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Value-Based procurement for medical devices: A scoping review

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Abstract

Background: Despite this seemingly simple definition of value in different perspectives, the definition of value-based procurement for medical devices is still unclear. This study aimed to delineate the definition of value-based procurement for medical devices and its characteristics.

Methods: According to the systematic method for scoping review described by Arksey and O'Malley, we reviewed related literature through target databases (PUBMED, ProQuest, Web of Science, Scopus, and Science Direct) during 2004-2020. The publications that focused on the procurement of medical devices and address the issue of value in procurement were selected. The publications whose full-text was not available and were not in English were excluded. By using data charting tables, selected articles were reviewed and concepts and definitions were extracted

Results: According to the eligibility criteria and reference checking, 24 documents were selected. There are different definition and understanding for value-based procurement (VBP). Identified characteristics of VBP are information, actors Collaboration, patient experience, value analysis team, ability to evaluate alternatives, value proposition, competitive dialogue, and weighing evaluation criteria.

Conclusion: VBP is a framework that guides the review and decision-making to procure medical devices. In this framework, all dimensions of the value equation (outcome/related costs) must be considered and weighted. Health systems need to work on identified aspects.

Keywords: Value, Value-Based Health Care, Value-Based Procurement, Medical Devices

Conflicts of Interest: None declared
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Introduction

Value-based health care (VBHC), like other health care reforms, has been introduced to address a number of health system challenges, including rising costs and the variation in quality of care (1, 2) .This concept focuses on health outcomes and their related costs as the value is defined by Porter as health outcomes per dollars spent (3). Among all the factors involved in the process of providing health outcomes, medical devices have the potential to drive VBHC (2, 4), as it is at th e heart of value creation and a tool for value-based transformation in the health system. Traditional approach in the procurement of medical devices focuses only on the price factor (5). In many countries (developed or less developed), price factor and cost containment continue to play a major role in the procurement of medical devices (6, 7).

Price-based approach, which is derived from the short-term perspective of cost reduction, usually does not take into account the needs of patients and the total costs of acquiring medical equipment (2, 6). Focusing solely on the price will result in neglecting the role of different

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↑What is "already known" in this topic:
Value-based procurement for medical devices has been an emerging topic in recent years.

→What this article adds:
Value-based procurement is a framework that guides the review and decision-making to procure medical devices.
Multi-criteria decision-making is the basis of value-based procurement.

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stakeholders, including patients and providers in the whole process as well as the challenges facing the health system (8). In addition to not considering other factors in the procurement of medical equipment, there is diversity in the procurement process between countries as well as within a country (9). These limitations in the medical device procurement can be seen in the inadequate information system, conflicting incentives, fragmented organizing in procurers, and disqualification of procurers to seek more value (6, 10, 11).

However, medical devices procurement systems in hospitals and health systems have not been adjusted to overcome this challenge (2, 12, 13). A shift from a purely price-focused approach to a more comprehensive one with the goal of including the patient outcomes will cause long-term efficiencies and better health for patients (14, 15). Studies have shown that a shift to a value-based approach in medical equipment procurement can lead to better health and greater cost-effectiveness in hospital (5, 9, 12, 16). Besides, this approach would be also useful for identifying opportunities for innovation (11). A report showed that some of European countries are moving towards value-based procurement (VBP), albeit at different speeds (17). Thus, VBP would be a key element to unlock value-based health care (15).

Despite the seemingly simple definition of value in different perspectives (18), the definition of VBP for medical devices is still unclear. Due to the novelty of this concept, there is no common language associated with it, and everyone has interpreted it according to their own inference. Accordingly, we decided to answer the following questions through a scoping review of the literature:

1- What is the definition of VBP for medical devices?

2- What are medical devices VBP characteristics?

Methods

According to the systematic method for scoping review described by Arksey and O'Malley (19), we reviewed the related literature. The study time frame was from 2004 (as the concept of value in health system was first proposed in 2004 by Michael Porter) to 2020.

Data Sources and Search Strategies

Target databases for the literature search were the PUBMED, ProQuest, Web of Science, Scopus, Science Direct, and Google scholar databases. The example of search strategy is presented in Table 1. Also, for ensuring comprehensiveness of the search, reference lists of the selected documents and the related websites were also checked.

