exercise highlights the information each metric can and cannot tell analysts and decision-makers. Going forward, more refined metrics should be developed based on more standardised and detailed cost accounting data and linked datasets and registries.

**Keywords:** Efficiency, Health System, Efficiency Indicators, Outcomes, Performance

## Why is health system efficiency important?

The concept of health system efficiency – as well as the related topics of cost-effectiveness and value for money – seeks to capture the extent to which the inputs to the health system, in the form of expenditures, labour, and capital, are used to secure valued health system goals. It is one of the most commonly debated dimensions of health system performance.

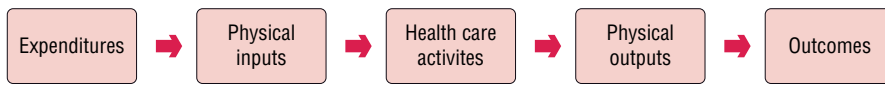
Inefficiency in any part of the health system leads to a number of undesirable consequences, including comparatively poorer outcomes for patients. If finite health system resources are not used efficiently it will also mean that some

individuals are denied access to care. Taking a broader perspective, health system inefficiencies may divert resources from other sectors of the economy where the resources could be put to good use. In addition, not only does increased efficiency allow money to be spent more effectively, but the ability to eliminate waste also demonstrates good stewardship of the health system, which can persuade governments and citizens to finance universal health coverage.

The pursuit of efficiency is therefore one of the central preoccupations of health policy-makers and managers, and there is considerable evidence to suggest that inefficiencies exist in all health systems.

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**Figure 1:** The simplistic view of health system production



Source: Authors

The World Health Report 2000 pointed to very large apparent worldwide variations in efficiency at the system level, a finding replicated by both the Organisation for Economic Cooperation and Development (OECD) as well as the European Commission.<sup>1 2 3 4</sup> In this article, we review the concept of efficiency and focus on interpretation of metrics, making use of a framework to facilitate analysis. For more detail please see our full volume on measuring health system efficiency produced by the European Observatory on Health Systems and Policies.<sup>5</sup>

### Understanding production processes in the health system

Efficiency indicators are useful to compare and evaluate production processes. Taking a simplistic view, efficiency is represented by the ratio of the inputs an organisation consumes in relation to the valued outputs it produces (see Figure 1). An organisation consumes a set of physical resources, referred to as inputs, often measured in terms of total expenditures or physical inputs like health care personnel or beds; it then transforms those inputs into a series of valued outputs, such as an episode of care, through a set of discrete health care activities.

Any specific indicator of efficiency may seek to aggregate all inputs into a single measure of costs, or it may consider only a partial measure of inputs. For example, labour productivity measures such as ‘patient consultations per physician’ ignore the many other inputs into the consultation, and the many outputs other than patient consultations produced by the physician. In effect, such partial measures create efficiency ratios using only a subset of the inputs and outputs represented by the arrows in Figure 1. In short, the indicator shows only a fragment of the complete transformation of resources into desired outcomes (improved health).

Numerous other issues arise when seeking to develop operational models of efficiency in health care, reflecting the complexity of the health care production process. The production of the majority of health care outputs rarely conforms to a production-line type technology, in which a set of clearly identifiable inputs is used to produce a standard type of output. Instead, the majority of health care is tailor-made to the specific needs of an individual patient, with consequent variations in clinical needs, social circumstances and personal preferences. This means that there is often considerable variation amongst patients in how inputs are consumed and outputs or outcomes are produced. For example, contributions to the care process may be made by multiple organisations and caregivers, an ‘episode’ of care may occur over an extended period of time, and in different settings, and the responsibilities for delivery may vary from place to place and over time.

“although the core idea of efficiency is easy to understand it often becomes difficult to operationalise

Therefore, although the core idea of efficiency is easy to understand in principle – maximising valued outputs relative to inputs – it often becomes difficult to operationalise it when applied to real-life situations, particularly at the system level.

### An analytic framework to facilitate interpretation of efficiency indicators

In light of the challenges in measuring efficiency and interpreting analysis, we have developed a simple framework to assist analysts seeking to understand and respond to efficiency concerns. Using this framework, five aspects of any efficiency indicator can be explicitly considered to clarify what precisely is being measured and to determine subsequent analysis or action (see Figure 2):

- the **entity** to be assessed;
- the **outputs** (or outcomes) under consideration;
- the **inputs** under consideration;
- the **external influences** on attainment;
- the **links with the rest of the health system**.

