

Using value to assess improvement in healthcare; but what counts as ‘value’?

Abstract

We contribute to the literature by advancing the debate on valuing healthcare and its relevance to assessing improvement. A systematic literature review includes academic papers and reported case-based information. We examine the potential contribution of subjective (qualitative) insights to valuing healthcare and to healthcare decisions, explicitly incorporate all stakeholders' perceptions of the treatment process and health outcomes and explore the issues raised by illustrating an inclusive approach to making healthcare decisions. The insights afforded present “value” as a multidimensional concept, which relies on objective and subjective elements and the assessment of which is open to differing interpretations. We propose that researchers and healthcare professionals adopt mixed methods (quantitative and qualitative approaches) to collect measurements and stakeholder perceptions of health outcomes, treatment processes and attendant costs. While recognizing that the explicit inclusion of treatment processes and of stakeholders' perceptions alongside economic and accounting measures may present reporting challenges, we argue that it has the potential to lead to better decisions.

Key words: healthcare decisions, value of healthcare, healthcare, outcomes, stakeholders' perceptions.

Healthcare, education and law and order are some of the compelling imperatives that governments face. Amongst these, healthcare is arguably the major contender for a share of the public purse. Further, healthcare has a marked impact on society as a whole; it transcends the personal. Healthcare systems in many countries face significant challenges from an ageing and growing population, new technology and medicines, unsustainable funding and shortages of health professionals (McClellan, McGinnis, Nabel and Olsen, 2008). For example, diabetes has grown into an international phenomenon, the potential consequences of which include heart disease, sexual difficulties, foot ulcers and damage to kidneys, eyes and nerves. While devastating to the individual, these ailments and the attendant costs impinge on the well-being and productivity of nations. And diabetes is but one of a myriad of modern afflictions (World Health Organization, 2013). Internationally, escalating public expenditure in the health sector has brought pressure for cost savings, performance improvements, resource allocation, accountability and equitable delivery

(Broadbent and Guthrie, 1992; Lawrence, Alam, Northcott and Lowe, 1997; Broadbent and Laughlin, 1998; Lowe, 2000; Robson, 2008; Cordery, Baskerville and Porter, 2010).

Porter (2008: 172) exhorts: 'Value must be the fundamental goal of any healthcare system. Measuring¹ [footnote added] value, and improving it, must become the driving force for every participant in the system. Echoing Porter (2008), Gray (2011: 1) predicts that value will be the focus in the health sector for the next era: '21st century healthcare will be dominated by patients, outcome and value, because the challenges facing 21st century healthcare in every society are massive and growing.' For 'participant', we read 'stakeholder'. We argue for awareness of stakeholders' perceptions, consultation and appropriate action in response to feedback. This is consistent with stakeholder theory, which emphasizes participation, inclusion and mutual dependence (Wheeler *et al.*, 2003)

Quintiles (2011: 3) comment:

The problem is that while everyone agrees on the importance, no one has yet identified a single definition that applies across multiple platforms and perspectives. That's because like various definitions held by different stakeholders, the challenge to developing a better, more complete understanding of value shifts as perspectives change.

A robust conception of the value of healthcare is pivotal in taking up Porter's call for value to drive all participants in the healthcare system to assess and improve it. We work towards this conception by briefly reviewing the history of healthcare management, decision-making and information in several countries to place the article in context, by reviewing issues that relate to valuing healthcare, examining Michael Porter's views (principally, those expressed in Porter [2008, 2010, 2012 and 2013]) on 'value in healthcare', and by arguing for the need to consider stakeholder views when valuing healthcare. We follow with discussion, reflection and conclusion.

HEALTHCARE MANAGEMENT AND INFORMATION FOR DECISIONS

This section presents a brief review of the history of healthcare management, decision-making and related information in the United Kingdom (UK), United States of America (USA), Australia and New Zealand (NZ) to place the article in context.