Study Selection

Based on the searches, peer-reviewed articles and reports were retrieved for review by researchers. Eligibility criteria are presented in Table 2. The publications that focused on the procurement of medical devices and ad-

Table 1. Example of Search Strategy

PubMed	((((((((((((Durable Medical Equipment[Title/Abstract]) OR (Durable Medical Equipment[Text Word])) OR (Equipment[Text Word] AND Supplies, Hospital[Text Word])) OR (Equipment[Title/Abstract] AND Supplies, Hospital[Title/Abstract])) OR (Radiation Equipment[Title/Abstract] AND Supplies[Title/Abstract])) OR (Radiation Equipment[Text Word] AND Supplies[Text Word])) OR (Tomography Scanners, X-Ray Computed[Title/Abstract])) OR (Tomography Scanners, X-Ray Computed[Text Word])) OR (Ventilators, Mechanical[Text Word])) OR (Ventilators, Mechanical[Title/Abstract])) OR ((((((((((((((((((((((medical device*[Title/Abstract]) OR (medical device*[Text Word])) OR (capital medical device[Title/Abstract])) OR (capital medical device[Text Word])) OR (reusable medical device[Text Word])) OR (reusable medical device[Title/Abstract])) OR (medical equipment*[Title/Abstract])) OR (medical equipment*[Text Word])) OR (medical supply[Text Word])) OR (medical supply[Title/Abstract])) OR (health equipment*[Title/Abstract])) OR (health equipment*[Text Word])) OR (medical technology[Text Word])) OR (medical technology[Title/Abstract])) OR (diagnostic device*[Title/Abstract])) OR (diagnostic device*[Text Word])) OR (diagnostic medical device*[Text Word])) OR (diagnostic medical device*[Title/Abstract])) OR (health supply[Title/Abstract])) OR (health supply[Text Word])) OR (medical supply[Text Word])) OR (medical supply[Title/Abstract]))) AND ((((((((((((((((((Procure*[Title/Abstract]) OR (Procure*[Text Word])) OR (Purchase*[Text Word])) OR (Purchase*[Title/Abstract])) OR (Acqui*[Title/Abstract])) OR (Acqui*[Text Word])) OR (Buy*[Text Word])) OR (Buy*[Title/Abstract])) OR (tender*[Title/Abstract])) OR (tender*[Text Word])) OR (contract*[Text Word])) OR (contract*[Title/Abstract])) OR (bid*[Title/Abstract])) OR (bid*[Text Word])) OR (suppl*[Text Word])) OR (suppl*[Title/Abstract])) OR (award*[Title/Abstract])) OR (award*[Text Word])) OR (((((((Purchasing, Hospital[Title/Abstract]) OR (Purchasing, Hospital[Text Word])) OR (Hospital Purchasings[Text Word])) OR (Hospital Purchasings[Title/Abstract])) OR (Purchasings, Hospital[Title/Abstract])) OR (Purchasings, Hospital[Text Word])) OR (Hospital Purchasing[Text Word])) OR (Hospital Purchasing[Title/Abstract]))))) AND (((((((((Value*[Title/Abstract]) OR (Value*[Text Word])) OR (Value-based[Text Word])) OR (Value-based[Title/Abstract])) OR (Value Assessment[Title/Abstract])) OR (Value Assessment[Text Word])) OR (Value Appraisal[Text Word])) OR (Value Appraisal[Title/Abstract])) OR ((((life economic values[Title/Abstract]) OR (life economic values[Text Word])) OR (value of life[Text Word])) OR (value of life[Title/Abstract]))))
Web of Science	TOPIC: (Value* OR Value-based OR "Value Assessment" OR "Value Appraisal") AND TOPIC: (Procure* OR Purchase*OR Acqui* OR contract* OR tender* OR bid* OR supply OR award*) AND TOPIC: (medical device OR medical equipment)
ProQuest	(noft(durable medical equipment) OR noft(equipment AND supplies, hospital) OR noft(capital equipment AND hospital) OR noft(radiation equipment AND supplies) OR noft(Tomography Scanners, X-Ray Computed) OR noft(medical device*) OR noft(medical equipment*) OR noft(diagnostic device*)) AND (noft(Purchasing, Hospital) OR noft(hospital purchasings) OR noft(purchasings, hospital) OR noft(hospital purchasing) OR noft(Procure*) OR noft(Purchase*) OR noft(tender*) OR noft(award*) OR noft(contract*) OR noft(bid*)) AND (noft(values of life) OR noft(life economic values) OR noft(Value*) OR noft(value-based) OR noft(value assessment) OR noft(value appraisal))
Science Direct	#1 Medical device OR medical equipment OR medical technology #2 Value OR Value-based OR value analysis OR value assessment OR value appraisal #3 procurement OR purchasing OR tender OR contract #1 AND #2 AND #3