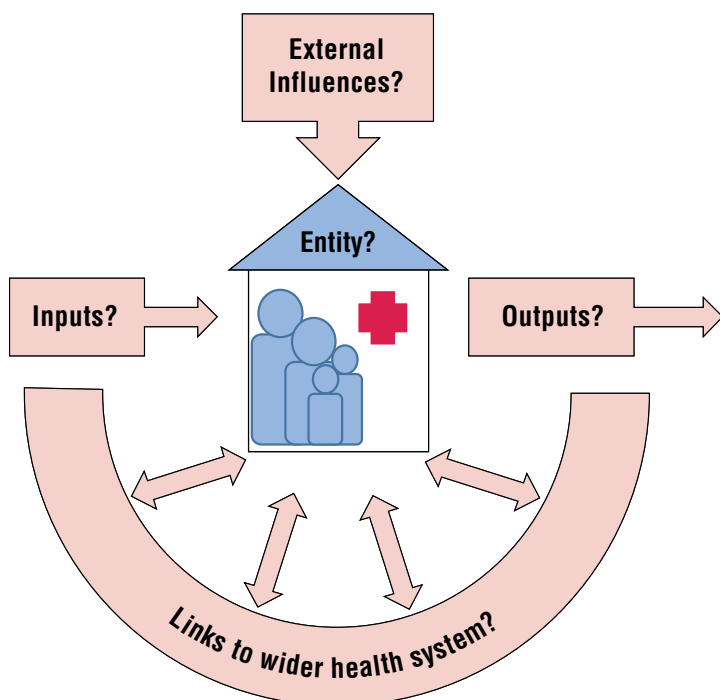
In the following sections we briefly discuss each aspect.

#### Identifying the accountable entity: who is being evaluated?

An assessment of efficiency first depends on understanding the boundaries of the entity under scrutiny. At the finest level, an entity could be a single treatment, where the goal is to assess its cost relative to its expected benefit. At the other extreme, the entity could be the entire health system. Most often, efficiency measurement takes place at an intermediate level, where the actions of individuals or groups of practitioners, teams, hospitals or other organisations within the health system are assessed. Whatever the chosen level, as a general principle it is important that any analysis reflects an entity for which clear accountability can be determined. It is also important that entities being compared are genuinely comparable and producing outputs under similar conditions.

#### What are the outputs under consideration?

Two fundamental issues need to be considered with regards to outputs: how should the outputs of the health care sector be defined and what value should be attached to them? In principle health care outputs should usually be defined in terms of the health gains produced. However, the concept of health gain has

**Figure 2:** Visualisation of analytic framework

Source: Authors

proved challenging to make operational. Recent progress in the use of patient reported outcome measures (PROMs) offers some prospect of making more secure comparisons, at least of providers delivering a specific treatment<sup>6</sup> and a number of well-established measurement instruments have been developed that could be used to collect before/after measures of treatment effects, such as the EQ-5D and SF-36.<sup>7 8</sup>

In practice, however, analysts are often limited to examining efficiency by measuring the volume of activities, for example in the form of patients treated, operations undertaken, or outpatients seen. Such measures are manifestly inadequate, as they fail to capture variations in the effectiveness (or quality) of the health care delivered. Yet there is often in practice no alternative to using such incomplete measures of activity in lieu of health care outcomes.

### What are the inputs under consideration?

The input side is usually considered less problematic than the output side. Physical inputs can often be measured more accurately than outputs, or can be summarised in the form of a measure of costs. However, when considering costs

as the input the implication is that the organisations under scrutiny are free to deploy inputs efficiently, taking account of relative prices. In practice, some aspects of the input mix are often beyond the control of the organisation, such as capital stock, at least in the short term.

Labour inputs can usually be measured with some degree of accuracy, often disaggregated by skill level. An important issue is therefore how much aggregation of labour inputs to use before pursuing an efficiency analysis. Unless there is a specific interest in the deployment of different labour types, it may be appropriate to aggregate into a single measure of labour input, weighting the various labour inputs by their relative wages. Additionally, with regard to labour inputs, problems may arise if the interest is in examining the efficiency of sub-units within organisations, such as, for example, operating theatres within hospitals. As the unit of observation within the hospital becomes smaller (department, team, surgeon, and patient), it becomes increasingly difficult to attribute labour inputs to that specific unit.