¹ We are circumspect about the use of the term 'measurement' in relation to 'value' and avoid it. The term may be appropriate where it refers to objective data, but not in reference to our conception of value, which embraces both objective and subjective elements. See Concise Oxford English Dictionary (2011); 'Measure (verb): ascertain the size, amount or degree (of something) by comparison with a standard unit of or with an object of known size.'

Writing in the UK context, Rea (1994:87) points out that resource management was historically the sole responsibility of *medical* professionals. Robson (2008) reviews the role and context of accounting information in healthcare decisions in the UK, particularly, but not exclusively, since the National Health Service (NHS) was established in 1948. In tracing the development of accounting information, he refers to the *Uniform System of Accounts*, by Sir Henry Burdett (1893), which by the 1916 edition, comprised 'over 50 classifications of expenditure and hospitals were required to produce statistical tables detailing information on the number of beds available, and number of in-and out-patients' (Robson, 2008:346). This notwithstanding, decisions on funding by hospital boards continued to be based on population statistics rather than on this newly available information. Rea (1994) observes that from the 1950s to 1980s, a department-based costing system was favoured, which expressed expenditures at highly aggregated functional levels (see also Bloomfield, Coombs, Cooper and Rea, 1992).

Robson (2008) traces the rise of a new general management in the UK health sector during the 1980s, a cost performance culture, a concomitant increase in unit managers, devolution of responsibility to unit managers for budgetary control and for most operational decisions, as well as efforts to involve clinical teams in financial and general decision-making. He elucidates the difficulty of providing accounting information appropriate for decision-making. In his comprehensive study of discourses on costs and practices of accounting in hospitals in the USA spanning almost the entire twentieth century, Preston examines them in their historical context and 'within a wider set of discourses' (1992: 64) with which accounting discourses correlate. He highlights the dominance of the cost-reimbursement discourse over those on cost control and the medical justification of cost for most of the century, after which retrospective reimbursement was displaced by the prospective payment system (PPS) based on diagnostic related groups (DRGs) and embodying cost control considerations.

While Chua and Preston (1994) acknowledge difficulties involved in assessing the effects of accounting-led reform in healthcare, they use the PPS as an example for this purpose. PPS - proponents argued for incentives that would lead to reduced costs. The authors chronicle many of the effects, such as such as increased outpatient care, shortened lengths of stay, increased home-healthcare, increased discharges to nursing homes and hospital closures. While rational arguments can be made that these effects are consistent with intentions, Chua and Preston challenge them on the grounds that quality may be compromised, although they

acknowledge that this is hard to prove, and that the evidence of having actually reduced costs is weak. A major issue is that the PPS does not produce an holistic report of healthcare costs because it does not regulate all components of the health system.

Lawrence, Alam, Northcott and Lowe (1997) review developments in accounting for healthcare in New Zealand from the economic depression of the 1930s through to the new management reforms in the 1990s. In the 1930s, New Zealand became one of the first countries in the world to introduce "free" hospital health care for all New Zealanders. Lawrence et al. (1997) report that during this time, financial management was under the control of the health boards, which placed clinical services ahead of accounting. This appears to have persisted into the 1980s, as illustrated by the experiences of one of the authors of this paper who was head of a clinical department at a regional hospital in the early 1980s. Although staff were sponsored to undertake further education, the health board declined her request for financial assistance to complete a degree in economics on the grounds that this was of no relevance to a department-head in a hospital. They advised, however, that they were prepared to sponsor a psychology degree in its stead. Another indication of the approach to financial management was the "spend it or lose it" attitude to a budget surplus at the end of the financial year. This is consistent with Hopwood's (1990: 16) comment that, prior to the 1980s, '(h)ospitals and health management [in the UK] had invested lightly in the accounting craft, in part because health care had not been perceived as primarily an economic phenomenon.'