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Table 2. Selection Criteria

Inclusion criteria	-	Studies on medical devices procurement
	-	Value assessment: value-based approach, HTA
	-	Available in full text
Exclusion criteria	-	Language: Non-English
	-	Resource type: book review, letter, book chapters, editorial, viewpoints, comments

dressed the issue of value in procurement were selected. The publications whose full-text was not available and were not in English were excluded.

and key issues were identified. The following data were extracted from the selected articles: Author(s) year of publication, origin/country, aims/purpose, type of publication, and key findings. Finally, the definition and attributes of VBP were coded.

Results

As shown in Figure 1, in total, 2635 articles were retrieved. After exclusion of duplicates (N = 419), the title and abstract screening resulted in 103 articles for full-text screening. According to the criteria in Table 2, after reviewing the full-texts, 22 articles were kept for data charting. By reference checking, 2 more documents were added.

The frequency of documents varied during the study period, but in recent years the number of articles and documents in this field has increased and this shows the increasing attention to this approach. Countries that have put VBP on the agenda or implemented it are mostly in Western Europe and North America.

Definition of VBP in Medical Devices

Most researchers have considered the procurement of medical equipment equal to the purchasing of medical equipment, while purchasing is part of the procurement

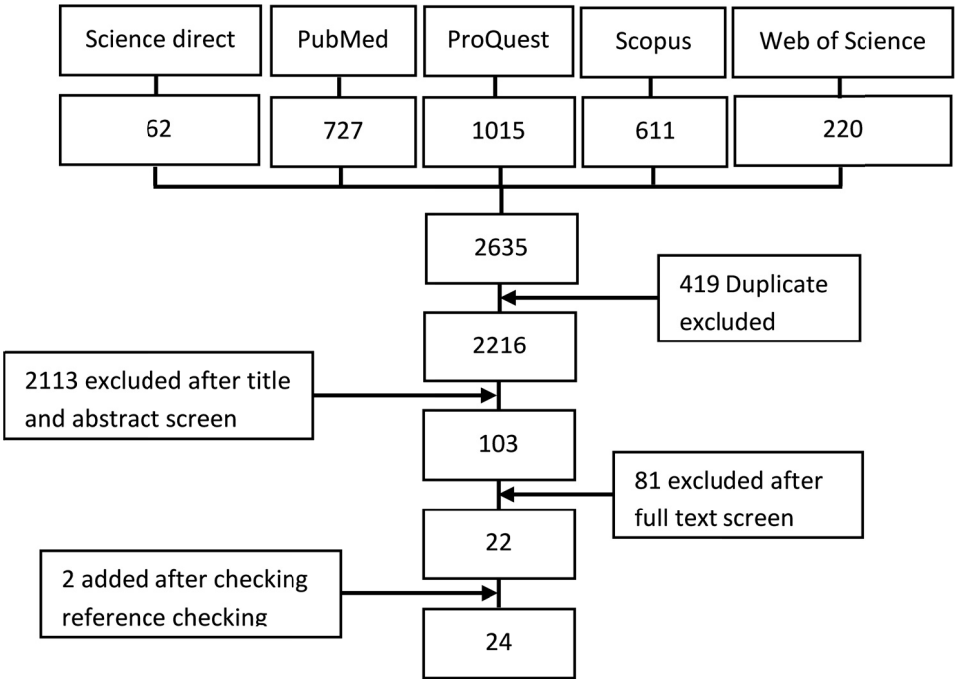

Fig. 1. Stepwise process for selection of papers

Table 3. Summary of Selected Publications

Author(s)	Year of Publication	Origin/ Country	Aims/Purpose	Type of Publication	Key Findings
James C. Robinson (10)	2008	USA	Applies the core principles of value-based purchasing To the medical device market		Core principles of value-based purchasing are integrated data on price and performance; alignment of financial incentives; and organizational capability to evaluate alternatives.
Christopher D. Provines (20)	2010	USA	To explore organizational barriers of value-based pricing.	Review	A better understanding of value will help lead to better investment decisions for the company and a better spending of our scarce health-care dollars as a society.