### What are the external influences?

In many contexts, a separate class of factors affects production – the external

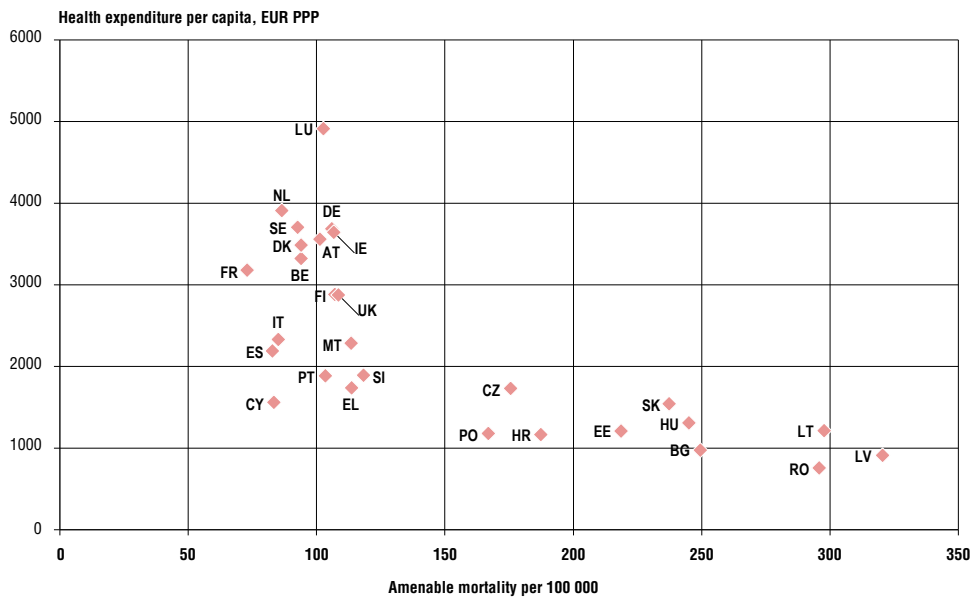
or ‘environmental’ determinants of performance. These are influences on the entity, beyond its control, that reflect the external environment within which it must operate. For example, population mortality rates are heavily dependent on the demographic structure of the population under consideration and the broader social determinants of health. Likewise, a community nurse practicing in a remote rural area may appear inefficient when assessed using a metric such as ‘patient encounters per month’ if local geography limits the number of patients that can be visited.

There is often considerable debate as to what environmental factors are considered ‘controllable’. This will be a key issue for any scrutiny of efficiency and holding relevant management to account. The choice of whether to adjust for such external influences is likely to be heavily dependent on the degree of autonomy enjoyed by management, and whether the purpose of the analysis is short run and tactical, or longer run and strategic. In the short run, almost all input factors and external constraints may be fixed. In the long run, depending on the level of autonomy, many may be changeable. In many circumstances it will be appropriate to consider efficiency metrics both with and without adjustment for external factors.

Broadly speaking, environmental factors can be taken into account by restricting comparison only to entities operating within a similarly constrained environment; by modelling the constraints explicitly, using statistical methods such as regression analysis;<sup>9</sup> or by undertaking risk adjustment to adjust the outcomes achieved to reflect the external constraints.<sup>10</sup>

### Links with the rest of the health system

No outputs from a health service practitioner or organisation can be considered in isolation from the rest of the health system in which they operate. Scrutiny of a health system entity in isolation, be it a team of surgeons or a hospital, may ignore the important implications of its impact on whole system efficiency. For example, if a primary

**Figure 3: Amenable mortality and health expenditure per capita, 2013**

Source: OECD Health Statistics 2016 and Eurostat.

care practice is held to account only by metrics of costs per patient, it might secure apparently good levels of efficiency by inappropriately shifting certain costs (such as emergency cover) onto other agencies, such as hospitals or ambulance services. The chosen metric may create perverse incentives for the practice, and may fail to capture its serious negative impact on other parts of the health system. That consequence should in principle be accounted for in any assessment of that practice's efficiency.

“No outputs can be considered in isolation from the rest of the health system”

### Applying the framework to compare health system efficiency in the European Union

To illustrate, we apply the framework to a crude metric that compares per capita health care expenditure to amenable

mortality rates in the EU-28 Member States (see Figure 3). Countries towards the bottom right of the figure are spending low levels on health care but have very high rates of amenable mortality. Countries towards the top left have very low levels of amenable mortality but high levels of spending. Countries in the bottom left are low spenders that secure low levels of amenable mortality, and thus appear most efficient.