Major changes occurred in 1993; directors of Crown Health Enterprises (CHEs), which replaced health boards, were appointed to run New Zealand hospitals as successful businesses. The Health and Disability Services Act, 1993, required hospital managers of health institutions to earn a return on assets employed and to pay a dividend to the shareholding ministers under a new market forces model (Lawrence, Alam, and Lowe, 1994). To assist this transfer of power, new accounting and reporting procedures to give profit/loss statements at the unit level and a case mix accounting system were introduced based on DRGs (Lawrence *et al.*, 1997). In many respects, the Australian health system has been subject to the same social, economic and political forces as the New Zealand and other OECD countries described above.

Throughout the western world, effectiveness and efficiency grew in importance through the 1990s because funding tightened and was available only to those services that produced

positive results at a reasonable cost (Gray, 2011). In the UK, calls to improve efficiency in the UK health sector were accompanied by the reorganisation of accounting information (Hopwood, 1984; Robson, 2008). The Institute of Medicine (2001: 6) describes efficiency as “avoiding waste, including waste of equipment, supplies, ideas, and energy”. Hussey, de Vries, Romley, Wang, Chen, Shekelle and McGlynn (2009) review and characterise existing health care efficiency measures within the USA to facilitate a common understanding about the adequacy of these methods. They report on the definition, measurement and costing of health service outputs in the USA, with common health service types used as outputs, including hospital discharges, procedures, and physician visits. Hussey *et al.* question the ability of efficiency measures to account for variance in quality, arguing that (2009: 784) ‘efficiency measures have been subjected to few rigorous evaluations of reliability and validity, and methods of accounting for quality of care in efficiency measurement are not well developed’ Owing to the lack of quality control they suggest that most efficiency measures should more correctly be referred to as “cost of care” measures. (2009: 804).

Five economic evaluation measures feature prominently in the healthcare literature, each of which finds favour in a range of studies: cost minimisation analysis (CMA) (Drummond, O’Brian, Stoddart and Torrance, 2005), cost consequence analysis (CCA) (Canadian Coordinating Office for Health Technology Assessment, 1997; Mauskopf, Paul, Grant and Stergachis, 1998), cost effectiveness analysis (CEA) (Mooney, 2003, Drummond *et al.* 2005), cost utility analysis (CUA) (Mooney and Lange, 1993; Russell and Weinstein, 1996; Mauskopf *et al.*, 1998; Gold, Siegel, Mooney, 2003; benefit-cost analysis (BCA) (Boardman, Greenberg, Vining and Weimer, 2006). Oakes, Considine and Gould (1994) suggest that, although each type of evaluation places a different emphasis on the way it compares benefits and costs and that, although one method may be better suited for a particular decision than another, they share a common objective, which is (1994: 18),

...to create a calculus of health care where outcomes can be objectively defined and measured, and where true costs can be identified and counted. This calculus can then be used to rank medical activities and prioritize health care expenditures.

The literature reviewed in this section illustrates the evolution of health management, the locus and focus of decision-making and the nature of supporting information, although the nature and timing differs across countries. A striking characteristic is the almost exclusive emphasis on cost and inputs. Outputs feature only when interest in efficiency and

effectiveness arises. Further, the interpretation of the consequences of accounting-led initiatives is problematic. Interestingly, the economic evaluation measures refer to outcomes, particularly in benefit-cost analysis. This paves the way for valuing healthcare, which we consider in the next section.

VALUING HEALTHCARE

Bourguignon, (2005: 359-360) subdivides 'value' into three 'large families': (1) 'measurement value', (2) 'economic value' and (3) 'philosophical value'. Measurement value is comparable to the measure or approximate quantification of an element in a hierarchically structured series²; economic value includes both usage value, i.e. the social utility of a commodity, and exchange value, the relation between supply and demand; philosophical value reflects the degree of importance or worth and incorporates both objective and subjective value.

