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Using the Value Equation—Improving Pediatric Healthcare in Publicly Funded Healthcare Systems

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Opinion statement

Purpose of review The value equation refers to health outcomes achieved for resources expended. This review will explore the use and limitations of the value equation as well as differences in its application across publicly and privately funded health systems with particular focus on the implications for children's healthcare systems.
Recent findings There is growing interest in improving the value of specific interventions and in using concepts of value to allocate resources efficiently, particularly in publicly funded healthcare systems. Value might be appropriately defined differently for children by incorporating perspectives of parents, recognizing that they may have different perceptions.
Summary The value equation is an essential tool in driving improvement in healthcare delivery as it defines what is most important for patients and families, and includes the resources required to achieve the desired outcome. Use of the value equation is as relevant and important in publicly funded healthcare systems as it is in privately funded systems.

Opinion

The value equation introduced by Porter and Teisberg [1] provides a useful way to examine health outcomes generated by the expenditure of resources or cost. When using this tool, it is important to note that relevant outcomes depend on whose perspective (payer, patient, parent/caregiver) is taken. Additionally, the measures of

cost may not fully capture all important resources relevant to healthcare purchasers such as inconvenience and service quality. Despite these limitations, the value equation focuses improvement efforts and informs decisions about relative value between competing interventions. This concept is as applicable to pediatric healthcare systems as it is in adult healthcare services, whether they are publicly or privately funded.

Introduction

It may well be a universal truth that governments and other purchasers of healthcare services are contending with the challenge of raising revenues enough to keep pace with inflation in healthcare costs, costs that are being driven by aging-related increases in utilization as well as costs of new technologies and therapeutics. It may also be a universal truth that the people served by the healthcare system and those paying the bills for healthcare have rising expectations about safety, service, and the anticipation of a good outcome. As the production of healthcare becomes more transparent through better collection and analysis of data, it has become clearer that, across jurisdictions, there is wide variability in how reliably caregivers apply generally accepted medical evidence, how well systems prevent avoidable harm, and how well systems meet consumer expectations around timeliness or service. Moreover, there is wide variation in the costs of delivering healthcare, both in terms of the cost of specific services and the per capita costs of caring for a population. There is also variation in the outcomes delivered by different systems.

Given these factors, there is widespread interest in ensuring that the benefits of healthcare are worth the money expended, that resources are used in the best way possible, and that systems deliver more with the money made available. In other words, the value of healthcare services improves and the value delivered is worth the cost. The interest in value has caused healthcare policy makers, payers, and providers, to consider mechanisms that can drive enhancements in value faster than the status quo creates.

Management scholar, Michael Porter [2], argues that value in healthcare needs to be defined in quantitative and objective ways that are relevant to the consumer and focused on the clinical outcomes achieved for the specific costs incurred. Porter and co-author Elizabeth Teisberg introduced the concept of value-based healthcare delivery and define value as outcomes divided by cost [1]. They prescribe standard methods for defining both the numerator and denominator of the value equation in ways that are condition or service specific. In subsequent work, Porter and Lee have proposed a number of strategies to enhance value including organizing into integrated practice units, measuring outcomes and costs for every patient, bundled payments for care cycles, integrating care delivery across separate facilities, expanding excellent services to other geographies, and building an enabling information technology platform [3••]. These strategies are being embraced in many jurisdictions and are broadening the ways in which providers think about enhancing value.

Despite the great interest in using the value equation to drive improvement and the relatively common-sense nature of the approach, there is a dearth of evidence that such a focus or strategic framework improves value or that the concepts of value captured are the most relevant to the patient experience.

Moreover, it is not clear to what extent concepts developed for the market-driven US healthcare system are relevant for other jurisdictions such as the publicly funded systems of Canada or Europe. This review will explore the use and limitations of the value equation as well as differences in the application across health systems and will focus on the implications for children's healthcare systems.

Subjective and objective measures of value

Porter's concept of value—condition-specific outcomes divided by costs—provides a quantitative and comparable measure of value that has attracted considerable interest in healthcare. However, Porter's value equation is not the only approach to measuring value in service delivery. For example, Heskett and colleagues have defined value from the perspective of the consumer as the difference between the sum total of service benefits and the sum of the costs incurred where both benefits and costs include tangible and intangible factors [4]. Whereas Porter looks at value from the perspective of a rational consumer interested only in maximizing clinical outcomes, Heskett considers value to be determined in the eyes of the beholder. Whereas payers might be able to agree on a common definition of value for specific services, it is likely that the people selecting and using healthcare services will have much more varied approaches to perceiving value. For families choosing healthcare services, characteristics such as waiting times, convenience, customer service, and other factors may be just as important as quantitative measures of service outcomes. Indeed, families of children with special healthcare needs identify a range of service characteristics beyond traditional measures of quality that are important to them [5].

Value in a publicly funded healthcare system

Outside the USA, a number of different systems have been used to provide access to healthcare for citizens and to fund healthcare delivery. Some countries, like the UK and Canada, have publicly funded services that are available to all citizens whereas other countries, like Germany, have a system of government-subsidized social insurance programs that ensure universal coverage without directly funding the operations of healthcare providers. In many countries, with publicly funded healthcare, such as the UK and Greece, a parallel system of privately funded care provides complimentary or competing services. In other countries, such as Canada, no significant privately funded care is available. These differences influence the governments' roles in driving value and the importance of any specific approach in changing behaviors within the healthcare systems.