The framework demonstrates that this conclusion is not so straightforward. The *accountable entity* in this instance is an entire health system. One important consideration is that it is not clear that all of the countries included in the analysis are comparable to such an extent that their health systems have the same potential to produce health care outputs. In all likelihood the countries are not sufficiently comparable to be considered together given the multitude of differences, including how they organise health services and inherent differences in their populations' health needs. Some countries towards the bottom right of the Figure may be operating efficiently given their low levels of expenditure. It would be sensible to restrict the set of countries to those that are most comparable, or to only construct the figure for a single country using multiple years of data.

Moreover, the *output* considered is amenable mortality, which captures deaths that are considered avoidable in the presence of timely and effective care. This measure is attractive in the sense that it captures a valued health outcome and it is directly influenced by the quality and availability of health care. However the *input* is health care expenditure, which serves as an imperfect proxy for the health system's many inputs and especially for the inputs to amenable mortality. Additionally, health care expenditures go towards other outcomes besides amenable deaths; it is not possible to disentangle expenditure on conditions amenable to health care from expenditure on other minor conditions, such as glue ear. Amenable mortality rates are also affected by current health expenditure but are also affected by factors such as the prevalence of disease, which occur as a result of things like genetics, current and long-term health behaviours, and health care in previous years. No efforts are made to control for these and other *external influences* that undoubtedly play an important role in determining amenable mortality rates; this is something that should be done prior to drawing any conclusions about which system is most efficient.

Nevertheless, aggregate analyses like this can provide interesting information about how well systems are performing overall and can highlight unexpected variations that might not be observed by focusing on specific health care processes alone. Yet at the same time, these metrics are useful only as a starting point before conducting further analysis, since they cannot give any clear indication about where problems might be occurring *within the health system* and are susceptible to missing information. The location (e.g. provider) where an efficiency issue becomes apparent is not necessarily the area where policy-makers should take action if they want to make improvements.

### Potential for health system efficiency evaluations in the future

The interest in health system efficiency has been heightened by the perception of high growth in health system expenditure in most countries and the widespread

belief that efficiency gains can be made. However, despite being one of the most fundamental health system performance concerns for researchers and policy-makers, the measurement of health system efficiency in practice is difficult to realise. It has proved challenging to develop robust measures of comparative efficiency that are feasible to collect or estimate, that offer consistent insight into comparative health system performance, and that can be usable in guiding policy reforms.

A challenge to better information on efficiency is the lack of agreement on information standards and protocols

There is enormous scope for improvement in measuring efficiency. Conceptually, there is much work still to be done in creating indicators that conform to the usual requirements of specificity, validity, reliability, timeliness, comparability, and avoidance of perverse incentives. On the input side, there is a need for more consistent and more detailed costing of the care given to individual patients. Management accountants have a key role to play in this respect. On the output side, the use of PROMs might offer great scope for improved quality measurement. Furthermore, most indicators reflect only part of the patient pathway. The increased use of electronic health records, linked datasets and registries, capturing entire patient treatments, offers considerable scope for developing more complete efficiency metrics, capable of assessing the relative merits of alternative approaches to care.

A general challenge to better information on efficiency is the lack of agreement on information standards and protocols. Even within countries, there is considerable variation in interpretation of accountancy rules and the use of patient level information systems. International comparison is even more problematic, and there would be major gains if there could be international agreement on basic reporting and information standards, building on achievements such as EuroDRG<sup>11</sup> and the System of Health Accounts.<sup>12</sup>

Measuring the efficiency of health systems is therefore a challenging but worthwhile undertaking. Decision-makers who rely on inadequate analysis or interpretation of efficiency metrics to implement reforms may inappropriately target apparently inefficient practices. For example, an initiative to reduce the length of hospital inpatient stay may in some circumstances yield gains in terms of more intensive use of hospital resources. Yet in other circumstances this may be at the expense of serious additional costs for ambulatory health services, or even future readmissions to hospitals. Decision-makers therefore need to assess the balance of such risks when seeking to tackle inefficiency, and make informed judgements about how to reform their system. We believe the analytic framework presented here helps to facilitate the appropriate interpretation of the relevant efficiency metrics.

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