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Table 3. Continued

Author(s)	Year of Publication	Origin/ Country	Aims/Purpose	Type of Publication	Key Findings
Corinna Sorenson, Panos Kanavosa (6)	2011	EU	To discuss the procurement of select medical devices across five countries	Review	A general theme across all national procurement systems was a focus on cost-containment
William T. Obremskey, Teresa Dail, A. Alex Jahangir (16)	2012	USA	We describe the challenges, implementation, and outcomes of cost reduction and product stabilization of a value-based process for purchasing medical devices	Case study	The implementation of a facility-based technology assessment committee that critically evaluates new technology can decrease hospital costs on implants and standardize some product lines
Chris Henshall Tara Schuller (18)	2013	UK	Describes some of the key themes from The Health Technology Assessment International Policy Forum	Round tables summaries	Most decision-making systems seek to take account of similar elements of value, although they are assessed and combined in different ways
Gerecke G, Clawson J, Verboven Y (2)	2015	EU	To address healthcare challenges and present new framework based on new EU directive	Report	
Corinna Sorenson, Michael Drummond, Lawton R. Burns (21)	2015	-	Examines medical device reimbursement and pricing policies in the United States and Europe, with a particular focus on value	Review	Compared to the United States, Europe more formally and consistently considers value to determine which technologies to cover and at what price, especially for complex, costly devices
Nicolas Martelli, Paul Hansen, Hélène van den Brink, Aurélie Boudard, Anne-Laure Cordonnier, Capucine Devaux, Judith Pineau, Patrice Prognon, Isabelle Borget (22)	2015	France	To develop a funding decision-support tool combining MCDA and mini-HTA,	Survey	The tool could help to promote a more structured and transparent approach to HTA decision-making
Gabriela Prada (15)	2016	Canada	This article presents an overview of value within healthcare systems and how healthcare value-based procurement is being implemented across various jurisdictions in Canada.	Round tables summaries	Strategic, value-based procurement can be a powerful tool to reinvent the future of healthcare.
Caroline Mosessian (23)	2016	USA	Examines the extent to which Value Based Purchasing is being used to purchase implanted orthopedic medical devices	Survey	Decisions are commonly, made by committees and process is still mostly based on information derived from the clinical experience of clinicians and local knowledge of procurement officers, with less influence from more formalized health technology assessments

process. In the initial definitions of VBP, the use of a more complex process and cost awareness at all stages have been stressed (10, 20). Knowing that value is a sum of social and economic effects as well as benefits for the health system in decision making, VBP is a change from the traditional short-term cost savings approach to a more comprehensive approach in which health system performance and patient outcomes as well as the long-term efficiency and effectiveness of decisions are core elements (15). In redefining quality and value with the strategic and VBP approach, the Institute du Québec has identified the patient-centeredness as the key to creating quality in procurement and shifting approach (26). In another definition by the Boston Consulting Group VBP is considered as an approach that takes into account all costs and outcomes in the procurement process (2).

In Italy, researchers have considered the application of economic evaluation methods in the process of procuring medical equipment as VBP. By creating a new indicator (tender score) and combining it with economic evaluation, these researchers have tried to operationalize the concept of VBP (5, 9, 12). In another operational definition, VBP is the development of a physician-centered approach and involving physicians' preferences in the provision decisions of medical equipment for patient care (16).

VBP is a decision-making methodology that improves the quality and outcomes of purchasing decisions while maintaining cost control (11, 23) and it is possible through setting clinical requirements, cost reduction expectations, and innovation opportunities (4, 14). With these