Countries also differ widely in the degree to which funding for physician services are integrated with funding of hospital and other services. Furthermore, there are significant differences in the degree to which care is coordinated and provider organizations are integrated along a continuum of service providers. Even within Canada, there is wide variation across the individual and independent provincial healthcare systems such that British Columbia is organized into relatively autonomous regional authorities which coordinate a broad range

of healthcare services for the population each serves, whereas Ontario's system is largely composed of independent service delivery organizations with little coordination between each or across a service continuum.

Thus, while each country works to develop a more cost-effective and higher performing healthcare system, the levers available in each context and the specific objectives in the drive to value vary greatly. In making the best use of public resources, governments may think about value in three different ways, technical, allocative, and personal value, as introduced by Muir Gray, Director of Better Value Healthcare in the UK [6]. *Technical value* refers to the impact of quality and safety improvement efforts that yield better health outcomes and may be most consistent with the concepts introduced by Porter and colleagues. *Allocative value* refers to the relative benefits derived through appropriations to make available certain equipment, therapies, or services. *Personal value* refers to the value perceived at a personal level by those being served by healthcare and allows for the kinds of tangible and intangible characteristics suggested by Heskett and his colleagues.

Allocating scarce resources according to value

Allocative value is of increasing importance as governments contend with the introduction of expensive technology such as robotics or expensive therapeutics; some of which target small populations of citizens. Tools such as cost-effectiveness analysis [7] allow different healthcare investments to be compared using a common impact measure such as quality-adjusted life years (QALYs) or lives saved. Such tools allow governments to allocate scarce resources most efficiently. One approach that governments use to determine whether or not to fund specific services is through health technology assessment agencies or committees that analyze relevant literature and model the economics of introducing new technologies. Organizations such as the UK's National Institute for Health and Clinical Excellence (NICE) have used the concept of a threshold cost per QALY to determine whether certain expenditures are justified [8, 9]. In contrast, other agencies, such as Ontario's Health Technology Assessment Committee, rely on a more qualitative assessment and there is no clear threshold for informing government funding decisions. In other cases, there are collaborative efforts across independent healthcare systems such as the European Union's network for health technology assessments to establish consensus and develop guidelines [10].

Whereas government has a vital interest in using scarce resources to the greatest good, there are a number of challenges with health technology assessments in ensuring the governments' allocation decisions adequately measure value or yield recommendations that are in line with the value preferences of citizens [11]. Cost-effectiveness analysis is complicated by difficulty in quality-adjusting life years, assessing the longitudinal costs with and without the technology in question, and capturing a range of other important considerations such as the value of hope or of scientific advances that might not be possible without investments in a particular technology [12••, 13, 14]. It is also difficult for quantitative methods such as cost-effectiveness analysis to capture society's preferences to differentially address the needs of special populations such as children or other vulnerable groups [15, 16].

Allocative methods and cost-effectiveness analysis have particular applicability in pediatric medicine in the justification of universal or targeted screening programs, immunization and other prevention programs, the adoption of new treatments, and the application of more targeted interventions such as genetic testing [17]. One might predict that such analyses will become increasingly important as more expensive therapeutics are developed or as transformative alternative therapies such as gene editing become available.

Driving improvements in value

Beyond making funding allocation decisions that ensure the most efficient use of resources, governments, payers, and policy makers also see to drive consumers to choose services with greater value and to drive providers to create more value in the way they deliver services. A variety of strategies have been used to drive consumers to make value-based choices through the development of value-based insurance design, consumer-directed healthcare, personal health spending accounts, and the transparent reporting of outcomes. Similarly, a variety of strategies have been used to drive providers to enhance value beyond what they might be incented to do by the intrinsic motivation of wanting to continuously improve outcomes. Such strategies include bundling payments for services that are better delivered in a coordinated fashion, differentially paying for services based on outcomes, and requiring or incenting the transparent reporting of outcomes [18]. Each of these strategies presupposes that relevant measures of value are available, understandable, and actionable. However, implementation of each of these strategies has been hampered to a great extent by the paucity of agreed-upon outcome measures and the difficulty of making relevant outcome measures accessible and understandable. Despite the widespread interest in driving value, there is very limited data to support the effectiveness of any of these strategies in promoting better outcomes.

Value-based insurance design encourages high-value service use by applying lower copayments and discourages low-value services by applying higher copayments in the design of insurance benefits packages [19]. Incentives may also be provided to encourage participation in disease management programs or other activities. There is evidence that consumers are sensitive to the price of medications [20], thereby lending support for such programs. There is also some evidence that such programs drive improvements in compliance [21] and more cost-effective medication strategies [22, 23]. However, it is not yet clear if the costs of such programs or consumer attitudes about them [24] support the idea that they increase overall value [25•] Other strategies aimed at influencing consumer choice, such as the use of personal health budgets recently piloted in the UK's National Health Service, also have mixed reviews and provide little evidence that outcomes improve [26–28].