Economic/accounting value

On balance, BCA appears to be the most comprehensive of the economic evaluation measures because it includes monetary, social costs and overall benefits. It can be used to measure economic and allocative efficiency, either within the health sector or across a range of sectors, and can be used to decide on whether or not an intervention will produce a Pareto efficient outcome (see for example, Boardman *et al.*, 2006; Guinness and Wiseman, 2011). Further, the literature identifies close links between value and BCA (see for example, Hanley and Splash, 1993; Sen, 2000; Lenman, 2000; Baum, 2012).

The Quality Adjusted Life Year (QALY) is a widely-used measure of the benefit of health outcomes (in terms of life-years added) that can be incorporated. Within BCA (Gray, 2011). Rosser and Kind (1978) developed the QALY, which combines the length and quality of life into a single index number (Gold *et al.*, 1996). The use of QALY as a health outcome measure potentially leads clinicians to focus on length of life. Although QALY potentially alleviates the problem of measuring healthcare outcomes with a view to cost-effectiveness and related decisions, it suffers from several drawbacks, because health is a function of both the quantity (mortality) and quality (morbidity) of life. Notwithstanding these challenges, QALY is a pragmatic tool that can serve as a key input to deliberations about improving the allocation of healthcare resources (Daniels and Sarvin, 2008).

A recent discussion during a meeting of the Board of Counties Manukau Health (CMH 2016) illustrates how other information can temper the impression given by QALY data. The Board

² Refer, however, to footnote 1

is considering the possibility of funding additional elective bariatric surgery (the surgical management of obesity). As part of the discussion, the lead bariatric surgeon presents a QALY league table (Table 1) indicating the cost per QALY to the Board. In addition, the Board considers a review of five case-controlled cost-effectiveness studies of bariatric surgery³. Although other information might also bear on the decision, the above approach goes some way towards supplementing the bare QALY statistics in deciding whether to fund additional elective bariatric surgery or to pursue other surgery options.

Procedure	Cost per QALY (\$NZ)
Bariatric Surgery	Up to \$5000
Hip Joint Replacement	\$6,000
Kidney Transplant	\$12,000
Haemodialysis	\$25,000
Breast Cancer	\$30,000
Carotid Endarterectomy	\$85,000

TABLE 1. QALY LEAGUE TABLE. SOURCE: CMH (2016)

The conventional accounting view of value is limited to actions involving economic information and is characterised by denomination in monetary amounts (Boyce, 2000). A view of value that is restricted to economic information, places significant artificial constraints on the scope of accountability in a broad sense (Gray, Owen and Adams, 1996). As Gray puts it (2006: 809), ‘...there is other ‘value’ than that of money – the value of life, the value of society, the value of quality and, if one is of a religious bent, the value of creation itself.’

In recognition of ‘other value’, alternative accountings have evolved that focus on the valuation of social benefits and costs quantifiable in monetary terms as well as social impacts that are not easily and meaningfully quantifiable in monetary terms (Boyce, 2000).

Philosophical value: objectivity, subjectivity and perceptions

³ The authors of the five case studies are Cremieux, Buchwald, Shikora, Ghosh and Yang 2008; Sampalis, Liberman, Auger and Christou 2004, Finklestein, Allaire, Burgess and Hale 2011; Chan, Stoll and Colditz. 2011, Weiner *et al.* 2013.

The National Institute for Health and Clinical Excellence (NICE, 2005) uses the best available evidence to base its decisions on value in healthcare. However, because evidence is not always complete and of good quality, NICE must apply judgements. These judgements are of two types: (1) scientific value judgments that interpret the quality and significance of the evidence available, and (2) social value judgments that relate to society rather than to science (Rawlins, 2004; NICE, 2005). Bourguignon (2005) points out that, although the distinction between subjective and objective value is not clear-cut, subjective value involves personal opinions and feelings rather than facts.