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Table 3. Continued

Author(s)	Year of Publication	Origin/ Country	Aims/Purpose	Type of Publication	Key Findings
Andrea Messori, Sabrina Trippoli, Claudio Marinai (5)	2017	UK	To investigate the cost-utility profile of prostheses for hip replacement and to calculate a value-based score to be used in the process of procurement and tendering for these devices.	HTA	The incorporation of value-based criteria in the procurement process can contribute to optimizing the value for money for THA devices
Andrea Messori, Sabrina Trippoli (12)	2017	-	This study explored how pharmaco-economic models can inform the procurement of TKA devices to improve their value for money.	HTA	Results showed that incorporating the principles of cost-effectiveness into the tendering process is feasible for devices.
Joanne Meehan, Laura Menzies, Roula Michaelides (13)	2017	UK	To adopt the resource-based view (RBV) as a lens to explore the extent to which NHS resources support the strategic adoption of value-based approaches	Empirical case study	In public procurement environments, the significant legitimizing impact of the policy environment can effectively block the progression to more sustainable procurement approaches, and requires consideration if procurement is to contribute strategically.
Heidi Krantz, BSN,a Barbara Strain, Jane Torzewski (24)	2017	USA	To assess value analysis process in procurement of Medical device innovation	Case study	Consideration of the degree to which the product or a potentially new innovative idea improves patient care and patient satisfaction is also part of the decision-making process, but other financial concerns and a value-based analysis do and will play an important part in this decision.
Sabrina Trippoli, Erminia Caccese, Claudio Marinai, Andrea Messori (9)	2018	Italy	To explored using pharmacoeconomic models in the in-hospital procurement of thrombectomy devices.	HTA	Bridging the methodology of cost-effectiveness with the every-day practice of in-hospital procurement can contribute to maximizing the health returns that are generated by in-hospital expenditures for medical devices.
Kull S, Atanasov P, Jonas N (14)	2018	EU	To assess the impact of evidence-focused policy changes on the availability of clinical evidence for medical devices and their use in purchasing.	Structured review of clinical trials	Across all EU countries, the median use of MEAT vs. lowest price tender award criteria increased from 49% before to 69% after 2014.
Bruce Campbell Mark Campbell Lee Dobson Joanne Higgins Bernice Dillon Mirella Marlow (25)	2018	UK	To have a detailed scrutiny of claims made for the benefits of products and the corresponding evidence	Documents review	It illustrates the importance of relevant evidence and of having a clear vision of the place of new products in care pathways from an early stage
Federico Pennestrì, Giuseppe Lippi, Giuseppe Banfi (11)	2019	Italy	To introduce VBP from a theoretical and an empirical level, referring to relevant practices and challenges which emerged in the current institutional, clinical and academic debate	Review	When different dimensions of value are supported by well-designed study to identify the respective outcomes, it becomes easier to find better solutions in support of healthcare quality and sustainability
Fiona A. Miller, Pascale Lehoux, Stuart Peacock, Valeria E. Rac, Jeff Neukomm, Carolyn Barg, Jessica P. Bytautas and Murray Krahn (4)	2019	Canada	To have detailed analysis of how procurement approaches the decision task	Document review	While aiming to go beyond price in the acquisition of most medical technologies, it adopts a narrow approach to assessing quality and costs, but also attends to factors little considered by HTA

definitions, Krantz seems to have provided the most comprehensive definition: "making deliberate choices on what products and services are needed to provide best-in-class care at an affordable cost through a framework that guide the review and decision-making processes by analyzing the cost and clinical outcomes expected from the use of that product or equipment in the care of patients." (24) The results of analysis of selected articles in understanding the definition of VBP in medical devices are shown in Table 3.

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VBP Characteristics

Changing the paradigm of medical equipment procurement in health systems must be accompanied by a clear and definite framework (4, 22). Using the best practices and models and combining them in a way that is methodologically easy and reliable can be very useful in this development (9, 22). The comprehensiveness of evaluation criteria in the procurement process and their classification with a view to creating value can reflect the concerns of health system policymakers and decision makers. In the EU, the 2014 Directive has been positive in the use of VBP and the shift towards patient outcomes and value-added supplements, although this effect has not yet been widespread (14).

The new approach to medical equipment procurement should be user-friendly, simple, and reliable. In selected studies, researchers have each pointed to the characteristics and principles of VBP. Although these features have a wide range in appearance, in practice they have a lot of overlap (Table 4).

The dimensions and characteristics identified for VBP in medical devices (Table 5) are described below and their importance is also noted.

Information

Information is the heart of VBP and the cornerstone of decision-making in most studies. Information means analyzing data on working devices, new technology, costs for similar devices, total cost of acquisition, the incentives of the key actors, and organizational capability (2, 10, 16, 23-25). Medical devices information shortages are not only seen in performance information but also in costs associated with it (10). In fact, the scientific evidence for medical devices is limited due to number of reasons, including low regulatory requirements and limited financial resources, to produce evidence (25). We need standard and transparent information in all areas (16) and this information must be strong and comparative to make resilient and effective decisions (23).