Both publicly funded and privately funded healthcare systems have experimented with programs that differentially reward providers based on performance. In the USA, the Center for Medicare and Medicaid Services introduced a value-based purchasing program that provided an additional 1% reimbursement for hospitals meeting certain performance targets including measures of patient experience. This followed a long-standing practice of requiring hospitals to report certain performance measurements. Although

performance did improve in hospitals participating in this program, they did not improve statistically more than hospitals that did not participate [29••], suggesting that it was not the pay-for-performance program that drove improvements. There has been similar experience in the UK where the Commissioning for Quality and Innovation (CQUIN) program rewarded hospitals based on performance but failed to produce significant improvements in clinical outcomes [30].

Measurement alone may drive improvement, with or without tying performance to reimbursement [18, 31]. However, it has been difficult to identify relevant measures in many areas. Although quality measurement has been widely used in some jurisdictions such as the USA, most metrics in use assess compliance with evidence-based standards—measures of process rather than outcomes. Porter, Larsson, and Lee address the limitations in the measurement sets maintained by the National Quality Measures Clearing House including the following: the paucity of outcomes measures, particularly patient-reported outcomes; measurements that relate to the practice of individual specialists rather than the performance of systems of care; and efforts at outcomes measures being focused on clinical status such as survival rather than functional outcomes that are meaningful to consumers [32•]. The International Consortium for Health Outcomes Measures (ICHOM) is a not-for-profit organization founded by proponents of value-based healthcare, including Porter, to develop appropriate comparative measures that can be used globally for value-based decision making [33]. ICHOM's measurement framework includes metrics on the burden of treatment and complications, patient experience, and health or well-being. To date, they have developed 21 measurement sets covering 47% of the global disease burden including several conditions of childhood. For any given condition, experts from six or more countries develop a measurement set of between four to more than ten measures with rigorous measurement specifications and implementation guides. Many of the participants in the standard-setting process represent countries with publicly funded healthcare systems.

Experience with value-based healthcare in pediatrics

Whereas strategies to improve value through increased care effectiveness, improved safety, and better service are relevant in caring for children and adults, there are a number of reasons that some of the concepts of value-based healthcare may apply differently in pediatric care compared to healthcare for adults. Given that adult caregivers are typically the healthcare purchasing decision makers for pediatric care, there may be value-defining characteristics of service that are relevant to caregivers beyond the clinical outcomes most relevant to a child's condition. Indeed, Anderson and colleagues noted that factors related to caregiver engagement and support were important drivers of value from their perspective [5]. In defining value and outcomes from the patient's perspective, it is also common to rely on caregivers' reporting of outcomes. It is possible, as has been shown for some children with epilepsy, that parents and children perceive quality of life and other outcomes differently from each other [34].

Another reason that value-based healthcare may have different considerations for children is that pediatric care may be less discretionary in the eyes of adult decision makers compared to their own healthcare and there are likely

fewer potential service providers compared to the numbers available for adult healthcare. Thus, value-based insurance design may not drive the same changes in decision making or the same cost savings experienced when applied to adult populations. There is limited data examining value-based insurance design for children. However, Ellis and colleagues found that value-based insurance design did not reduce the overall costs of care for children with special healthcare needs [35], a group that drives pediatric healthcare costs. In contrast, out of pocket expenditures increased.

Efforts to promote evidence-based care and to eliminate aspects of care that add little value have been introduced in healthcare systems across countries with a range of funding mechanisms. Choosing Wisely is an initiative of the ABIM Foundation intended to help clinicians and patients make choices that are supported by evidence and truly necessary as well as safe [36]. This initiative has been adopted by many professional societies across many countries. Through this and other initiatives, there is a greater focus on overuse in medicine as evidenced by a doubling of medical journal articles on the topic over a 2-year period since the introduction of Choosing Wisely [37]. Healthcare providers who have adopted the Choosing Wisely paradigm have achieved reductions in the use of low-value interventions such as unnecessary laboratory testing and diagnostic imaging. Organizations or societies participating in Choosing Wisely typically develop a list of low-value interventions that are targets for changing practice. Several such lists have been developed for pediatrics which include the inpatient setting [38] and the neonatal intensive care [39]. The desire to drive an evidence-based approach to practice transcends the differences in national health systems, and this approach has been adopted in countries with publicly funded healthcare [40] as well as the USA.

Conclusion

Discussions about value and the use of the value equation are relatively new, and published articles related to the use of the value equation are sparse. However, the concepts of identifying and improving upon relevant outcomes are not new. Furthermore, the use of value-related tools such as cost-benefit analysis for making allocative decisions of limited resources has been widespread for some time. Whereas the underlying concepts may not be new, the value equation does encourage deliberate thinking about those outcomes that are most relevant to healthcare purchasing decision makers and to encourage deliberate efforts to reduce the resources necessary to deliver improved outcomes.

Compliance with Ethical Standards

Conflict of Interest
Michael Apkon declares that he has no conflicts of interest.

Human and Animal Rights and Informed Consent
This article does not contain any studies with human or animal subjects performed by the author.

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