A person's perception of value depends on their focus – 'differentiated reality' according to Llewellyn (2007), whereby notions of value cross boundaries among the 'physical', 'structural', 'agential', 'cultural' and 'mental' realms. In a BCA of clinical trials in New Zealand that is yet to be published, (XXX1 – authors' anonymity), we identify stakeholders' perceptions of associated benefits and costs, and classify them according to Llewellyn's (2007) five differential realities: (1) the physical realm enables the identification of health outcomes in the study, which include both positive health improvements and adverse drug reactions; (2) the structural realm assists the identification of structure, policies and procedures that govern the ethics committees, the treatment protocol and the operation of clinical trials; (3) the agential realm facilitates the feelings experienced from doing something worthwhile that will potentially benefit future generations; (4) the cultural realm enables the valuing of participation, including caregiver education and knowledge created by the trial that is transferred to standard clinical practice; and (5) the mental realm facilitates perception, thought, feelings, desires, emotions and predispositions.

There are similarities between Llewellyn's five differential realities and the NICE classification of factors that contribute to the value of healthcare mentioned earlier in this section. The physical and structural realms are scientific value-judgments and the agential, cultural and mental realms are social-value judgments. There can be no absolute 'objectivity' since it is reliant on individual judgment. Even money is worth only what users believe it is worth. Assessing value can never be a purely objective exercise; the meaning of value can vary significantly among different people or different organisations in different sectors.

MICHAEL PORTER'S VIEWS ON VALUE IN HEALTHCARE

Michael Porter has devoted considerable attention (principally, 2008, 2010, 2012, 2013) to 'value in healthcare' in recent years. Consistent with the quote in the opening section, Porter

(2010) argues that improved ability to define and measure value is central to managing health in challenging economic times. In terms of Porter's model (2008, 2010, 2012, 2013):

$$\text{Value in health} = \frac{\text{patient outcomes}}{\text{costs}}$$

He (2010: 2477) emphasises the need for a rigorous approach to defining, describing and measuring outcomes and costs. He also (2008) advocates that the cost of the entire healthcare process should determine the true costs of delivering healthcare. Adoption of clinical pathways that detail the steps in a treatment care protocol and standardise care for specific clinical problems assist this costing process (Kinsman, Rotter, James, *et al.*, 2010). Porter (2012: 18) presents salient elements of what he terms 'measuring healthcare', namely: 'patient', 'treatment processes', 'treatment protocols and guidelines', 'patient adherence', organisational structure, 'biologic indicators' and 'health outcomes'. The patient enters the system with initial conditions. The nature and complexity of the conditions influence the health outcomes and the prescribed treatment processes. The established treatment protocols and guidelines inform the treatment process while the organisational structure and information systems influence them. Biologic indicators measure the degree of success of the treatment process and predict the eventual health outcomes.

We illustrate the way in which these elements affect the experience of a hypothetical patient who has an initial condition of diabetes. The process is the diabetes clinical pathway or protocol; for example, the number of clinical check-ups and prescribed medication. The biologic indicator is Haemoglobin A1C levels and the health outcomes are survival with no congestive heart failure. The health outcomes are consistent with Porter's (2010).three-tiered outcome hierarchy. Outcome measurement begins with a definition of a set of outcomes for a specific medical condition reported on one of three tiers, each of which comprises two dimensions. Tier one reports patient health status achieved or retained (for degenerative conditions) - survival and the degree of health or recovery; tier two, the process of recovery - the time required to achieve recovery and the disutility of the care process; tier three - the sustainability of health: disease recurrences or complications and new health problems consequent on treatment.

The structure is the treatment unit and 'patient adherence' refers to the extent that patients follow instructions related to prescribed diet and medications. The extent to which patients comply with their treatment process affects both biologic indicators and health outcomes.