Table 4. The Definition of VBP

Author	Year	Definition
Robinson	2008	The conceptual ideal of value-based purchasing is the informed, cost-conscious, and sophisticated consumer spending his or her own money and choosing among simple services in a technologically stable environment (10)
Obremskey	2012	- Value-based purchasing attempts to assess the added value for physician preference items by linking payment more directly to the quality and efficiency of a new technology regarding patient care - A physician-driven process for technology utilization in patient care (16)
Gerecke, G	2015	In contrast to price based procurement, VBP is an advanced approach that factors total costs and outcomes into the process (2)
Gabriela Prada	2016	"Shifting procurement's traditional focus on short-term cost savings to a more holistic objective that includes health system performance and patient outcomes, giving preference to longer-term cost efficiencies, and working with suppliers to identify opportunities to develop more innovative products and services" (15)
Mosessian	2016	Value Based Purchasing is a methodology for decision-making that is expected to improve the quality and outcomes of purchasing decisions while maintaining cost control.(23)
Jean-Guy	2017	Strategic value-based procurement could actually reinvent the future of health care. This patient-centered approach to system integration stresses the quality of procurement, rather than minimization of costs and quantities (27)
Messori & Trippoli	2017	Application of economic evaluation in term of cost-effectiveness in competitive tenders
Krantz	2017	Making deliberate choices on what products and services are needed to provide best-in-class care at an affordable cost through a framework that guide the review and decision making processes by analyzing the cost and clinical outcomes expected from the use of that product or equipment in the care of patients (24)
Kull	2018	Set Evidence requirements for medical devices and ensure appropriate incentives awarding innovation and the consideration of patient outcomes (14)
Fiona A. Miller	2019	Decision making process navigates clinical requirements, cost reduction expectations and innovation opportunities and that this is not an approach dominated by price (4)
Federico Pennestrì	2019	The process in which providers purchase medical technologies and devices in order to provide good quality healthcare at competitive or sustainable prices (11)

Table 5. VBP Characteristics

Attribute	Robinson (2008)	Obremskey (2012)	BCG (2015)	Prada (2016)	Mossesian (2016)	Martelli (2016)	Krantz (2017)	Campbell (2018)	Dohmen (2019)	Pennestri (2019)
Information	*	*	*		*	*	*	*	*	
Actors collaboration	*	*		*			*		*	*
Patient experience		*				*	*		*	*
Value analysis team and Ability to evaluate alternatives	*	*	*	*		*			*	
Value proposition and competitive dialogue			*	*				*		
Weighing evaluation criteria		*	*	*			*			

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Patient Experience

The patient is at the core of the evolution of value-based health care (3). According to the definition of VBP, patient participation is an underlying component in improving health care delivery. Patient involvement leads to more credible decisions, better outcomes, and more effective resource allocation (11). There is a major notion towards growing use of patient-related outcome measures and patient-related experience measures in clinical studies of medical devices (28).

Stakeholders Collaboration and Transparent Expectations

The diversity of stakeholders in the procurement process (providers, suppliers, communities, clinicians, and academics) and their needs and wants complicate the concept of value (13, 18), and this is compounded by instability of these needs. VBP needs continuous collaboration among stakeholders (11). The lack of alignment and transparency of expectations of different stakeholders disrupts value creation and increases resource wastage. The most important stakeholders in the procurement of medical devices are physicians, as their preferences play an important role in their selection (22).

Value Analysis Team and the Capacity to Evaluate Options

To understand the concept of value beyond cost savings, in addition to collaboration and aligning stakeholder expectations, it is necessary to form teams of managers, decision-makers, and clinicians in health care organizations. The main goal of this team is to prioritize needs, collect and standardize information, and prepare request for proposals (RFP) (15). In order to determine the costs and quality of new products, the health system and, in particular, the hospitals must be able to assess and respond to technological change. New technologies should be assessed by a technological review committee to decide if the existing analysis reveals that progress is better than current practices (10, 16, 25). Also, the health technology assessment (HTA) may be a way to boost the management of medical devices and these teams can run Mini HTAs (4, 9).