'Outcomes' refer to 'favourable outcomes' minus 'adverse outcomes', or put another way, value equals effectiveness minus harm (Gray, 2011). Porter (2010) separates objectively-determined outcomes from patient-perceptions of outcomes and he distinguishes between outcomes and processes. Porter's view (2010: 2) is that patient satisfaction with their treatment (for example, hospital stay or outpatient visit) relates to process, whereas patient satisfaction with health relates to health outcomes.

Although he argues that we should measure outcomes that matter to patients in assessing value in health, he is dismissive of patient perceptions of care. Porter (2012: 2):

Outcomes are the results of care in terms of patients' health over time. They are distinct from care processes or interventions designed to achieve the results, and from biologic indicators that are predictors of results. However, discomfort, timelines, and complications of care are outcomes, not process measures, because they relate directly to the health status of the patient.

We refer to a hypothetical arthritis sufferer to illustrate a health outcome. She has regained the ability to walk from the front door of her house to the letterbox, through the intervention of medication, physiotherapy, walking aids or hip-joint replacement. A healthcare professional may use Porter's model to compare this outcome with the cost involved to arrive at the most cost-effective treatment. Although the model is consistent with Porter's statement above, in that it does not reflect patients' perceptions of treatment, it does not appear to incorporate patient perceptions of the outcome, which he claims to be relevant. This might be problematic if the patient were dissatisfied with the most cost-effective treatment and consequently did not comply with the process (i.e. absence of patient-adherence), leading to a diminution of value. For example, some people may avoid medication for cultural reasons. If medication were the most cost-effective treatment, the patient's perception of value would differ from that of the health professional.

Porter (2010) asserts that value increases if outcomes improve at equal or lower cost, or if outcomes remain the same at lower cost. He does not compare values across medical conditions because he maintains that the set of outcomes is different for each medical condition. Similarly, he questions the validity of using a single number to determine QALY on the grounds that the quality of life is multidimensional and the relevant dimensions vary according to medical condition. While he acknowledges the importance of patients' perceptions of outcomes, he dismisses their perceptions of care. He is also silent on the

potential influence of other stakeholders' views on value. Porter's approach may not help the decision maker to select the best value options across medical conditions in the absence of a common unit of analysis.

STAKEHOLDER PERCEPTIONS

Many groups and individuals have a vital stake in the effective and efficient management of a health system or one or more of its components. An awareness of their perceptions potentially adds to the value of healthcare. Stakeholder theory incorporates a range of ideas and approaches. Donaldson and Preston (1995) use three classifications: 1) normative; 2) instrumental; 3) descriptive. Normative approaches indicate how organisations should behave in relation to their stakeholders. Instrumental approaches prescribe ways for organisations to relate to their stakeholders to maximise outcomes. Descriptive approaches record how organisations actually behave in their relationships with their stakeholders (Jones and Wicks, 1999).

A Quintiles study ranking stakeholder groups according to the extent to which they add value to healthcare concludes that 'patients themselves are not doing enough to improve their own health outcomes' (Quintiles, 2011: 9). They suggest that collecting, recording and acting on stakeholders' views would provide opportunities to increase health literacy, empower stakeholders to improve health outcomes, and thus increase the value of healthcare. Gray (2011) distinguishes among three key factors that influence patients' perceptions of their experience: (1) 'hotel amenities'; (2) 'interpersonal skills'; (3) 'technical /clinical skills'. He suggests that understanding how patients perceive value in healthcare requires a consideration of all three aspects. For example, a patient's perception of a peaceful waiting room relates to hotel amenities; of kind and caring staff to interpersonal skills; and of the thoroughness of assessments to technical/clinical skills.

A recent report into the serious failings at the Mid Staffordshire NHS Foundation Trust (Francis, 2013) highlights the need to consider stakeholder views. Robert Francis (2013: 3) introduces the report thus: '...the story it tells is first and foremost of appalling suffering of many patients. This was primarily caused by a serious failure on the part of a provider Trust Board. It did not listen sufficiently to its patients and staff'. The enquiry investigates why, between 2005 and 2009, death rates among the Mid Staffordshire NHS Foundation Trust

patients were considerably higher than expected. The Trust leadership erred by relying too heavily on financial indicators, while neglecting cure indicators. This flowed through the organisation, to the detriment of patient care. As Francis (2013: 45) opines, 'the Trust was operating in an environment in which its leadership was expected to focus on financial issues, and there is little doubt that this is what it did. Sadly, it paid insufficient attention to the risks in relation to the quality of service delivery this entailed.'

Quintiles (2011) report on a survey of 200 biopharmaceutical executives, 153 managed care executives, 400 primary care physicians, 103 specialists, and 1000 adults diagnosed with a chronic disease. The researchers asked: 'In your own words, how would you define "value" in healthcare?' Quintiles (2011: 5) tellingly observe:

Stakeholders have internalized the concept of value in very different ways, with biopharma executives as the only group in which a majority includes outcomes as part of their definition. For patients and physicians, the process (quality of care) appears to matter as much as the outcome when it comes to value, although nearly one-third of patients do not feel they can define value.

An awareness of stakeholders' perceptions of care enhances understanding of the differences in health outcomes among population groups. In New Zealand, the way in which indigenous Māori perceive the health system differs from that of non-Māori, which may shape perceived health outcomes (Mills, Reid and Vaithianathan, 2012).

In a BCA case study at a New Zealand hospital (XXX1, author-anonymity), An interviewee who is representative of one of the stakeholder groups maintained that health boards disadvantage the indigenous people of New Zealand (Māori) by promoting the over-use of pharmaceuticals. The significance of this comment lies in Māori's tendency to avoid the use of pharmaceuticals and consequently they frequently do not adhere to taking prescribed medications. Awareness that some groups adhere to one treatment regime but resist another and of the reasons therefor, potentially eliminates waste, reduces health inequalities and leads to better value in healthcare.

Although rigorous measurement of outcomes and costs enable systematic improvement in the treatment delivery process, they do not *per se* provide a mechanism through which stakeholders can influence the assessment of value or contribute to organisational decisions impacting on their lives.

DISCUSSION, REFLECTION AND CONCLUSION

We have reviewed and evaluated the literature that pertains to valuing healthcare. We subscribe to the notion of philosophical value, which recognises the multidimensional nature of value and embraces both objective and subjective elements (Bourguignon, 2005), we accept that so-called objectivity is itself interpreted subjectively to an extent (NICE, 2005) and we recognise the concept of differentiated reality (Llewellyn, 2007). Further, value is in the eyes of the beholder; it follows that different people have different impressions of value. Our conception of the value of healthcare embraces some dimensions of heterogeneity and context-specific outcomes (Galvin, 2014). Arrow's (1950) impossibility theorem asserts that there is no unambiguous decision-making rule for multi-person, multi-criterion decisions based on rankings or preferences among more than two options. Each of the stakeholders in a healthcare system has interconnected responsibilities and unique needs that potentially influence that system and the value placed on it (Quintiles, 2011). Our interpretation of the academic and practitioner literature reviewed in this article is that these differing needs are currently either not at all, or not adequately, captured by healthcare systems, thus justifying innovative ways of taking them into account.

To provide value in healthcare for all participants and equity in health outcomes demands that health teams become more responsive to individual tastes and needs and offer greater choice as to when and how they provide healthcare services. For example, by encouraging patients to write their end-of-life care plans, health teams become more aware of patients' perceptions and this has changed the way in which at least this has changed the way one hospital treats the terminally ill (National Ethics Advisory Committee 2014). Patients often opt for a shorter life and to die in their own homes surrounded by family, whereas medical teams at one time tried to prolong life as long as possible, even if this meant the patient died in hospital connected to a lifesaving machine. Patients also observe things that may go unnoticed by busy staff, such as non-compliance with hospital cleanliness and staff hand-hygiene. Infections are a common adverse event that occurs in healthcare and results in additional medications, longer hospital stays and patient distress. A district health board in New Zealand finds that patients welcome the opportunity to report poor hygiene and non-compliance with procedures on the wards, and that 21% of patients surveyed felt that this was a key dimension of their treatment experience. Analysis of reported perceptions potentially improves hygiene standards and ultimately reduces costs. (XXX2 - authors' anonymity).