Choosing the Right Criteria and Weighting Them

While new innovations that increase patient quality and/or minimize health care costs can enhance value in our health care system, many emerging technologies remain questionable. Although the lowest price approach may be the most transparent method, the quality criteria are considered only to the extent specified by the procurer. In the new procurement paradigm, it should be possible to evaluate all price and quality criteria, including technical and functional characteristics, and the total cost of the acquisition, which requires the technical competence of the procurer (28). While costs can be measured simply by a variety of methods, defining, identifying, measuring, and analyzing heterogeneous outcome indicators have always been challenging (11). Applying clear and unambiguous metrics of quality, efficiency, and cost that are easy to interpret and operate is crucial in creating a value-based approach. Dimensions that have not yet been considered or under considered (For example, quality-based factors, such as technical merit, accessibility, environmental characteristics, and innovative characteristics) need to be identified, weighed, and used in medical procurement decisions to create a successful bid (15).

Value Proposition and Competitive Dialogue

A procurement process, which includes a discussion of needs between the parties and a structured value proposition by suppliers, can form success in VBP. A competitive dialogue is a technical term to have a discussion before articulating needs in RFP (25). This action helps to identify and define value expectations and subsequently to have the most appropriate value proposition. Appropriate value proposition consists well-conceived and clearly different relevant claims (25).

Discussion

Simultaneously improving health outcomes and controlling or reducing costs, or in other words improving the value of health care, has always been a challenge for health systems. Procurement of medical equipment plays a key role in the quality of health services (29) and can be a starting point for a value-based health system. The findings indicated that VBP is a process that is end user-driven based on actual requirements provides higher quality services and organizational performance, addresses issues in cooperation with vendors, and refinements of user-centric services. Any approach that leads to better results at a lower cost will be value based. These approaches should extend the benefits for patients (lower costs and better outcomes), providers (better care efficiencies), payers (stronger cost controls and reduced risks), suppliers (alignment of prices with patient outcomes), and the society (reduced health care spending and better overall health) (11, 30).

Recognizing the real need is the starting point of the VBP process. Basically, efficiency and effectiveness is the primary goal of any system; and purchasing medical equipment that is not required challenges the effectiveness of the system. Different criteria usually have to be considered when deciding to buy medical equipment in hospitals (22, 31). The greater weight of the price criterion in these decisions is derived from the cost control thinking in the short perspective and cannot guarantee value creation (25). The criteria used in these decisions must be carefully selected (16) and their effect on the final decision must be transparent and ultimately lead to the purchase of the highest quality equipment at a reasonable price (6). Strong and relevant information is the basis of decisions to buy medical devices (32). In addition to clinical data, the information includes details of the various costs (8, 33).

An important feature of VBP is a different view of costs rather than prices. Focusing on short-term costs and prices can seriously challenge the creation of value for patients. The difference between the price factor and the cost is that

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the price is a single number, while the cost includes various factors that are relevant to medical devices. These factors include relocation costs, staff training costs, overhead and depreciation costs, software upgrade costs, and contract ancillary costs that must be considered (2, 6). VBP of the medical devices considers the cost in the form of the total cost of the ownership of the device and its subsequent costs in the decision-making (26).

Another important aspect of VBP is to consider patients' experiences in decision-making. The patient's understanding of their level of health can complement clinical information; and in some cases, it can even be an alternative (28). Recently, clinical evaluation studies of medical devices have voluntarily considered patients' experiences as an important factor, and this has an increasing trend (28, 34). Patients' experiences have the potential to improve the quality of health care as well as costs. However, its implementation requires scientific frameworks and resources to produce reliable data (34).

Involvement of different people in decision-making is another important point that should be considered. One of the major challenges in the procurement of medical devices is the conflict of interests (10) and organizational barriers (20, 24). Historically, physicians have played a major role in purchasing medical devices based on clinical data they have, but in VBP, the emphasis is on decisions by teams and committees (16). These committees bring together different perspectives and capabilities and provide a solution to the aforementioned challenges.

Study Limitations

The aim of this study was to understand the VBP dialogue in medical devices. Scattering of procurement issues by various health systems made it difficult to retrieve articles, and despite selecting appropriate keywords and checking references, articles that did not explicitly use these keywords may not be retrieved.

Conclusion

VBP is a framework that guides the review and decision-making to procure a device. The novelty of this approach is the multi-criteria approach to make procurement decisions. In this approach, all dimensions of the value equation (outcome/related costs) must be considered. As mentioned, the cost is seen as the total cost of ownership, and along with other outcome factors, each will have its own weight in the decision. To have VBP, health systems need to work on standardizing information, paying more attention to patients' experiences, identifying stakeholders and their expectations, building data analysis capacity, developing decision criteria, and improving tenders and contracts through value propositions.

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Conflict of Interests

The authors declare that they have no competing interests.

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