Value can also emerge from a collective desire for something. Gray *et al.* (1996) propose a ‘polyvocal’ citizenship approach to ensure that every stakeholder has a ‘voice’ in the organisation. This perspective appears to empower stakeholders and enables them to reflect on their experiences, values, interests and concerns (Cotton, Fraser and Hill, 2000; Hill, Fraser and Cotton, 2001). However, some scholars are critical of the suggestion that active stakeholder engagement creates value for all (see for example, Owen *et al.*, 2001; Belal, 2002; Dey, 2000; Gray, 2000, 2001; Thomson and Bebbington, 2004). The last-cited authors argue that organisational interests may bring power that controls the dialogue in stakeholder engagement exercises. Taking this concern into account, O’Dwyer (2005) recommends that the structure of stakeholder engagement should be open and allow as much freedom as possible for participants to set the agenda.

Gray’s (2011) prediction (see introduction above) that the focus for the next era in healthcare will be driven by communities and will create health services that are patient-centred, safe and effective, and produce greater value from the resources used is dependent on engagement with all stakeholders. Strong leadership will be important in driving changes.

Porter focuses on health outcomes, which are achieved by structure and treatment processes, managed by biologic indicators and are subject to patient initial conditions and patient adherence. Drawing on the insights derived from our review and our reflection thereon, we argue that all the components of healthcare contribute to health outcomes, have cost implications and therefore affect the value of healthcare. Accordingly, we suggest a modified version of Porter’s model that recognises the treatment process and the centrality of stakeholder perceptions in valuing healthcare.

While a mixed-method research design, such as that described above, recognises both subjectivity and objectivity, Sale, Lohfeld and Brazil (2002) assert that quantitative and qualitative approaches address different phenomena and that (2002: 50) ‘(t)he fact that the approaches are incommensurate does not mean that multiple methods cannot be combined in a single study if it is done for complementary purposes.’

We conceptualise the value of healthcare in the following expression, which comprises treatment process, health outcomes and cost. The numerator reflects the sum of processes and health outcomes. The subscript ‘p’ represents perceptions in both cases.

$$\text{Value} = \frac{(\text{Treatment} + \text{Treatment}_p) + (\text{Outcomes} + \text{Outcomes}_p)}{\text{Costs}}$$

We include in 'treatment_p', the perceptions of a range of stakeholders, not only those of patients and medical teams, because medical interventions may impact on others. The inclusion of 'treatment_p' encourages healthcare professionals to take into account the perceptions of the wider economic, social and cultural implications of their activities.

While we acknowledge the extensive issues arising from the determination and application of healthcare costs outlined in an earlier section, we make three points relating to the retention of costs in the above expression. First, irrespective of cost-related issues, our focus is on incorporating stakeholder perceptions into the model; Second, Porter addresses cost-shifting to a large extent by stipulating an holistic approach to cost determination. Third, we do not deny the need for continuing improvement in costing and cost-effectiveness measures. The expression above will not automatically resolve into decisions; its interpretation presents a challenge to decision-makers in healthcare. We argue that the explicit inclusion of treatment processes and of stakeholders' perceptions in valuing healthcare has the potential to lead to better decisions. However, merging quantitative and qualitative dimensions into a quantitative result does not offer a satisfactory solution. We advocate further research and broad conversations among all stakeholders, to develop complementary use of the two approaches (Sale *et al.*, 2002), with the suggested model as a start towards making effective use of limited healthcare resources.

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